

What a Feeling!
A Multistage, Multimethod
Investigation of Emotions and their
Antecedents in an Irish Language
MOOC

Elaine Beirne, BA

Thesis Submitted for the Award of PhD

Fiontar agus Scoil na Gaeilge
Dublin City University

Supervisors:

Dr. Mairéad Nic Giolla Mhichíl

Dr. Gearóid Ó Cleircín

July 2020

Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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ID No.: 11436128

Date:

*Since feeling is first
who pays any attention
to the syntax of things*

E.E. Cummings

Acknowledgements

Over the past four years, I have been extremely fortunate to have two exceptional supervisors. My first thank you, therefore, goes to them. Prof. Mairéad Nic Giolla Mhichíl and Dr. Gearóid Ó Cleircín, without your unwavering patience, advice, support and encouragement as I confronted each roadblock, this thesis would never have been realised. Your belief in me has helped me to grow both personally and professionally and for that, I will be forever grateful, buíochas ó chroí.

I would like to thank the Department of Culture, Heritage and the Gaeltacht who gave me the financial support to pursue this project over the past four years.

I would also like to express my sincerest thanks to all the participants who took part in this study. Without your willingness to share the intimate details of your learning experience with a complete stranger this study would not exist.

My colleagues at Dublin City University and fellow postgraduate students have been a source of inspiration and support during this journey. I would especially like to thank Ellen, Conchúr and Oisín, who have been sounding boards, advisors, and cherished friends to me throughout this journey.

Closer to home, I would like to thank my friends, especially Megan and Shannon, who have been my constant cheerleaders throughout this journey. Your friendship has kept me going – Thank you.

A special thank you goes to Adam, for being there through everything. I look forward to all the adventures that have been put off until '*after the PhD*'.

My final word of thanks goes to my family for their continued support and love, not just during the PhD but my entire life. To my parents, Ruth and John, words cannot express how much I love and admire you. I owe everything to you both.

Buíochas ó chroí libh go léir

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List of Abbreviations

AEQ	Achievement Emotion Questionnaire
ANS	Automatic Nervous System
BQ	Background Questionnaire
CALL	Computer Assisted Language Learning
CBLE	Computer-Based Learning Environment
CEFR	Common European Framework of Reference
CFI	Comparative Fit Index
CNS	Central Nervous System
CVT	Control Value Theory of Achievement Emotions
DCU	Dublin City University
DLE	Distance Learning Environment
EES	Epistemic Emotion Scale
EFL	English as a Foreign Language
ESM	Experience Sampling Method
FL	Foreign Language
FLA	Foreign Language Anxiety
FLCAS	Foreign Language Classroom Anxiety Scale
FLE	Foreign Language Enjoyment
GLL	Good Language Learner

ICC	Intraclass Correlation
ID	Individual Differences
ITS	Intelligent Tutoring System
L2	Second Language
LCDH	Linguistic Coding Differences Hypotheses
LMOOC	Language Learning Massive Open Online Course
MEQ	Momentary Emotion Questionnaire
MOOC	Massive Open Online Course
OLS	Ordinary Least Squares
RMSEA	Root Mean Square Error of Approximation
SDL	Sustained Deep Learning
SLA	Second Language Acquisition
SRMR	Standard Root Mean Squared Residual
STEM	Science, Technology, Engineering and Mathematics
TBLE	Technology-Based Learning Environment
TL	Target Language

Abstract

What a Feeling! A Multistage, Multimethod Investigation of Emotions and their Antecedents in an Irish Language MOOC

Elaine Beirne

It has become widely accepted that emotions play a key role in the learning process. Therefore, understanding learners' emotions in computer-assisted language learning (CALL) has become an important area of inquiry as the demand for these resources continues to increase. To date, however, research has focused almost exclusively on one emotion, anxiety. Consideration of a much broader range of both positive and negative emotion would provide a more holistic insight in to the online language learning experience, and thus warrants further investigation. This research, presents an investigation in to the emotional experiences of learners participating in an Irish language, massive open online course (MOOC). Language learning MOOCs (LMOOCs) such as this one constitute an emerging and relatively unexplored CALL environment that has much to gain from emotion research.

Using Pekrun's (2006) Control-Value Theory of Achievement Emotions as the guiding theoretical framework, this study seeks to answer the over-arching research question: What are the sources of learners' emotions experienced during an LMOOC? The research design adopted to address this question was iterative in nature with findings from prior stages contributing to the methodological instruments and procedure used in the main study. An experience sampling method was adopted to collect self-report data pertaining to learners' emotions and their cognitive appraisals during the main study. This approach facilitated in-the-moment emotion reports from participants following various task-types and tested the Control-Value Theory at an intra-individual level. This data was further enhanced by weekly emotion diaries, which delved deeper into the learners' perspective.

This multiple methods study finds that learners experience a range of both positive and negative emotions while learning the Irish language online. A multilevel analysis of the quantitative data confirms that the cognitive appraisals of perceived control and subjective value both directly and interactively predict learners' emotions at an intra-individual level during the MOOC. Furthermore, there are significant relationships that exist between task types and learner emotions, a finding that is of particular relevance to learning design and pedagogical strategies. A thematic analysis of the qualitative data supports these quantitative findings but also highlights other appraisals that appear to be relevant to the elicitation of emotions during the LMOOC. Taken together, the findings of this study suggest that learning a language online is not just a cognitive process but also an emotional one and educators, learning designers and even the learners themselves need to consider this when engaging in such courses.

Publications

Beirne E., Nic Giolla Mhichíl M. and Mac Lochlainn C. (2019) 'Curiouser and Curiouser: The Wonderland of Emotion in LMOOCs', in Calise M., Delgado Kloos C., Reich J., Ruiperez-Valiente J. and Wirsing M. (eds.) Digital Education: At the MOOC Crossroads Where the Interests of Academia and Business Converge. EMOOCs 2019. Lecture Notes in Computer Science, vol. 11475. Switzerland: Springer International Publishing

Bernie, E., Mac Lochlainn, C. and Nic Giolla Mhichil, M. 'Moody MOOCS: An Exploration of Emotion in an LMOOC', *European Journal of Open and Distance E-Learning*, forthcoming.

Glossary

Affect

The term 'affect' is defined as "aspects of emotion, feeling, mood or attitude which condition behaviour" (Arnold and Brown 1999, p.1). It is an umbrella term that encompasses a wide range of variables.

Computer Assisted Language Learning

Computer assisted language learning (CALL) can be defined as "the search for and study of applications of the computer in language teaching and learning" (Levy 1997, p.1) or "using computers to support language learning and teaching in some way" (Egbert 2005, p. 3). In light of technology advancements, the word *computer* in the acronym can be understood to represent the wide range of devices and technologies that can be applied to language education (Hubbard 2009). Correspondingly, the field uses many acronyms each indicating a different focus:

CAI	Computer Assisted Instruction
ICALL	Intelligent Computer Assisted Language Learning
CELL	Computer-Enhanced Language Learning
TELL	Technology Enhanced Language Learning
WELL	Web Enhanced Language Learning

In this thesis, CALL will be used as a general term to cover all of the above.

Digital Learning Environment (DLE)

In this thesis, the term, digital learning environment, refers to learning environments in which technology-mediated methods are applied to facilitate learning and instruction. It encompasses, but is not limited to, online learning/content-management platforms, virtual or augmented realities, hypermedia systems and intelligent tutoring systems. Similar terms in the literature include computer-based learning environment, technology-based or technology-enhanced learning environment.

Distance Learning

For the purposes of this thesis and in accordance with Keegan (1980) distance learning is defined as providing education to students who are geographically separated from their classmates and instructor and in which the pedagogical material is planned and prepared by an educational institution.

While online learning is a form of distance learning, the two terms are not synonymous. Distance learning includes a wide spectrum of media-types (books, CD-ROMs, etc.) that provide content and instruction to learners at a distance, not only via the internet (Kaplan and Haenlein 2016).

Emotion

This thesis conceptualises emotion in accordance with the definition proposed by Reeve (2005, p.294), who states “emotions are short-lived, feeling-arousal-purposive-expressive phenomena that help us adapt to the opportunities and challenges we face during important life events”. Emotions are differentiated from other related concepts such as moods, feelings and attitudes. For a more detailed discussion of the conceptualisation of emotion in this thesis, see in Section 1.4.

L1

An abbreviation used when referring to the first language that an individual learns (usually as a child). Other terms include mother tongue, primary language or native language.

L2

An abbreviation for the second language.

LMOOC

Language MOOCs (or LMOOCs) are dedicated web-based online courses for second languages with unrestricted access and potentially unlimited participation (Bárcena and Martín-Monje 2014, p.1)

Massive Open Online Course (MOOC)

MOOCs are best defined using the four components of the acronym:

Massive: Enrolment is unlimited, with courses generally attracting thousands and sometimes hundreds of thousands of learners

Open: MOOCs generally carry no fees, no prerequisites other than Internet access and interest, no predefined expectations for participation, and no formal accreditation.

Online: All materials and activities are delivered over the internet; there are no face-to-face elements of the course

Course: MOOCs share the conventions of an ordinary course with a predefined timeline, learning goals and weekly topics for discussion

(McAuley *et al.* 2010; Blackmon and Major 2016)

It is important to note, however, that as MOOCs continue to evolve and variations emerge, definite characteristics are difficult to determine. As Baggaley (2013, p. 368) points out there is “no such single entity of a MOOC”. For instance, with respect to the idea of ‘massive’, some courses with approximately 50 students have been dubbed by their creators as MOOCs (Blackmon and Major 2016). This categorisation is often due to the potential for larger enrolments (*ibid*). Variations also emerge with respect to the concept of ‘open’. In many cases, the term refers solely to entry requirements and the corresponding lack of fees and enrolment prerequisites, while in others, the concept is extended to incorporate access to course materials; in these cases, course materials are made available to reuse and adapt freely (*ibid*). On platforms such as FutureLearn and EdX, however, course material is usually copyrighted and access to the course is closed after completion.

For the purposes of this thesis, the term MOOC will be used to refer to fully online courses that are designed for large numbers of participants, offering free access to activities and content. There are wide range of platforms that host MOOCs: some are international, spanning countries and continents (e.g. EdX, FutureLearn, Coursera, etc.), some are domestic (e.g. France Université Numérique (FUN)), while others belong to a single

university (e.g. XuetangX). Each platform has an underlying philosophy that greatly influences the design of its MOOCs.

Online Learning

Online learning can be broadly defined as any form of learning conducted partly or wholly over the Internet (Bates 2019). Bates (2019, p. 312) describes a continuum of learning and teaching that ranges from face-to-face to fully online, with different forms of blended learning in between (flipped, hybrid etc.). With reference to this continuum, in this thesis the term online learning will refer to learning that takes place fully online, learners do not attend face-to-face classes but study entirely online. There is a physical separation between instructors and learners, which is one form of distance education (Keegan 1980).

Second Language Acquisition

Refers to the process of learning another language after the first language or mother tongue has been learned (Gass 2013). In this context, 'second' can refer to any language that is learned subsequent to the first language (Ellis 1994). Thus, it can refer to the learning of a third or fourth language.

Second or Foreign Language Acquisition

Researchers sometimes draw a distinction between *second* and *foreign* language acquisition. The former takes place in settings where the language plays an institutional and social role in the community (e.g. English learned in Ireland or the United Kingdom), while the latter takes place in settings where the language plays no major role in the community (e.g. English learned in France) and primarily involves classroom-based learning (Ellis 1994). This distinction is not of significance to this study, however, thus the terms second language acquisition (SLA) and foreign language acquisition (FLA) are used synonymously in this thesis.

Second Language Acquisition or Learning

While some researchers differentiate between 'acquisition' and 'learning' (for example Krashen 1981), this thesis will use the terms interchangeably.

Sustained Deep Learning

This learning is “characterized as sustained because an extended period of time (often several years) is required to achieve it; it is characterized as deep because, when it is complete, the learner is seen as proficient or expert” (Schumann 1997, p.32). It is differentiated from learning to walk or talk as such forms of learning are generally inevitable; SDL refers to the acquisition of knowledge and skills in which a great deal of variation is evidenced among individuals (ibid).

Target Language (TL)

Refers to the language being learned.

1 Introduction

1.1 Overview

This study examines the emotional experiences of adult online language learners engaging in an Irish Language Massive Open Online Course (MOOC) on the FutureLearn platform. The primary aim of this research is to identify the sources of emotion for learners during this language learning MOOC (LMOOC). Improving understanding regarding the sources of learners' emotions is essential for informing future language learning interventions, which can potentially assist course designers, facilitators and platform providers in enhancing the learning experience and improving the outcomes of such courses.

Underpinned by the Control-Value Theory of Achievement Emotions (Pekrun 2006), a multistage, multimethod research design is adopted to investigate learners' emotions and their corresponding appraisal antecedents during the course. The study also examines whether there are specific task types in the course that influence learners' emotions. The research design accounts for the dynamic nature of emotional experiences (Scherer 2000). Additionally, it places a strong emphasis on the 'learner voice', which has been largely absent from MOOC research (Veletsianos and Shepherdson 2016). This study finds that emotions are prevalent in the Irish language MOOC, with learners reporting both positive and negative emotions to varying degrees during the course. The findings provide empirical support for the assumptions of the Control-Value Theory of Achievement Emotions (CVT) with respect to the antecedent effects of control and value appraisals (Pekrun 2006). Additional antecedent appraisals that are both course-related and non-course-related, are also identified as sources of emotion during the LMOOC. Beyond appraisals, the study finds that certain task types in the LMOOC are related to emotions. This finding in particular has important implications for instructional design strategies.

Finally, this study is conducted in a novel learning context. This study also contributes to theory, methodology and knowledge of practice in the field. These contributions are summarised in Table 1.1. It is important to note, however, that while this research is conducted in a second language-learning context, it is not an investigation of the language acquisition process. The focus of this study is on emotions and their antecedents, while taking into consideration the contextual influences of an Irish language MOOC.

Table 1.1 Overview of study contributions to field

	Supported	Developed	New
Theory	Supports appraisal theories of emotion	Control-Value Theory of Achievement Emotions (Pekrun 2006) – investigates the main and interactive effects of control and value appraisals on achievement and epistemic emotions	Identifies the moderating impact of four task types in evaluating differential patterns of appraisal/emotion relations
Empirical	Supports empirical studies on the presence and sources of emotion in learning	Empirical evidence for control and value appraisals as emotion antecedents	Identifies other appraisal antecedents
Method	Supports the use of self-report approaches for emotion detection	Intra-individual approaches to emotion measurement	Combination of quantitative and qualitative measures.
Context	Supports previous studies which have examined emotions in online learning contexts	Research on emotion in MOOCs	Investigation of emotion during an Irish language MOOC
Knowledge of Practice	Supports existing research exploring the effective design of MOOCs	Develops upon learner-centred approaches to MOOC design by considering psychological aspects of learning	Improved understanding of emotion antecedents which can inform learning design decisions

(Adapted from Hogan 2017)

1.2 Contextual Background

This section functions as a partial rationale, providing some background information on the key concepts in the thesis. The current and predicted supply and demand for MOOCs is discussed followed by a review of the global trends regarding second language learning. The conceptual history of emotion and cognition is then charted briefly in order to provide a backdrop to the underdevelopment of emotion research in both mainstream and educational psychology for many years. This is followed by a discussion of more current neurobiological research that supports the link between emotion and cognition, emphasising the importance of considering emotion in educational research.

1.2.1 Massive Open Online Courses

There is a growing interest in MOOCs. By the end of 2018, the total number of people who had enrolled in a MOOC had grown to over 101 million (Shah 2018). The numbers of courses are also growing steadily with over 11,000 courses currently available from over 900 universities worldwide on over 35 different platforms (ibid). The most recent trends regarding the rise of micro-credentialing and MOOC-based degrees show that MOOCs are becoming more ingrained in the university model (ibid).

MOOCs are only becoming more important to Higher Education. According to a recent OECD report, 44% of 18-35 year olds held a third-level degree in 2018 compared to 35% in 2008 (OECD 2019). These figures indicate that the demand for higher education is increasing. The CEO of FutureLearn, Simon Nelson, echoed this conclusion in a keynote address at the 2019 EMOOCs Conference referencing an Ernst and Young Parthenon report which has predicted that there will be nearly 14 million new students per year enrolling in tertiary education worldwide until 2030 (Nelson 2019). In order to meet that demand, there would need to be 700 new universities built every year, each serving 20,000 students, the equivalent of 13 new universities per week. This observation highlights a significant gap in supply that will not be filled by campus-based education alone. In addition, it is predicted that many of these students will not be the traditional tertiary education seekers. Existing and emerging skills gaps, and the displacement risks associated with artificial intelligence and automation will give rise to a new type of learner with different motivations and priorities (Nelson 2019). The Governor of the Bank of England, Mark Carney, has even predicted the need for “a quaternary system of

education, founded on the same principle of universality as primary, secondary and tertiary education” to serve this new demand for education (Express 2018). It seems likely that more flexible online learning options, such as MOOCs, are at least part of the answer.

1.2.2 Language Learning Demand

Online language learning platforms such as Duolingo, Babbel, LingQ and FluentU are immensely popular. Duolingo, for instance, has over 300 million active users¹. Since 2014, the number of language learning MOOCs (LMOOCs) available across the MOOC platforms has also increased (Beirne, NicGiolla Mhichíl and Ó Cleircín 2017). In 2015, the global digital language learning market hit nearly \$6 billion (Ambient Insights 2016). However, the digital English language learning market comprised over 60% of that figure (\$3.8 billion). The same report announced that the overall global language learning market (digital and non-digital) had hit \$54.1 billion in 2015 but predicted that this would gradually shrink due to “the adoption of cost-effective technology-based products and the migration away from classroom and print product” (Ambient Insights 2016). These figures point to a growing demand for digital language learning options.

Further trends relating to language learning attitudes, motivations, and the changing global economy, forecast continued demand for language learning courses more generally. In 2016, 65% of the adult working-age population of the European Union (EU; 18-65 years) reported to know at least one foreign language (EuroStat 2016). Almost nine out of ten EU citizens believe that the ability to speak foreign languages is very useful and 98% say that mastering languages will be good for the future of their children (European Commission 2012).

Career-driven motivations are leading people to learn additional languages (IALC 2016). In fact, over half of Europeans (53%) use at least one second language at work and forty-five per cent said they think they landed a better job in their own country due to their foreign language skills, according to a Eurobarometer study (European Commission 2012). Globalisation in the workforce and growing international trade increasingly necessitates the acquisition of language skills among employees in order to conduct business effectively. A knowledge of additional languages also supports better relations

¹ Correct as of 05/10/2019 <https://ai.duolingo.com/>

between countries based on mutual respect and understanding. Furthermore, while English is a common language of communication across the world and often the first foreign language of choice for most non-Anglophone countries (Enever, Moon and Raman 2009), economic reports indicate that the global economy is moving away from an English-speaking world. For instance, the Chinese, Latin American (Spanish- and Portuguese-speaking) and South Asian (Hindi- and Urdu-speaking) economies have grown substantially over the past decade (Graddol 2006; Wiley, Moore and Fee 2012). These trends could potentially diversify demand in the language-learning sector.

1.2.3 Emotion and Learning: Friends or Foes?

Learning is an emotionally taxing experience. Despite this, there is a paucity of emotion-related research in the field of educational psychology (Pekrun *et al.*, 2007; Dörnyei 2009b). This paucity stems from a long held belief in the field of psychology that affect and cognition were separate systems that seldom interacted (Lyons 1999). Early philosophers even coined the metaphor of master and slave to describe the relationship between emotion and reason (Solomon 2008). Emotions were thought of as “more primitive, less intelligent, more bestial, less dependable, and more dangerous than reason, and thus need to be controlled by reason” (Solomon 2008, p.3). Furthermore, the emergence and proliferation of behaviourism in the 1920s directed researchers’ attention to observable phenomena, and concepts that were subjective and not distinctly observable or easy to measure were effectively ignored (Harzem 2004; Moore 2011). As such, emotion has been under-researched within the discipline for a long time.

Today, neurobiological evidence has made it clear that emotion and cognition are two interdependent systems (Damasio 1994; LeDoux 1996; Panksepp 1998). Damasio (1994, p. xii) states:

...reason may not be as pure as most of us think it is or wish it were...Emotions and feelings may not be intruders in the bastion of reason at all: they may be enmeshed in its networks for worse and for better.

This statement acknowledges that emotion might work to our advantage (“for better”) or disadvantage (“for worse”) but regardless Damasio (*ibid* p.xiii) says, “I suggest only that certain aspects of the process of emotion and feeling are indispensable for rationality”.

Furthermore, based on a review of the more recent theoretical and empirical evidence, Forgas (2008, p.99) concludes:

[T]here are close neural links and a complex, multifaceted, and bidirectional relationship between affect and cognition. Cognitive processes determine emotional reactions, and, in turn, affective states influence how people remember, perceive, and interpret social situations and execute interpersonal behaviours.

Consequently, emotions are beginning to receive more attention in the field of psychology and educational psychology.

In educational contexts, the link between emotions, thinking, and learning is particularly important. Immordino-Yang and Damasio (2007, p.5) propose two learning-related activities directly affected by emotion. Firstly, they state that “emotional processes are required for skills and knowledge acquired in school to transfer to novel situations and to real life”, and secondly, that “it may be via an emotional route that the social influences of culture come to shape learning, thought and behaviour”. While Immordino-Yang and Damasio’s claims are largely speculative, empirical studies have also concluded that the cognitive processes recruited most heavily in education, namely attention, learning, memory, decision-making, reasoning and problem solving, are subsumed in emotion (Isen, Daubman and Nowicki 1987; Phelps 2004; Vuilleumier 2005; Um *et al.* 2012; Jung *et al.* 2014).

The thesis is particularly concerned with the educational domain of second language learning. In his work on the neurobiology of affect in language learning, Schumann (1994 p. 232) points out that:

[T]he brain stem, limbic and frontolimbic areas, which comprise the stimulus appraisal system, emotionally modulate cognition such that, in the brain, emotion and cognition are distinguishable but inseparable. Therefore, from a neural perspective, affect is an integral part of cognition.

Schumann (1997) argues that emotional reactions influence the attention and cognitive effort devoted to learning, referring, in particular, to one type of learning, sustained deep learning (SDL). Second language learning can be characterised as a form of SDL because continued learning over an extended period is needed to achieve it, and when complete, the learner is seen as proficient (*ibid.*, p. 32). According to Schumann (*ibid.*),

this type of learning is controlled by stimulus appraisal and cannot be accounted for by cognition alone; it has a strong emotional and motivational component that supports and even drives learning. Affect, therefore, is central to second language learning and all sustained deep learning.

Despite this, the field of SLA has suffered from an 'emotional deficit' (Dörnyei and Ryan 2015, p.10), much like the neglect of emotional inquiry that has existed within the realm of educational psychology more generally. Garrett and Young (2009, p. 209) describe emotion as being kept "in the shadows" of language learning discussions, while Swain (2013, p. 205) refers to them as "the elephants in the room - poorly studied, poorly understood, seen as inferior to rational thought". Dörnyei stressed the importance of investigating emotion in second language learning in an interview with Murphy (2010, p. 22):

This is a huge topic, but the current situation is sadly straightforward: Apart from a few exceptions (for example the work of John Schuman, Peter MacIntyre and Jean-Marc Dewaele), emotions have been by and large neglected in the field of SLA. This is all the more surprising given that: (a) classrooms are venues for a great deal of emotional turmoil; (b) emotions are known to be salient sources of action (for example when we act out of fear or anger or happiness); and (c) the process of language learning is often emotionally highly loaded for many people.

Dörnyei later confirmed this observation, stating that: "perhaps the greatest omission of the classic Individual Differences paradigm is that it barely acknowledges the central role of emotions in human thought and behaviour" (Dörnyei and Ryan 2015, p.9).

1.3 Study Aims

The interdependence of emotion and cognition means that emotions are central to learning processes. However, as outlined above, emotions have experienced a long period of neglect in educational research. While research in this regard is beginning to take an 'affective turn' (Pavlenko 2013), there is still much to understand about the relationship between emotion and learning.

This study contributes to the field by closing the gap both empirically and theoretically (see Table 1.1). In a climate where online learning options are increasingly more available and in demand, such research is of particular consequence. Moreover, as learning

analytics rapidly transform approaches for dealing with the large amounts of data generated by MOOCs, it is important that research also considers the human side of learning.

Therefore, underpinned by the Control-Value Theory of Achievement Emotions (Pekrun 2006), this study investigates the sources of learners' emotions during an Irish language MOOC. More specifically, this study will:

- Identify the emotions related to Irish language learning in a MOOC
- Test the assumptions of the Control-Value Theory at a within-person level in an LMOOC
- Establish the influence of course content on emotions
- Gain an insight into the learner perspective regarding the sources of their emotion during the course

1.4 Defining Emotion

As a precursor to reviewing the literature on emotions in the next chapter, this section will provide a brief discussion on what is meant by the term 'emotion'. Arriving at a generally accepted scientific definition of emotions, however, is not an easy feat. Ever since James (1884) asked the question, 'What is an emotion?', there has been an ongoing debate among emotion researchers about the nature, cause, and definition of emotions. Despite the fact that the term 'emotion' is used widely in everyday speech, defining it, in academic terms, has proven to be a challenge. Wenger, Jones and Jones' (1962, p.3) articulation of this challenge is still relevant today:

Emotion is a peculiar word. Almost everybody thinks he understands what it means, until he attempts to define it. Then practically no one claims to understand it. Scientists who investigate it disagree. Philosophers, novelists, and others who write about it disagree.

In 1981, Kleinginna and Kleinginna (1981) identified over 100 different definitions for the term 'emotion'. More recently, Izard (2010) interviewed a number of academics working in the field of emotion to understand their interpretation of the term. From the results, Izard (2010, p.367) concluded:

No succinct synthesis could capture everything in the 34 definitions of 'emotion' given by the participating scientists. These definitions defy complete

synthesis, in part by virtue of their meaningful originality. They represent ingenious insights and intellectual nuances from each scientist's separate studies and observations, often on different aspects of emotion.

Despite the continuing proliferation of books, journals, conferences, and theories on the subject of 'emotion', there is still little consensus on the meaning of the term in the academic literature.

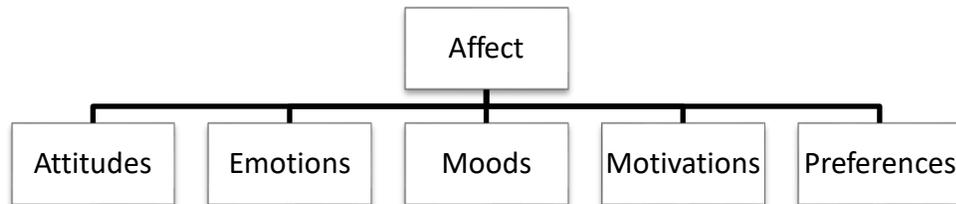
1.4.1 The Debate

Determining what should be and should not be labelled as an emotion, is the source of much debate among researchers in the fields of psychology, education and linguistics. One strand of the debate focuses on the relationship between terms such as 'mood', 'affect', and 'emotion', which are often used synonymously in both academic research and everyday life. Researchers generally differentiate between moods and emotions in terms of the i) temporality, ii) intensity, and iii) cause and direction of the phenomena (Rosenberg 1998; Keltner and Ekman 2000; Scherer 2005). Emotions are characterised by their strong intensity and short-lived nature, while moods are more diffuse states that last longer than emotions. Scherer (2000) emphasises that emotions are dynamic, and continuously fluctuating by nature. In terms of direction, Frijda (2009) points out that emotions are typically directed at specific people or events, that is, an object, while moods are objectless, "about nothing specific or about everything - about the world in general" (Frijda 2009, p. 258). Some researchers consider emotions and moods to be distinct categories based on the categorical distinctions outlined above (see Rosenberg 1998). In comparison, Pekrun (2006) determines that they are part of the same multi-dimensional space. This view accounts for the affective states that cut across the conceptual boundaries outlined, for example, if an affective state is intense and short but has no clear focus.

In practice, emotion researchers in the field of psychology tend to specify which phenomenon they are investigating, while their colleagues in the field of education and second language acquisition (SLA) frequently refer to a variety of emotional phenomena using the term 'affect' (Aragao 2011). However, 'affect' is more of a general term, which Aragao (2011, p. 303) describes as "an umbrella term, subsuming a list of other concepts (feeling, mood, attitude, value, judgment, personality factor, learner variables)". Using

generic terminology can result in a lack of clarity regarding which aspect of affect is the focus.

Figure 1.1 Affect as an umbrella term



A second strand of the debate surrounds the various components of emotions. While researchers in the aforementioned review of scientific opinion did not agree on a definition of emotion, Izard (2010, p.368) found that many gave a definition that recognised that, a) neural circuits and neurobiological processes, b) phenomenal experience or feeling, and c) perceptual-cognitive processes, were aspects of emotion. For decades, researchers have assumed the existence of three core elements that jointly construct an emotion. These elements are *physiological arousal*, such as an increased heartbeat or sweating; *motor expression*, such as facial expressions or tone of voice; and *subjective feeling*, which is the conscious experience of feeling happy or sad etc. These three components are often referred to as the 'emotional response triad' (Scherer 2001). Early emotion theories such as the James-Lange Theory (Lange and James 1922) and the Cannon-Bard theory (Cannon 1927) focus on the nature of the relationship between these three components. For instance, the James Lange Theory proposes that bodily changes cause an emotion. Alternatively, the Cannon-Bard Theory argues that emotion and arousal are triggered simultaneously. Over the years, as emotion theories and discussions have progressed, this triad has expanded further to include the components of cognitive processing, action-tendencies, neurological activity and social context (Kleinginna and Kleinginna 1981; Scherer 2001, 2009). Despite a consensus on the multi-componential nature of emotions, not all researchers agree on every component. For instance, the

cognitive appraisal component is increasingly being recognised as an antecedent rather than a component of emotions (Shuman and Scherer 2014). Other tensions also remain regarding the order in which the components occur, their mutual influence, and, importantly, how many and which of these elements are required for a phenomenon to be labelled an emotion (For a review see Moors 2009).

A third topic concerns the matter of consciousness and whether or not emotions need to be consciously experienced in order for them to be labelled as an emotion. Feelings (i.e. the subjective feeling component of an emotion) are generally considered the conscious experience of an emotion (Scherer 2000, 2001; Izard 2009). Damasio (2000), however, suggests that even though we tend to be conscious of our feelings, there is no evidence to suggest that we are aware of them all. Damasio (ibid p.36) explains:

...we often realise quite suddenly, in a given situation, that we feel anxious or uncomfortable, pleased or relaxed, and it is apparent that the particular state or feeling we know then has not begun on the moment of knowing but rather sometime before. Neither the feeling state nor the emotion that led to it have been 'in consciousness', and yet they have been unfolding as biological processes.

Lewis and Todd (2005) who differentiate between two levels of consciousness make a similar argument. The first is *focal attention* or a direct and deliberate awareness. The second is a background or *pre-attentive awareness*, which is when an experience is subjectively felt but not cognitively processed. As Lewis and Todd (ibid, p. 4) explain:

With respect to affects, such as those accompanying emotions, pre-attentive awareness can include feelings (e.g., tightness in the chest) before they are the object of focal attention.

Some researchers, however, refer to feelings of lower awareness as moods (Pekrun 2006; Reeve 2009).

Another long-standing question in emotion research has focused on the number of emotions and their classification. Answers to the question, 'How many emotions are there and what are they?' vary significantly from one author to another dependent on their field and theoretical stance. The different perspectives tend to focus on the nature of the basic units of emotion, and whether these units are essentially dimensional or discrete (Russell 2009). The dimensional perspective conceptualises emotions as arising from

combinations of fundamental dimensions (Feldman-Barrett *et al.* 2007). This perspective has roots in the 20th century work of William Wundt (1905, cited by Scherer 2001, p.4474). Wundt suggested that subjective feelings are described by their position in a three-dimensional space. The three-dimensions include i) pleasantness – unpleasantness, ii) rest – activation, iii) and relaxation – attention (Scherer 2001). Wundt's work ignited a research tradition that has continued to the present. However, successive models have differed with respect to the number of dimensions included. For instance, Arnold (1960) proposed one dimension, the positive-negative dimension. In contrast, a study conducted by Smith and Ellsworth (1985) found that six dimensions, pleasantness, anticipated effort, certainty, attentional activity, self-other responsibility/control, and situational control, represented the 15 emotions investigated. Fontaine *et al.*'s (2007) study showed that four dimensions, evaluation-pleasantness, potency-control, activation-arousal, and unpredictability, satisfactorily represented the similarities and differences in the meaning of emotion words. The most common number of dimensions' researchers draw on seems to be two, with models such as the circumplex model of affect (Russell 1980), the positive activation - negative activation model (Watson and Tellegen 1985) and the vector model (Bradley *et al.* 1992) dominating the field today. All of these models are based on the two dimensions of valence/pleasantness and arousal/activation. In line with this perspective, an emotion such as fear emerges from a combination of negative valence, high arousal, and other attributes that are not specific to the category of fear *per se*.

The alternative, a discrete emotion perspective, determines that there exists a limited number of distinct emotion types, each with unique characteristics that can be distinguished from one another (Feldman-Barrett 2012). One highly influential type of discrete emotion theory, Basic Emotion Theory (Ekman 1992; Ekman and Cordaro 2011), proposes a limited set of basic emotions (for example, happiness, sadness, anger, fear, disgust, and surprise) that are universal, biologically inherited, and have unique physiological and neural profiles that distinguish them from one another. Another discrete emotion theory, the Differential Emotions Theory developed by Izard (2002, 2007, 2009 and 2011) posits the existence of emotions on different levels, a basic level and a higher more complex level. According to Izard (2009, p.7), the term 'basic emotion' refers to "affective processes generated by evolutionary old brain systems upon the sensing of an ecologically valid stimulus". Similar to Ekman's basic emotion theory, these emotions are biologically determined and occur automatically and often unconsciously (Izard 2011).

Preferring the term 'first-order emotions' to 'basic emotions', Izard (2011) outlines a list of first-order emotions, a) interest, b) enjoyment/ happiness/ contentment, c) sadness, d) anger, e) disgust, and f) fear. However, in an extension to the basic emotion theory. Izard (ibid) posits that these emotions are not experienced in their true form after early childhood. As an individual's cognitive system matures, cognitive processing plays a more prominent role in emotional experiences, instantly transforming basic emotions to complex emotions or emotion schema, once they are experienced; thus "after infancy, emotion schemas (not the so-called basic emotions) are the emotions of everyday life" (ibid, p.371). Therefore, what we usually refer to as *emotions* are more precisely described as *emotion schema*, according to Izard. This conceptualisation suggests that the further an individual is in their development, the more prominent a role cognitive processing plays in their emotional experiences.

Despite the large empirical literature that has attempted to determine which of these theories better explains emotional phenomena, there remains a lack of consensus. Some researchers even argue that discrete emotions exist and so do dimensions. For instance, Harmon-Jones, Harmon-Jones and Summerell (2017) propose that the dimensions of valence and arousal account for individual differences in the occurrence of discrete emotional experiences and that consideration of both discrete and dimensional conceptual views on emotion is needed to fully understand emotions. A similar view is held by Feldman-Barrett (1998, p. 595-6), who proposes that one theory may not apply to all people:

Theories of discrete emotions may be most appropriate for individuals who focus both on pleasantness and on their level of subjective arousal when labelling their subjective emotional experiences, because these individuals report less frequent co-occurrences between emotions of the same hedonic tone. In contrast, dimensional theories may best capture the affective experience of individuals who focus mainly on the pleasantness or unpleasantness of their subjective emotional experiences, because they report strong co-occurrences between emotions of the same hedonic tone.

1.4.2 The Conceptualisation of Emotion in Current Thesis

The preceding debate highlights that placing a specific definition on what emotions actually are is a challenging task. Therefore, it is better to narrow the focus and outline the specific characteristics of the phenomenon that is of interest in this research.

For the purpose of this thesis, the focus is on emotion as a transient state with a specific cause and direction, as opposed to a dispositional trait (Lazarus 1991), or longer-lasting, undirected, mood. Affect, therefore, is used as an umbrella term, encompassing both emotions and moods, as outlined by Aragao (2011). Furthermore, this study will focus on the emotions that an individual is aware of and consciously experiences. These characteristics ensure the emotion is measurable and subjectively gradable. Finally, in line with a componential perspective (Scherer 2000; Shuman and Scherer 2014), emotions are seen as “as multi-component, coordinated processes of psychological subsystems including affective, cognitive, motivational, expressive, and peripheral physiological processes” (Pekrun 2006, p. 316).

This conceptualisation draws on many of aspects of Reeve’s (2015) definition of emotion as “... short-lived, feeling-purposeful-expressive bodily responses that help us adapt to the opportunities and challenges we face during important life events”. A number of studies in the field of SLA have taken this definition to guide their work (see MacIntyre and Vincze 2017; Boudreau, MacIntyre and Dewaele 2018; Ross and Rivers 2018).

1.5 The Irish Language

Irish is the target language of the population of this study. This section outlines the history and status of the language in order to contextualise the research presented in this thesis.

The Irish language, called Gaeilge in the standardised form of the language, is a member of the Celtic family of languages and is the indigenous language of Ireland. It is closely related to Scots Gaelic and Manx as well as Welsh, Breton and Cornish (Ó hUiginn 2008). The Irish language has rich history of literature and song, and for centuries, Irish was the language of the majority of people living on the island of Ireland. The situation changed dramatically from the 16th century onwards as a result of a number of socioeconomic reasons, primarily among them, the advent of English rule in Ireland and the emigration and depopulation of the largely Irish speaking rural population, particularly heightened during the Great Famine in the 1840s (Mac Giolla Chríost 2005). With the creation of the Irish Free State in 1921, successive governments have pledged to preserve and promote the language. Today, Irish is both the national and first official language of the Republic of Ireland. It is however, only spoken by a minority and thus holds a minority language

status². English remains the dominant language of communication within the State (CSO 2017).

Irish is a compulsory subject in state schools in the Republic of Ireland at both primary and secondary level. A number of primary (9% of total³) and secondary schools (10% of total⁴) operate through the medium of Irish. Irish language medium schools help account for the relatively large number - approximately 1.7 million or 39.8% of people in the Republic of Ireland – who reported that they could speak Irish in the latest census (CSO 2017). However, with regard to the frequency of language use, only 17.4% of the population (aged 3 or over), or 586,535 people, speak Irish outside of the education system, and only 1.7% of the population of Ireland said that they did so on a daily basis (CSO 2017). The most visible clusters of Irish speakers live in the Gaeltacht: the name given to those regions in Ireland where Irish continues to be the main spoken language of a substantial number of inhabitants.

National reports indicate that the language enjoys considerable support amongst the population, with many of the opinion that the Irish language is integral to their national identity (Hickey 2008; Darmody and Daly 2015). Attitudes towards learning the language are notably different, however, as many students tend to look more negatively on Irish compared to other subjects, viewing it as less interesting and useful and, to some extent, more difficult (Darmody and Daly 2015).

It is important to acknowledge that the current situation of the language on the island of Ireland differs markedly between the Republic of Ireland and Northern Ireland. The Irish language is officially recognised in Northern Ireland as a minority language by ratification of the European Charter for Minority and Lesser-Used Languages. According to the 2011 census, 11% of the population in Northern Ireland have some knowledge of the Irish

² The term 'minority language' refers here to the number of speakers of Irish. It describes those languages that "are dominated politically and economically by numerically larger communities within a particular state" (Cormack 2007, p. 2).

³ Calculated from figures provided by Gaeloideachas (<https://gaeloideachas.ie/>) regarding total number of Irish-medium primary schools, and the Department of Education and Skills (<https://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/>) regarding the total number of primary schools

⁴ Calculated from figures provided by Gaeloideachas (<https://gaeloideachas.ie/>) regarding total number of Irish-medium post-primary schools, and the Department of Education and Skills (<https://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/>) regarding the total number of post-primary schools

language but only 6% speak the language (NISRA 2019). Attitudes towards the Irish language in Northern Ireland have traditionally reflected political differences between the Protestant and Catholic communities. In contrast to the Republic, there are no official Gaeltacht areas in Northern Ireland and the Irish language is taught only in some (mainly Catholic) schools, although some Irish-medium schools are also available. Recently, the Irish language has been subject to increasing political attention in Northern Ireland because of a campaign for the introduction of an Irish Language Act.

A broad range of government policies exist to protect the language and promote its use in the Republic of Ireland. In 2003, the Official Languages Act was passed giving expression to the constitutional status of Irish as the first official language. Further, in 2007, Irish was recognised as an official working language of the European Union. A number of organisations promote the Irish language. For example, Foras na Gaeilge⁵, an all-island body, supports Irish language initiatives which are generally outside Gaeltacht areas, while Údaras na Gaeltachta⁶ is focused on Gaeltacht areas. The most recent government document, the 20-Year Strategy for the Irish Language (Government of Ireland 2010), sets out the government plan to increase the number of people using the language outside the education system.

A long history of emigration from Ireland (Ó Conchubhair 2008) has resulted in a situation whereby a number of countries, mainly the United States, Australia, Canada and New Zealand, have groups of people of Irish heritage who promote the language (Department of Foreign Affairs and Trade 2017). Organisations such as Conradh na Gaeilge⁷, Comhaltas Ceoltóirí Éireann⁸, An Coimisiún le Rincí Gaelacha/ The Irish Dancing Commission⁹ and An Cumann Lúthchleas Gael/ The Gaelic Athletic Association (GAA)¹⁰ have branches internationally that promote the Irish culture and language through the provision of language classes and conversation circles as well as informally through sport, music and dance. The Department of Foreign Affairs and Trade also supports Irish studies programmes at universities worldwide, while the Department of Culture, Heritage

⁵ <https://www.forasnagaeilge.ie/>

⁶ <http://www.udaras.ie/en/>

⁷ <https://www.cnag.ie/en/>

⁸ <https://comhaltas.ie/>

⁹ <https://www.clrg.ie/index.php/en/>

¹⁰ <https://www.gaa.ie/>

and the Gaeltacht supports the development of Irish language courses in third-level institutions overseas (Department of Foreign Affairs and Trade 2019).

The Irish language has a significant presence in the media. The television station, TG4, radio channels such as Raidió na Gaeltachta and Raidió na Life, and a number of print and digital newspapers and magazines ensure that Irish language content is available both nationally and internationally. The language also has a visible online presence. Irish language websites created by media organisations, educational institutions, commercial businesses, community groups, and individuals bring a wide range of Irish language content to web users across a variety of online genres. The Irish language is also visible as a language of communication on a number of social media platforms. On Twitter, for example, as of July 2019 there has been over 3 million Irish language tweets sent since 2011 (Scannell 2019). Additionally, Facebook, Gmail, Whatsapp, Google and Samsung phones all have localised Irish language interfaces.

While UNESCO has classified the Irish language as ‘definitely endangered’ (Moseley 2010), the language is far from dead. New technologies are opening up the language to a much wider network of people who want to learn and use it.

1.6 Language Learning in Ireland

The most recent census found that 13% of the population spoke a language other than Irish or English at home (CSO 2017). The large numbers of immigrants settling in Ireland has provided Ireland with a rich diversity of community languages.

Nevertheless, Irish citizens have been found to lag behind their European counterparts in terms of foreign language competency levels. Eurostat figures from 2016 showed that 29.9% of Irish adults aged 25-64 knew one foreign language at the time of the survey (Eurostat 2016). The numbers that knew two or more languages were much lower (15.4% with two languages and 5.6% with three or more languages). This compares with the European average of over 35% with one foreign language, 21% with two languages and almost 9% with three languages. A comparison to the previous survey conducted in 2011, however, shows that the numbers reporting knowledge of foreign languages in Ireland are increasing. In relation to the languages available for business, the 2019 Institute for Management Development (IMD) World Talent Ranking has ranked Ireland 38th out of 63

countries for language skills that meet the needs of enterprise, with an overall score of 5.92 out of 10 (IMD 2019).

With regard to the education system, while Irish and English are taught to almost all students at primary and post-primary level, the learning of other foreign languages is, at present, non-compulsory (except in the Leaving Certificate Applied and the Leaving Certificate Vocational Programme; Department of Education and Skills 2017). However, there is generally a third language entry requirement for most courses at third level. Approximately, 70% of students study a foreign language in Ireland up to Leaving Certificate¹¹ level, with French being the most commonly studied language followed by German, Spanish and Italian (Department of Education and Skills 2017). Other languages include Russian, Japanese and Arabic. Although the range of languages available for schools to offer is good, in reality, the choice of languages available to most students is limited (ibid).

Despite the demotivating effect of English being the lingua franca of our times (Department of Education and Skills 2017, p.17), Ireland's attitude to foreign language learning is positive according to the results of a 2012 Eurobarometer survey. Results showed that 78% of Irish respondents agreed that everyone in the EU should be able to speak at least one foreign language (European Commission 2012). The survey also revealed that Irish respondents considered language learning as a benefit for employment, with 59% considering language learning an advantage for getting work in another country, and 43% for using it at work or while on business travel. However, only 27% considered it important from the perspective of obtaining a better job in Ireland.

1.7 Organisation of Thesis

This chapter has outlined the contextual backdrop for the study. The thesis consists of six further chapters. Chapter 2 outlines the theoretical framework for the study and reviews the relevant literature. This review encompasses literature from the fields of Educational Psychology, Digital Learning, Second Language Acquisition and Computer-Assisted Language Learning. The research methodology is discussed in Chapter 3. This

¹¹ The Leaving Certificate Examination, commonly referred to as the Leaving Cert, is the final examination of post-primary education in the Republic of Ireland. Students who take this exam are usually 17 or 18 years of ages and have completed 5 or 6 years of post-primary education. The results of this examination are used for gaining entry to third-level courses.

chapter details the study context, the participants, and the data collection process. Chapter 4 and Chapter 5 comprise the two results chapters, presenting the analytic strategy and results for both phases of inquiry. In Chapter 6, findings from both phases are interpreted independently, and in relation to each other, with reference to the existing literature. The research questions are addressed specifically in this narrative. Chapter 7 concludes the thesis by revisiting the overall aims of the research and considering exactly what it achieved. The limitations of the study are also considered in this chapter, as are recommendations for further research in the area.

2 Literature Review

2.1 Introduction

The central premise to research on emotion in education is that emotions do not appear from nothing and disappear into nothing. Emotions have antecedents and there are effects when individuals experience different emotions. This study is particularly interested in the antecedents of learners' emotions in a language learning MOOC. Given the important effects that emotions can have on learning (Artino, Holmboe and Durning 2012), a better understanding of the factors that lead to certain emotions is essential for generating ideas on how to foster more learning enhancing emotional experiences (Goetz *et al.* 2010). Such research is of particular consequence in online learning environments where the dynamics of emotion are less visible to the instructor (Wosnita and Volet 2005).

The research conducted in this thesis is multi-disciplinary, overlapping with the fields of Educational Psychology, Second Language Acquisition (SLA) and Online Learning. This chapter reviews relevant research from each of these fields in order to set the scene for this study, highlighting what is known, what is yet to be investigated, and subsequently, the gaps this study will fill (see Table 2.1 for overview). Moving from the general to the specific, the chapter begins with research from the field of Educational Psychology. Specifically, Pekrun's (2006) Control-Value Theory of Achievement Emotions (CVT) is discussed as the theoretical framework for this study. Empirical support for the theory in digital learning environments (DLEs) is then reviewed to determine its reliability, validity and generalisability to this context. Emotion antecedent research conducted in DLEs is identified as being less advanced than research conducted in traditional classroom settings. A gap with regard to intra-individual approaches to the investigation of the theory is identified, with Thomas Goetz being one of the main researchers addressing this gap, but only in face-to-face learning environments. Other aspects of the theory not previously investigated are also highlighted. The second section focuses on Massive Open Online Courses (MOOCs), the DLE in which this study is situated. Emerging emotion research in this learning context is discussed with studies by Dillon *et al.* (2016) and Buhr, Daniels and Goegan (2019) being of particular relevance. Both these studies adopt a self-report approach to emotion measurement. Further, Dillon *et al.* (2016) provide the inspiration for an experience sampling methodology, while Buhr, Daniels and Goegan (2019) were the first to examine the CVT in a MOOC. The third section narrows the review to the field of SLA and the development of emotion research in this domain. Notable contributors are Jean-Marc Dewaele and Peter MacIntyre, who have advanced emotion research in the

field beyond foreign language anxiety and negative emotions more generally. Their research shows that both positive and negative emotions are relevant to the language learning experience. The fourth section comprises a systematic review. The review finds that there are only a limited number of studies which examine emotions other than anxiety in the field of online or computer-assisted language learning (CALL). Furthermore, no research has investigated the sources of a range of both positive and negative emotions in this domain. The chapter concludes by drawing attention to the case of language learning MOOCs (LMOOCs), a relatively new CALL environment and the research context for the current study. The potential of emotion research in the development of this learning model is highlighted.

Table 2.1 Overview of literature review

<p><u>Emotion in Education</u></p> <ul style="list-style-type: none">• Control-Value Theory of Achievement Emotions: Leading theoretical framework with respect to antecedents of emotion in learning contexts• Growing empirical support for theory in online context• Existing research predominantly adopts between-person designs even though theory refers to within-person processes• Extensive focus on achievement emotions - Other academic emotions not as widely investigated
<p><u>MOOCs</u></p> <ul style="list-style-type: none">• Growing in numbers and demand• Success of learning model is often questioned• More research needs to focus on the psychological aspects of learning in MOOCs.• Emotion research predominantly adopts quantitative methodologies, focuses on STEM subject domains and is mainly detached from theory
<p><u>Emotion in SLA</u></p> <ul style="list-style-type: none">• In the past the literature has overwhelmingly concentrated on the negative emotion of anxiety• Field has progressed significantly in past 2-3years as evidenced by special issue of <i>Studies in Second Language Learning and Teaching</i> (2018) entitled 'Emotions in Second Language Acquisition'• Studies are beginning to address range of both positive and negative emotion• More focus on dynamic functioning of emotion as opposed to 'a moment frozen in time'
<p><u>Emotion in Online Language Learning</u></p> <ul style="list-style-type: none">• Systematic review identifies that research is considerably less advanced than classroom-based equivalents• Again, anxiety is focus of majority• Other emotions are considered but scope of these studies is limited
<p><u>Language Learning MOOCs</u></p> <ul style="list-style-type: none">• Unique language learning context• Body of literature is nascent• Emotion research is non-existent

2.2 Emotion in Education

Having established the centrality of emotion in the learning process in the previous chapter, this section explores, in more detail, emotion research in the field of education. Specifically Pekrun's (2006) Control-Value Theory of Achievement Emotions is examined as a prominent academic emotion theory that proffers a taxonomy of academic emotions and a robust consideration of the antecedents of learners' emotions. It should be noted here that theories of emotional intelligence fall outside the scope of this review. The core of emotional intelligence theory is emotional regulation or the ability to manage your emotions (Humphrey *et al.* 2007). This thesis seeks to explore the relationship between appraisals and emotional states, rather than emotional regulation; therefore, theories of emotional intelligence fall outside the scope of this review. Existing research on emotion antecedents in DLEs is also reviewed in this section to provide a contextual backdrop of what is already known and what is yet to be explored in the field. The section begins by outlining the different types of emotions that the literature has determined are relevant to educational situations and their impact on learning.

2.2.1 Academic Emotions

Whereas emotions in general are cross-situational, academic emotions refer to those emotions that students feel while participating in academic activities. They are the feelings that students experience while sitting in class, listening to lectures, interacting with instructors and peers, doing homework, collaborating online, completing assignments, or taking a test, etc. Pekrun and colleagues (2002, p.92) described academic emotions as:

...emotions that are directly linked to academic learning, classroom instruction, and achievement (e.g., enjoyment of learning, pride of success, or test-related anxiety) [...] the domain of academic emotions would include students' achievement emotions experienced in school or university settings but goes beyond emotions relating to success and failure by also covering, for example, emotions relating to instruction or to the process of studying.

According to Pekrun and Stephens (2012) four groups of academic emotions exist: i) achievement emotions, ii) epistemic emotions, iii) social emotions, and iv) topic emotions. These types of emotions are differentiated based on their object focus. All emotions

experienced in academic contexts are classified into one or more of these categories. Some emotions are solely placed within one category, but there are others that are categorised to many, depending on the object focus at the time (Pekrun and Perry 2014). In particular, there is often an overlap between epistemic and achievement emotions. Drawing on the example used by Pekrun and Linnenbrink-Garcia (2012), the frustration felt when solving a mathematics problem is classified as epistemic if it is focused on the discrepancy between existing knowledge and the problem at hand. However, if the frustration is focused on the personal failure and inability to solve the problem, it can also be classified as an achievement emotion.

2.2.1.1 *Achievement Emotions*

Pekrun (2006, p. 317) defined achievement emotions as “emotions tied directly to achievement activities or achievement outcomes”. In the academic domain, activities such as studying and taking exams are typically judged according to competence-based standards of quality, thus, the emotions associated with these activities and the outcomes of these activities (success or failure) can be seen as achievement emotions (Pekrun and Perry 2014).

2.2.1.2 *Topic Emotions*

Topic emotions are triggered by the contents of learning material (Pekrun and Linnenbrink- Garcia 2012). Examples include empathetic emotions related to the fate of a protagonist when reading a novel; or the emotions evoked when studying historical or political events. While not directly linked to learning, topic emotions can affect students’ interest in learning (Ainley 2007).

2.2.1.3 *Social Emotions*

Emotions experienced in relation to other people are called social emotions (Pekrun and Linnenbrink-Garcia 2012). Learning is situated in a social context and thus social emotions can come into play. In classrooms, learners interact with peers and instructors face-to-face, while in online learning contexts, such interactions take place through the medium of platform discussion forums or group work activities. Pekrun and Linnenbrink-Garcia (ibid) point out that even when people learn alone, the goals, content and outcomes of learning are socially constructed, meaning that students never act in a social

vacuum. Social emotions can be related to the success and failure of others, such as admiration or envy, or they can be related to the individual's relationships with fellow learners and instructors, such as love and hate. Social emotions can impact learning engagement (ibid).

2.2.1.4 Epistemic Emotions

For epistemic emotions, knowledge and the generation of knowledge are the objects of emotions (Muis *et al.* 2015). Epistemic emotions are described as “emotions that result from information-oriented appraisals (i.e. the cognitive component of an emotion) about the alignment or misalignment between new information and existing beliefs, existing knowledge structures, or recently processed information” (Muis, Cherier and Singh 2018, p. 169). Epistemic emotions are associated with the process of comprehending new information and generally arise during novel or non-routine tasks (Boekaerts and Pekrun 2016). Epistemic emotions include surprise or curiosity following the initial appraisal of the task; joy if the information is consistent with or verifies existing knowledge; or confusion and frustration if the information is inconsistent with prior knowledge.

2.2.2 Academic Emotions and Learning

Despite the vast range of emotions that are now acknowledged to be relevant to an educational setting, test anxiety is an emotion much focused on in research (for a review see Zeidner 1998). Schutz and Pekrun (2007, p.3) pointedly note that research regarding other emotions was “next to nothing”. It has only been in the last two decades that researchers have begun to investigate other emotions in educational settings (Pekrun *et al.* 2002). Such research, however, has shown that, not only do learners experience a variety of emotions in academic settings (Pekrun *et al.* 2002), but also academic emotions have an influence on learners’ engagement and performance (Linnenbrink-Garcia and Pekrun 2011). More specifically, positive emotions such as enjoyment, hope, and pride, have been positively associated with intrinsic motivation, effort, self-regulation, and more sophisticated learning strategies (Pekrun *et al.* 2011). Negative emotions such as anger/frustration, shame, anxiety, and boredom have been associated with reduced effort, inhibited cognitive processes (such as attention and memory), increased external regulation, and lower performance overall (Pekrun, Elliot and Maier 2009; Pekrun *et al.* 2010; Pekrun *et al.* 2011). In addition, emotions experienced during academic

endeavours can shape subsequent behaviours, goals and emotions (Pekrun and Perry 2014).

Given the immediate and long-term implications that emotions have on learning and achievement, it is important that learning environments are designed to be cognisant of learning-enhancing emotions. Goetz *et al.* (2010) argued that the most productive way to achieve this is by investigating the antecedent factors that lead to specific emotions.

Much of what is known about academic emotions stems from research with learners participating in traditional classroom settings. The majority of research on the role of emotions in academic learning has focused on traditional, face-to-face classroom settings. Less is known about emotions in online learning environments and whether the predictors associated with academic emotions are similar to or different from classroom environments. In many ways the online learning environment is a unique context for the study of emotion, hosting a completely new set of parameters associated with being and learning online (O'Regan 2003). Daniels and Stupnisky (2012, p.225) identify that the technology itself can add a completely new level of complexity to emotional experiences. Furthermore, online learning environments lack the temporal, spatial, and intellectual supports that are readily available in more traditional, classroom-based learning environments (Artino and Jones 2012). The control for learning is shifted from the teacher to learner meaning that learning online "requires considerable autonomy and self-direction" (Artino and Stephens, 2009, p. 572). The physical absence of teachers and peers means that students are left to manage their own feelings in these environments (Harris 2003). Because of this, understanding the affective dimensions of learning is particularly significant for online learners.

Online learning has been depicted as lacking in emotional richness (e.g., lack of body language, facial expressions, and gestures) when compared to face-to-face learning (see Vrasidas and Zembylas 2003). Nevertheless, in a meta-analysis on the incidence rates of emotions in technology-enhanced learning environments, D'Mello (2013) identified that learners in these environments, similar to traditional learning environments, experience a range of both positive and negative emotions, such as enjoyment, curiosity, anxiety, anger, confusion, and boredom. Wosnita and Volet (2005) indicate that in online learning contexts, the dynamics of emotional experiences may be less visible to educators but they are still important contributors to learning in these environments. Thus, Wosnita and

Volet (ibid) called for more research on the role of emotions in online learning environments. Responding to that call, literature on emotions in online learning environments has grown substantially over the past decade. The present study seeks to complement this growing area of research by exploring the origins of learners' emotions in a Massive Open Online Course (MOOC).

2.2.3 The Control-Value Theory of Achievement Emotions

There are numerous theories on the origins of emotions. The Control-Value Theory of Achievement Emotions (Pekrun 2006) is the theoretical framework underpinning the investigation of emotion antecedents in this study. It is an appraisal theory of emotion. In essence, appraisal theories assume that emotions are determined and differentiated by an individuals' evaluation of events and situations rather than the event itself (Roseman and Smith 2001, p.3). Important questions addressed by appraisal theories, comprise the dynamics as well as individual differences in emotional response. The Control-Value Theory of Achievement Emotions (Pekrun 2006) is an appraisal theory developed for the field of education. It describes how the environment shapes cognitive appraisals, which in turn give rise to emotions.

Pekrun's (2006) Control-Value Theory (CVT) developed out of the need for increased emphasis and attention on emotions in the educational sphere. It integrates a largely fragmented field by drawing together assumptions from a range of theories such as i) expectancy-value theories of emotions (Pekrun 1992a; Turner and Schallert 2001), ii) transactional theories of stress appraisals and related emotions (Folkman and Lazarus, 1985), iii) theories of perceived control (Perry 1991; Patrick, Skinner and Connell 1993), iv) attributional theories of achievement emotions (Weiner 1985), and v) models addressing the effects of emotions on learning and performance (Pekrun 1992b; Fredrickson 2001; Pekrun *et al.* 2002; Zeidner 2007).

2.2.3.1 *The Three-Dimensional Taxonomy of Achievement Emotions*

The focus of the theory, as the name implies, is on achievement emotions. Achievement emotions are categorised as activity emotions or outcome emotions. According to the three-dimensional taxonomy of achievement emotions (Pekrun *et al.* 2002), which is incorporated in the CVT (Pekrun 2006), the differentiation of outcome versus activity

emotion is based on the object focus of these emotions. Activity emotions are those experienced during achievement activities. Examples of activity-related achievement emotions could include excitement experienced during learning, boredom experienced in classroom settings, or anger about task demands. Outcome-related achievement emotions can be felt in anticipation of an outcome or in response to an outcome. These are termed as prospective outcome emotions and as retrospective outcome emotions, respectively. Prospective outcome emotions include hope or anxiety experienced in the lead up to an outcome-related event such as an exam. Retrospective outcome emotions include feelings of joy or pride when the outcome is deemed successful, or the frustration, disappointment or shame felt if it is not.

The second dimension of the taxonomy groups achievement emotions according to their valence (positive vs negative), and the third-dimension groups achievement emotions according to the degree of activation implied (activating vs. deactivating; see Table 2.2). Other two-dimensional models of affective states (Feldman-Barrett and Russell 1998) also identify the dimensions of valence and activation. Research has documented that the emotions organised in this taxonomy are experienced frequently in achievement settings (see Pekrun 1992b; Titz 2001; Spangler *et al.* 2002).

Table 2.2 A three-dimensional taxonomy of achievement emotions

Object Focus	Positive		Negative	
	Activating	Deactivating	Activating	Deactivating
Activity	Enjoyment	Relaxation	Anxiety Anger Frustration	Boredom
Outcome	Hope Joy Pride	Relief Contentment	Anxiety Anger Shame	Hopelessness Sadness Disappointment

(Adapted from Pekrun and Stephens 2010, p.239)

2.2.3.2 Proximal Appraisals

The key proposition of the CVT is that achievement emotions, including prospective outcome emotions, activity emotions and retrospective outcome emotions are determined by different appraisal antecedents, the primary two being control appraisals and value appraisals.

The primary determinants of the level of subjective control individuals feel over achievement activities and their outcomes are causal expectancies and causal attributions. Pekrun (2006) describes three types of causal expectancies deemed relevant:

- 1. Action-control expectancy:** the expectation that an activity/action will be initiated and be performed. This concept is similar to the idea of self-efficacy (Bandura 1977).
- 2. Action-outcome expectancy:** the expectation that one's action will lead to successful outcomes. An example would be a student's belief that they are able to invest sufficient effort into learning some material (action-control expectancy) and that they will succeed as a result of their efforts (action-outcome expectancy).
- 3. Situation-outcome expectancy:** the expectation that an outcome will occur in a given situation without any intervening action. One example is a student's expectation that they will get a good grade even if they does not study.

These causal expectancies are prospective appraisals of the controllability of success and failure. They assess the relation between causes and their future effects. Causal attributions, in contrast, are retrospective appraisals. They are appraisals about whether the outcome was caused by one's own actions, by external circumstances or by other persons. These appraisals assess the causes of an outcome that has already come about.

With regard to the subjective value of an activity, the theory distinguishes between two different types of value appraisals: intrinsic values and extrinsic values. Intrinsic values relate to the subjective importance of an activity or an outcome in its own right. In comparison, extrinsic values relate to the value of an activity or outcome, not as an end

in itself but as a means of achieving or attaining something else. An example would be the value of attaining good grades in order to get a good job.

In addition to the independent effects of control and value on emotions, the CVT proposes that emotional experiences result from the interactive or combined effects of control and value appraisals (Pekrun 2006). In this way, the effect of perceived value on emotion differs based on the corresponding level of control and vice versa.

2.2.3.3 *Linking Appraisals and Emotions*

A successive element of this theory, which it is pertinent to review, is that of the specific emotions evoked by different appraisals. In some cases, it is the control or value appraisal alone that evokes the emotion, while in others the control and value appraisals are assumed to interact to evoke an emotion. The theory proposes the appraisal patterns associated with the three groups of emotion identified previously: prospective outcome emotions, retrospective outcome emotions and activity emotions.

Firstly, prospective outcome emotions are experienced in anticipation of a certain outcome. Outcome expectancies and outcome value are both assumed to be necessary to induce these types of emotions. Outcome expectancies are an indicator of internal control perceptions. The specific emotion experienced is also determined by whether the focus is on success or on failure. For example, if the focus is on success and the expectancy of success is high, anticipatory joy is aroused. Alternatively, if the focus is on failure or more specifically the non-occurrence of failure, anticipatory relief is experienced. These emotions also depend on the subjective value of the outcome. The emotion is more intense when more importance is placed on perceived success or failure.

Secondly, retrospective outcome emotions are experienced following the occurrence of success or failure. For some of these emotions, the degree of control is actually irrelevant, the primary appraisal is subjective value. These emotions are thus described as control-independent. Examples of control-independent emotions include joy or sadness, which are natural reactions to success or failure, respectively. In contrast, control-dependent emotions involve more complex cognitive mediations. Both outcome attributions and outcome value are assumed to be necessary to induce control-dependent emotions which include pride, shame, gratitude, and anger. Whether an outcome was caused by one's self, by other persons or by situational factors can induce different emotions. Pride

and shame are assumed to be induced by attributions of success and failure to the self, and gratitude and anger are induced when the success or failure is perceived as having been caused by other persons. Similar to prospective outcome emotions, these emotions are assumed to also depend on subjective value of success or failure, which influences the intensity of the emotion. The extent to which the perceived cause contributed to the outcome is also assumed to influence the intensity of the emotion.

Finally, activity emotions are experienced during learning activities or tasks. They are assumed to depend on a combination of both the perceived controllability of the activity and the value of the activity. For activity emotions, perceived controllability is usually determined by competence appraisals. In terms of subjective value, the activity can be valued either positively or negatively. For example, if a student feels competent to meet the demands of the task (control appraisal) and positively values the learning material (value appraisal), enjoyment is experienced. Anger can be evoked if there is a degree of controllability but the task is valued in a negative manner. If the individual values the activity, but little control is possessed, frustration may be the result. If a task is neither positively nor negatively valued boredom can be induced.

2.2.3.4 *Distal Antecedents*

The CVT also considers distal antecedents of emotion. The theory proposes that such variables affect emotions by first influencing control and value appraisals (Pekrun 2006). These can be internal factors such as achievement goals and control and value beliefs or external factors such as social environment and task design. By implication, these factors that affect students' appraisals should be important for their emotions. In this regard, environmental factors, in particular, have a practical relevance and hold important implications for course design.

2.2.3.5 *Functions of Achievement Emotions*

In addition to the origins of achievement emotions, the theory also addresses the functions of these emotions for achievement activities and performance. The theory predicts that achievement emotions influence cognitive resources such as: motivation, use of strategies, and self-regulation vs external regulation of learning (Pekrun *et al.* 2007, p. 16). The overall effect on academic achievement depends on the interplay between these cognitive, motivational and regulatory mechanisms, the characteristics of

the individual, and task demands (Pekrun and Perry 2014). In addition, just as achievement emotions influence performance outcomes, the performance outcomes can be the antecedents of appraisals and emotions. Thus, achievement emotions, their antecedents and their effects are considered to be linked by reciprocal causation over time (Pekrun 2006).

With regard to the effects of positive versus negative emotions, it is logical to assume that positive emotions would exert positive or enhancing effects on learning and that negative emotions would exert negative or inhibitive effects on learning. While that is true in many cases, the situation is more complex (Pekrun 2006). Pekrun (ibid) determines that the distinction is less about positive and negative emotions and more about the degree of activation implied (e.g. activating versus deactivating emotions). For instance, anxiety, a negative but activating emotion, can exert a positive motivational effect to invest effort to avoid failures (e.g. study for an upcoming exam) (ibid). At the same time, other negative activating emotions, such as anger and fear, have proven to be both enablers and inhibitors of learning and achievement (Pekrun and Perry 2014; Rowe and Fitness 2018). Indeed, negative emotions in particular appear to have a more complex relationship with learning (Pekrun and Stephens 2010).

While this study is not focused on investigating the impact of emotion on learning, this tenet of the theory is still important. It highlights that taking a simplistic positive-negative dichotomous approach to the study of emotions in education is insufficient. The role of emotions in learning is much more nuanced and it highlights the need for more investigations of discrete emotion states. The assumption of reciprocity and the ambivalence of some emotion effects are also important considerations when designing educational interventions. Furthermore, Rowe and Fitness (2018) suggested that the appraisals that lead to emotions might hold important information regarding the effects of the emotions on learning.

2.2.3.6 *Situation Specificity of Achievement Emotions*

Another aspect of the theory that has relevance to this study is the proposition that control and value appraisals and thus achievement emotions are situation specific, pertaining to specific academic domains or subdomains and tasks within these domains (Pekrun 2006; Pekrun and Perry 2014). Therefore, with specific regard to this study, it should not be assumed that the outcomes of research in other domains (e.g. maths) would be directly

relevant to a language-learning domain; research specific to language learning is needed. Pekrun and Perry (2014) extend this assumption to include more distal individual and situational antecedents, meaning the influence of factors such as task content and design, and features of an achievement setting are also organised in domain-specific ways.

2.2.3.7 *Universality of Emotion Mechanisms*

The final aspect of the theory considered is the stability of these appraisals. The CVT proposes that the functional mechanisms of human emotions are bound to universal, species-specific characteristics of our mind (Pekrun 2006, p. 329). This assumption implies that the basic structures and causal mechanisms of emotions should remain stable across individuals, genders, academic domains and learning environment. However, the mean level and specific contents of appraisal can differ, thus allowing the theory to be considered in learning contexts beyond the traditional learning environment, for which it was first proposed. This assumption is of particular relevance to this study as it indicates the relevance of control-value perceptions to the arousal of emotion in an online language-learning context.

2.2.4 Emotion Antecedents in Digital Learning Environments

2.2.4.1 *Control and Value Appraisal Antecedents*

Emotion antecedent research conducted in digital learning environments has shown that perceived control and value of achievement activities and outcomes have consistently predicted learners' emotions in these settings (Artino and Jones 2012; Lehman, D'Mello and Graesser 2012; Noteborn *et al.* 2012; Butz, Stupnisky and Pekrun 2015). Noteborn *et al.* (2012) found that task value was positively related to enjoyment and negatively related to boredom in a virtual world. Similarly, Butz *et al.* (2015) found that control and value appraisals were both positively associated with enjoyment, hope and pride, and negatively associated with helplessness amongst both online and on-campus students in their synchronous hybrid course. By manipulating learners' degree of control, Lehman, D'Mello and Graesser's (2012) experiment found that students reported higher levels of negative emotions when their level of control was limited. Artino and Jones (2012) found that students' self-efficacy related to learning in a self-paced online course and their value appraisals pertaining to the tasks they faced were both positively associated with

enjoyment and negatively associated with frustration and boredom. In sum, these studies find the expected positive association between control and value appraisals and positive emotions and the expected negative association between control and value and negative emotions.

Furthermore, Loderer, Pekrun and Lester (2018) undertook a meta-analysis of research related to the CVT conducted in what they define as 'technology-based learning environments'. They found that the levels of emotions differ across learning environments but that their functional relations with appraisals and learning are equivalent across these environments. This conclusion echoes Daniels and Stupnisky's (2012, p. 225) research, which reviewed articles in the 2012 *Internet in Higher Education* journal special issue on emotions in online learning environments and concluded that:

...although there are different targets for the appraisals of control and value when course delivery changes, ultimately, students are still evaluating their levels of perceived control and value...in the end both appraisals appear to affect the experience of discrete achievement emotions in much the same way as has been found in face to face classrooms.

Beyond the independent effects of control and value on emotions, the CVT also implies that control and value appraisals interact in triggering emotions. However, studies addressing the interactive effects of control and value on emotions are lacking in digital learning environments. Only a small number of studies have addressed this interactive effect and they have been based in traditional classroom settings. Goetz *et al.* (2010) conducted one such study. They found that the relation between control appraisals and enjoyment, pride and contentment was stronger in situations where high value appraisals are reported. Another, conducted by Bieg, Goetz and Hubbard (2013) found that for anxiety and pride, their relation with control was stronger (positively for pride and negatively for anxiety) in cases of high value, whereas the relationship between control and boredom changed direction depending on the value appraisal. A third study by Kögler and Göllner (2018) supports this finding regarding control and boredom. These studies, conducted in face-to-face learning environments, show that control and value do indeed interact to predict emotions. This finding holds a particular importance for the development of courses and design interventions (Beig, Goetz and Hubbard 2013). It is important, therefore, that this interaction effect is investigated in a digital learning environment to determine whether the findings discussed here hold in other learning contexts.

2.2.4.2 Other Antecedents of Emotions

Beyond control and value, research has identified other constructs as precursors for emotions in digital learning environments. Prior to the establishment of the theory, Järvenoja and Järvelä (2005) conducted a qualitative study to investigate how students described the sources of their emotional experiences when learning using computers. The results showed that there were five main sources of emotion, i) self, ii) context, iii) task, iv) performance and v) social. In the same issue, Wosnita and Volet (2005) summarised the sources of emotion identified by a number of their research papers, revealing that emotions can be directed at tasks, technology, self, one other person or a group of other people.

More recently, research has considered the impact of situational factors on emotions in digital learning environments. D'Mello *et al.* (2014) considered the cognitive qualities of tasks as an antecedent to emotion. They showed that by inducing cognitive conflicts through contradictory information, confusion was evoked among the learners. The aesthetics of the learning environment have also been shown to influence emotion. Um *et al.* (2012) found that the use of round shapes and warm colours in the illustrations and animations of a computer-based lesson induced positive emotions in learners that in turn facilitated the comprehension and transfer of learning scientific materials. A number of studies focused on Intelligent Tutoring Systems have also demonstrated the influence of instructional strategies on emotions. In a review in 2014, D'Mello and colleagues identified twelve affect-sensitive strategies employed by six different case studies focused on detecting and minimising negative states. The strategies included: encouragement; motivational messages; empathy; emotional displays; attentional reorientation messages; content repetition; explanation-based sub-dialogs; contradictory dialogs; instructed reappraisal; affective support messages; nonverbal mirroring; and false biofeedback. The studies that implemented these strategies reported positive outcomes like engagement, persistence, and learning, although with considerable variability in effectiveness. Differences in effectiveness were based on individual attributes and/or aspects of the learning session. These studies, which focus on the relation between the learning environment and emotions, highlight the potential impact that appropriate design interventions can have on the emotional experiences of learners.

2.2.5 Epistemic Emotions

The emotions learners experience while engaged in cognitive tasks during a language learning MOOC can be seen as epistemic emotions and/or achievement emotions. As is discussed in more detail in Section 2.6.1, language learning is an active process that involves both the development of skills and the acquisition of knowledge (Bárcena and Martín-Monje 2014). During the language MOOC, learners engage in cognitive activities that facilitate the acquisition and demonstration of these various elements of the language-learning process. Such activities are typically judged according to standards of quality by the students themselves and by course educators. As a result, a range of both performance-based (achievement) and knowledge-based (epistemic) emotions could be activated while engaged in learning activities on the course. This study, therefore, investigates epistemic emotions along side achievement emotions as potential emotions that could be experienced during the Irish language MOOC.

For a long time, however, research on emotions in education has focused predominantly on achievement emotions. More recently, educational researchers have expanded the range of emotions to include epistemic emotions, such as confusion, surprise and curiosity, which are associated with processing new information (see section 2.2.1.4; Pekrun and Stephens 2012).

While epistemic emotions have been considered theoretically (Brun and Kuenzle 2008; Morton 2010), only a few studies have examined the origins of these emotions empirically. In one such study, Chevrier *et al.* (2019) investigated the antecedents of epistemic emotions captured by a think-aloud procedure as learners engaged with four conflicting texts on the causes and consequences of climate change. They identified that epistemic emotions were triggered by epistemic congruence, appraisals of information novelty and complexity, and appraisals of the attainment of epistemic aims. As part of a series of studies, Vogl *et al.* (2019) also investigated cognitive incongruity as an antecedent to three epistemic emotions, surprise, curiosity and confusion. In one study, university students participated in a trivia task, in which they had to indicate whether a number of statements were correct or incorrect. After making their decision, participants had to indicate how confident they felt about their answer. Upon receiving feedback as to whether their answer was correct or not, they were asked to rate how they felt at that very moment. Within-person analyses revealed that surprise, curiosity and confusion were

induced by high-confidence errors. The intensity depended on participants' confidence in the answers that turned out to be incorrect (cognitive incongruity).

It has also been shown that control-value perceptions are relevant to the arousal of epistemic emotions (Muis *et al.* 2015; Pekrun *et al.* 2017). Muis *et al.* (2015) examined whether interactions between perceived control for carrying out a complex mathematics problem and value for that task served as antecedents to the epistemic emotions elementary students experienced. Of particular interest, path analyses revealed that value was an important antecedent to curiosity, enjoyment, confusion, frustration and boredom. The more students valued mathematics, the more curiosity and enjoyment they experienced. Simultaneously, the more students valued mathematics, the less likely they were to experience confusion, frustration and boredom. Control, in comparison, was only associated with anxiety wherein the more students felt in control of their learning the less anxious they were. Pekrun *et al.* (2017) also investigated task value as an antecedent to epistemic emotions. Similar to Muis *et al.* (2015), they found that curiosity and enjoyment correlated positively with the perceived value of a task while boredom correlated negatively with this appraisal. The other emotions, surprise, confusion, anxiety and frustration were not correlated with task value.

Overall, epistemic emotions are understudied relative to achievement emotions. This conclusion is significant given the fact that emotions serve important functions for learning. Studies have shown that epistemic emotions are critically important for cognitive learning, problem solving, and the generation of knowledge (D'Mello *et al.* 2014; Kang *et al.* 2009). More research is needed that considers these emotions, in particular in online learning contexts, given that each of the studies identified above were conducted in face-to-face settings. A deeper understanding of the origins of epistemic emotions may reveal new opportunities for enhancing cognitive processes during learning.

2.2.6 Person-Centred Analyses

Voelke *et al.* (2014) identified that there is a disparity between emotion theory and related research in the behavioural sciences: emotion theories generally refer to within person processes while empirical research focuses largely on between-person designs.

The vast majority of empirical research in the behavioural sciences is based on the analysis of between-person variation. In contrast...the mechanisms specified by psychological theories generally within, rather than across

individuals. This disconnect between research practice...and psychological theories constitutes a major threat to the conceptual integrity of the field.

(Voelke *et al.* 2014, p. 193)

Such is the case for research relating to the CVT. Although the findings reviewed previously are consistent with the CVT's general predictions, they only address the variation of variables between individuals (inter-individual), i.e. the relationship between cognitive appraisals and emotion in one person and cognitive appraisals and emotion in another person. This limitation is likely the result of only assessing appraisals and emotions once per person. However, as Goetz *et al.* (2016, p.116) correctly point out, the CVT refers to the relationship between appraisals and emotions within each person (intra-individual) and thus, empirical findings that focus on between-person trends do not provide direct evidence on the validity of the theory. While it may be the case that the within person relationship between cognitive appraisals and emotions is the same in both size and direction as the between-person relationship, researchers do not confirm this assumption. Furthermore, evaluating inter-individual differences becomes problematic when attempting to draw conclusions about intra-individual functioning. Any attempt to do so is referred to as ecological fallacy and involves interpreting data on a lower level or intra-individual level that are in fact aggregated on a higher level (Hox 2010). In this thesis, it is argued that within-person approaches are vital for examining the psychological mechanisms underlying emotions.

At present, there are limited number of studies that test the CVT using an intra-individual approach (Ahmed *et al.* 2010; Bieg, Goetz and Hubbard 2013; Goetz *et al.* 2016; Kögler and Göllner 2018). Ahmed *et al.* (2010) found that a substantial proportion of variation in learners' emotional experiences lies within individuals e.g. across the eight emotions investigated, over half of the total variance was within-students. They also found that the associations between appraisals and emotions were as predicted by the CVT. Higher competence appraisals were negatively associated with anger, anxiety and hopelessness and positively associated with enjoyment, hope and pride. Similarly, the value appraisal predicted anger, anxiety, and boredom negatively, and it predicted enjoyment, hope and pride positively. Findings from Bieg, Goetz and Hubbard (2013) were for the most part consistent with Ahmed *et al.* (2010). There was one exception, however, regarding the relation between value and anxiety, which was positive. While

previous research has reported a negative association between these two variables, the authors claim that the positive relation identified in this study is more in keeping with the assumptions of the CVT (Pekrun 2006). Finally, a more recent study conducted by Kögler and Göllner (2018) compared the relation between cognitive appraisals and boredom at three measurement levels, (between times within lessons, between lessons within students, between students) in order to learn more about where the effects are located. They found that while value negatively predicted boredom at all levels, the relation was strongest at the between-students level (level 3). The control appraisal on the other hand was significantly related with boredom only at the between-students level (level 3).

Concerning the methodology behind within-person designs, all of the identified studies have adopted an experience sampling approach. A variety of methodological labels such as event-sampling, real-time data capture, time-situated method, ambulatory assessment, intensive-longitudinal designs, or ecological momentary assessment have also been used to refer to this underlying methodology (Riediger 2010). Experience sampling involves participants completing self-report forms or questionnaires repeatedly as they go about their daily lives (Larson and Csikszentmihalyi 2014). In an educational context, the questionnaires are usually short and presented to learners on several occasions during the learning process (see Volet 1997; Boekaerts 2002; Ainley, Corrigan and Richardson 2005). Data collection periods for the studies referenced in this section were approximately two weeks, obtaining between 8 and 12 responses per person during that period. In Ahmed *et al.* (2010) participants responded to questionnaires following pre-determined classes, while in Kögler and Göllner (2018) and Bieg, Goetz and Hubbard (2013) participants were randomly signalled during specific classes.

Overall, findings from within-person studies highlight the importance of considering the ebbs and flows of learners' emotions during learning. Moreover, they show that control and value function as antecedents to learners' emotions at this level. The relations are generally consistent with those from between-person studies. Although, the contradictory findings regarding control and anxiety found in Bieg, Goetz and Hubbard (2013) and the differences in effect sizes identified at each level by Kögler and Göllner (2018), show that analyses conducted at the between-person level may not always provide accurate information regarding within-person functioning. While the move beyond between-person studies is encouraging, so far, studies have focused solely on authentic classroom

settings and are limited regarding the types of learners addressed – secondary school students (12-15 years) are the only population investigated to date.

2.2.7 Summary

The CVT offers a well-established framework for investigating the antecedents of learners' emotions. However, empirical support for the theory, from both traditional classroom settings and online, has focused for the most part on the between-person relations between antecedents and emotions. Studies addressing within person variation, which are more in keeping with the assumptions of the theory, are less common and so far, have been limited to classroom settings and samples of secondary school students (12-15 years). Moreover, only two studies have investigated the interactive effects of control and value on emotions in academic settings, and they too have been based in classrooms.

Other antecedent research shows how aspects of the learning environment can function as antecedents to emotions, with studies that have tested emotionally aware design interventions demonstrating the practical significance of emotion research with regard to enhancing the online learning environment.

Finally, research that considers emotions other than achievement emotions is limited. Therefore, this study will investigate epistemic emotions along side achievement emotions as potential emotions that could be experienced during the Irish language MOOC. Thus, extending research on the antecedents of epistemic emotions to an online learning environment. It will also be one of the first studies to investigate the within-person functioning of several epistemic emotions simultaneously. Overall, it is evident that while research has begun to explore the CVT in online learning contexts, many questions remain unanswered.

2.3 The 'MOOC' concept

MOOCs are one of the most recent online learning innovations to emerge in the Higher Education sector. In contrast to more formal forms of online learning where students have to meet certain admission requirements and follow full education programmes, MOOCs are relatively short courses, accessible to anyone, anywhere, who has an internet connection. While the nature and composition of individual MOOCs is variable, learning

on MOOCs in general is different. Even though MOOCs draw on elements of existing educational and learning models, they represent a new approach to instruction and learning.

More specifically, the content in MOOCs is not always static, it evolves dynamically through learner participation and user-generated content. The informal nature of MOOCs means that educators can experiment with new resources and innovate within the teaching practice of the provider. The shorter course timeframes in MOOCs, unlike longer online modules that contribute to wider degree programmes, also give instructors and designers the opportunity to take an iterative approach to design, making changes based on feedback and learning analytics. With open and flexible enrolments, MOOCs attract learners with diverse motivations and goals, and differing levels of engagement. Motivations for learning are wider ranging than is normally observed in a conventional course. Not all learners intend to complete the course or gain a certificate, other motivations include: interest in the topic, access to free learning opportunities, the desire to refresh knowledge, the opportunity to draw on world-class university knowledge, to meet new people, to challenge themselves or simply for fun (Davis *et al* 2014; Kizilcec, Piech and Schneider 2013). In terms of engagement, MOOCs facilitate a 'drop in' and self-directed approach to learning where individual learners are able to self-select and independently navigate activities. Accordingly, patterns of engagement vary and learners do not always adhere to the learning behaviours expected in formal course offerings (Kizilcec, Piech and Schneider 2013). MOOC learners can also be diverse in terms of their backgrounds, including age, education and life experience (Breslow *et al.* 2013). In comparison, registration restrictions (e.g., degree desired, age cohorts, or prerequisite knowledge), associated with formal online course offerings can limit the diversity of the participants in these courses. Although recent research suggests that MOOCs currently are not attracting as diverse a body of learners as you would expect (Hollands and Tirthali 2014).

MOOCs, as distinct learning environments, attract much attention from researchers (Veletsianos and Shepherdson 2016) due to the magnitude and variety of data they can provide (DeBoer *et al.* 2014). However, as further detailed in the following sections, MOOCs are constantly evolving and many questions remain unanswered concerning the

design of these environments. It is argued that emotion research has much to contribute in this regard.

2.3.1 MOOCs: A Global Phenomenon

Since MOOCs first appeared in 2008, a number of companies and partnerships have emerged such as EdX, Coursera and FutureLearn, which offer a platform to institutions through which to deliver their MOOCs. Although MOOC providers represent a small segment of the higher education sector, their global outreach is considerable, and the number of students enrolled is high. According to Class Central, an online portal which collates information about MOOCs and MOOC providers, there were over 101 million learners enrolled in over 11,400 MOOCs throughout the world in 2018 (Shah 2018). Allen *et al.* (2016, p. 38) expectantly claim that “the number of students touched by a MOOC can easily match that of those taking distance education courses”.

As well as the massive student uptake, MOOCs are global. For instance, EdX, Coursera and Udacity are US-based, while FutureLearn is UK-based. Many of the courses on the Iversity platform target German-speaking students, MiriadaX provides courses through both Spanish and Portuguese and France Université Numérique (FUN) is a French government-funded platform. Other national governments around the world have launched their own country-specific MOOC platforms that offer courses in languages other than English, including Italy with EduOpen, Mexico with MéxicoX, Thailand with ThaiMOOC, India with SWAYAM, Isreal with Campus-II, as well as China’s XuetangX, which had exceeded 12 million enrolments in August 2018 (EdTechReview 2018). Another interesting example is Edraak, an Arabic MOOC platform with more than 1 million registered learners. These cases demonstrate how MOOCs have spanned countries, languages, and cultures, and are continuing to garner interest from students and educators alike.

2.3.2 The Design Challenge

The distinction of MOOCs from other courses challenges the established process of design for learning. Therefore, although MOOCs are delivered to millions of individuals worldwide, questions as to how to promote optimum learning outcomes and enhance learning experiences in MOOCs are still being asked.

2.3.2.1 *Pedagogy in MOOCs*

At a general level, MOOCs were originally grouped into two broad categories (Veletsianos and Shepherdson 2016): cMOOCs and xMOOCs. cMOOCs are based on the principles of connectivism, where participants are actively involved in the creation of content (Rodríguez 2012). By contrast, xMOOCs adopt a predominantly cognitive-behaviourist approach to learning (Rodríguez 2012) and resemble “traditional, teacher-directed course[s], yet automated, massive and online” (Kennedy 2014, p.8). Explaining the difference between these two models, Siemens (2012) said, “cMOOCs focus on knowledge creation and generation whereas xMOOCs focus on knowledge duplication”. While the first MOOC was a cMOOC (Siemens 2005), xMOOCs have dominated the MOOC movement (Morris and Lambe 2014). It is noted, however, that MOOC providers are increasingly incorporating features of cMOOCs into their courses (Morris and Lambe 2014). The FutureLearn platform, in particular, facilitates this approach. They claim to support a social learning pedagogy, placing a focus on learning as conversation (FutureLearn 2018). This trend is also seen in LMOOCs. Martín-Monje, Castrillo and Mañana-Rodríguez (2017) reviewed research that indicates that existing LMOOCs tend to follow the instructional model of xMOOCs, but they also try to include elements of social interaction, which is a feature of cMOOCs. Nic Giolla Mhichíl *et al.* (2016) also noted in their review that the majority of LMOOCs aligned with an xMOOC approach, but many also incorporated forms of structured and facilitated collaborative engagement.

However, the literature is beginning to move away from what is increasingly seen as a simplistic categorisation, towards a more nuanced and micro-level discussion of exactly what is going on in different kinds of MOOCs. This move is evidenced by a number of new forms of categorisation being proposed (Downes 2010; Clark 2013; Conole 2014b). In particular, Conole’s (2014b) 12-dimension framework moves beyond a binary system and allows for variation within categories. It opens the doors for more nuanced MOOC design options, which recognise multiple purposes, topics and teaching styles. The importance of this diversification is highlighted by Bayne and Ross (2014, p.22) who indicate that:

The problem with [an] over simplistic categorisation of MOOCs is that it may do more than misrepresent what goes on in MOOCs: it may also shape and constrain future MOOC development in unhelpful ways.

While more nuanced options are welcomed, the design decisions for course creators are only complicated further.

2.3.2.2 Redefining success

Investigations of learning in MOOCs have focused on the low retention and completion rates (Liyanagunawardena, Adams and Williams 2013; Perna *et al.* 2014; Weller 2014). Consequently, design interventions are often focused on allaying these trends (Ferguson and Clow 2015). This approach stems from the fact that in traditional educational contexts, retention is an important metric that is used to measure success and educational value (Mullraney 2014).

An alternative perspective, and one with which this study closely aligns, criticises the use of retention and completion rates as a proxy for learning success in a MOOC because they fail to account for the unique nature of learning in these contexts (Sokolik 2014; Breslow 2016; Hood and Littlejohn 2016). In a recent study, Henderikx, Kreijns and Kalz (2017) compared success as determined by course completion metrics to success according to the perspectives of the learners themselves. They found that while the course completion rates from the two MOOCs investigated were 6.5% and 5.6%, the rating of success derived from learners' intentions for the same MOOCs were 59% and 70% respectively. Thus, completion rates could be a misleading indicator of learning, leading to unnecessary interventions. As Milligan, Littlejohn and Hood (2016, p. 17) state:

...it is necessary to move beyond the artificial binary distinction between completers, and non-completers, to fully investigate the motivations and drivers, including contextual, cognitive and behavioural factors, that are influencing learners' behaviour and actions.

Further research is needed to develop our understanding of the actual learning experience in MOOCs. Only then can we design the most comprehensive and effective learning environments. Grover *et al.* (2013, p.1) suggest that the question, 'What makes a good MOOC?' should be reframed as 'How can we make a MOOC work for as many of its diverse participants as possible?'

2.3.2.3 Learning analytics: One solution

The use of learning analytics to investigate the experience of learning is growing in popularity among online courses more generally (see Viberg *et al.* 2018 for review), but

also MOOCs (Tabaa and Medouri 2013; Coffrin *et al.* 2014; Seaton *et al.* 2014). The large amount of data generated by MOOCs make them very amenable to the use of learning analytics, which can be defined as “the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environment in which it occurs” (Long *et al.* 2011). In academia, there can be different levels of analytics, each providing different insights (e.g., analytics can be conducted at the level of the institution, department, or learner; van Barneveld, Arnold and Campbell 2012). In general, learning analytics refers to learner-level analytics (van Barneveld, Arnold and Campbell *ibid*), where data pertaining to learner activity, such as the number of clicks, forum interaction and formative assessments are collected to gain a depth of knowledge on students’ behaviour (Tempelaar, Rienties and Giesbers 2015). This data can then be used to identify at-risk students or problematic course units, and inform appropriate modifications, interventions or feedback (Siemens and Long 2011; Baker and Siemens 2014; Yu 2015), thus improving the quality of both teaching and learning. However, learning analytics are not a pancea. Recent critiques identify some of the challenges and limitations that need to be overcome as digital data becomes more embedded in learning management systems and educational decision making (Wilson *et al.* 2017; Selwyn 2019).

2.3.2.4 *A different perspective*

While digital trails contribute to our understanding of the learning experience, learning in MOOCs is not wholly understood using learning analytics alone (Littlejohn *et al.* 2016). As Reich (2015, p.1) notes “we have terabytes of data about what students clicked and very little understanding of what changed in their heads”. This is where emotion research can come into play, giving us an insight into the more subjective side of learning in MOOCs. This observation is supported by Terras and Ramsay (2015), who call for research into the psychological aspects of learning in MOOCs. They argue that the psychological dimension of learning is particularly significant for MOOCs because “the massive and open nature of MOOCs places the control of learning at the discretion of the learner” (Terras and Ramsay 2015, p.472). Littlejohn *et al.* (2016) agree that in MOOCs the onus is placed on individual learners to create and navigate their own learning journey. Therefore, in order to gain a more in-depth understanding of the learner experience, “it is essential to evaluate the psychological barriers and enablers to effective engagement and learning concerning MOOCs” (Terras and Ramsay 2015, p.475).

2.3.3 Emotion research in MOOCs

Research on emotions in MOOCs has begun to grow as more students and universities embrace this instructional mode of delivery. Among the research conducted to date, there has been a focus on the relation between emotions and achievement in MOOCs. Some studies have focused on attrition with results showing that negative activating emotions such as frustration, anxiety and confusion are related to dropout in MOOC settings and thus learner achievement (Wen, Yang and Rosé 2014; Dillon *et al.* 2016; Xing, Tang and Pei 2019). A study conducted by Tze *et al.* (2017) investigated the link between emotion and engagement in MOOCs. They found that learners with low levels of boredom and low levels of guilt showed more engagement in learning the course materials and in adhering to rules in the MOOC (e.g., completing quizzes on a regular basis). Anxiety, however, was more complex. While the low anxiety learners were cognitively and behaviourally more engaged than high anxiety learners, the high anxiety learners were more socially engaged than the low anxiety learners (Tze *et al.* 2017). In another study, Henderikx, Lohr and Kalz (2019) explored the relation between boredom and enjoyment and barriers to learning in MOOCs. They found small associations between levels of boredom and barriers such as 'Tech and online learning related skills', 'social context' and 'time, support and motivation'. Thus, this emotion can contribute to the experience of these barriers or these barriers can be the source of this emotion. Enjoyment, however, was not significantly related to any barrier.

Another focus of emotion research in MOOCs has been on establishing the most effective method of detecting emotion in MOOCs, trialling new algorithms, tools, models and technologies. Approaches explored to date include sentiment analysis techniques to infer positive and negative sentiment from text-based contributions to MOOC discussion forums (Wen, Yang and Rosé 2014; Chaplot, Rhim and Kim 2015; Yang *et al.* 2015). Some researchers have inferred specific emotions, such as boredom, confusion, frustration and happiness, from clickstream data obtained from course log files (Leony *et al.* 2015). Other researchers are using physiological methods. For example, Pham and Wang (2018) developed AttentiveLearner, an intelligent tutoring system for smartphones that uses both the front and back camera to track i) learners' photoplethysmography (PPG) signals (pulse changes) and ii) their facial expressions in real-time during MOOC learning. Initial results showed that it could detect the five emotions of boredom,

confusion, curiosity, frustration and happiness, with 84% accuracy (Pham and Wang 2018).

Studies investigating the antecedents of emotion in MOOCs, however, are limited. One study by Dillon *et al.* (2016) investigated the impact of the learning environment on emotions. At various points throughout the MOOC, learners were asked to report the emotions they were experiencing in relation to the course and content. They found that the emotions were content or context-sensitive; learners experienced different emotions during different types of content in the MOOC (e.g. videos, problem sets etc.). Furthermore, it was positive emotions, more specifically hope, enjoyment and contentment that were experienced most often. Daniels, Adams and McCaffrey (2016) also found that learners reported more positive affect than negative affect in a MOOC, with 61% reporting high levels of enjoyment and 71% reporting that they did not feel bored. Thus, MOOCs appear to present a largely positive emotional experience. Returning to the antecedents of emotion, a second study by Buhr, Daniels and Goegan (2019) explored whether autonomy and relatedness functioned as antecedents to cognitive appraisals and the emotions of enjoyment and boredom in a MOOC setting. They also explored whether such relationships differ for men and women. A total of 1037 participants completed an online questionnaire following their participation in a paleobiology MOOC. The study found that when learners felt that their need for autonomy and relatedness were met, they were less likely to feel bored and more likely to enjoy the course. They also found that the cognitive appraisals of control and value mediated these relationships. Control and value were positively associated with enjoyment and negatively associated with boredom. While the vast majority of the effects were the same for men and women, they did find a negative association between autonomy and enjoyment for men. One of the limitations of Buhr, Daniels and Goegan's study is that they collected data pertaining to learners appraisals and their emotions after the course had ended. Consequently, participants were reporting memories of those appraisals and emotions, which may be distorted by false memory. On the other hand, one of its strengths is that it is underpinned by a theoretical framework; emotion research in MOOCs has largely been detached from theory. Taking an atheoretical approach to research also appears to be common among MOOC research more generally (Joksimovic *et al.* 2018). It is crucial that emotion research in MOOCs is theoretically

informed in order to establish a more cohesive field of inquiry that draws on the advancements in other fields.

2.3.4 Summary

MOOCs potentially have a lot to gain from emotion research. Their unique characteristics of being massive and open present opportunities but also challenges for educators and course designers. Emotion research has the potential to influence the development of these learning environments by providing an insight into the subjective experience of learners so that more informed decisions regarding course structure and design can be made. While a growing number of studies are looking at emotions in MOOCs, there is still much more to be understood. In order to understand how MOOCs can leverage the link between emotion and learning to improve learning, more studies are needed that focus on the source of emotion in these contexts. In addition, studies to date are limited to quantitative accounts and STEM related subject domains (e.g. programming: Moreno-Marcos, Alario-Hoyos and Munoz-Merino 2018, mathematics: Dillon *et al.* 2016; Afzal *et al.* 2017; Rothkrantz 2017, and astronomy: Pham and Wang 2018). Research needs to diversify in this regard.

2.4 Emotion in Second Language Acquisition

This study aims to explore the sources of emotion in the subject domain of language learning. Therefore, this section focuses the literature review to look more specifically at existing emotion research in the area of language learning. Apart from the research on foreign language anxiety, emotions have not been a prominent topic of research in the field of second language acquisition (SLA). This dearth of research is even more pronounced among studies in online language learning. Hence, while this study is primarily focused on the online language-learning context, the following sub-sections will begin by reviewing the research conducted in face-to-face contexts. The quantity and variety of studies in this area is comparatively larger and much of the findings still hold relevance to the online domain.

Before launching into an overview and assessment of the literature on emotions in the field of SLA, however, a brief overview of the individual differences research is provided to outline the avenue through which emotion came to be acknowledged as a factor for predicting success in second language learning. Individual Differences Research

Why do individuals differ so much in second language attainment success?
After all, every healthy human being in an intact social environment masters a first language to a degree of fluency that, in other skill domains, would be recognised as elite or near elite levels...

(Segalowitz 1997, p.85)

The field of Second Language Acquisition (SLA) emerged from the study of two main areas: 1) the language acquisition process and 2) the factors that influence learners in this process (Larsen-Freeman and Long 1991). Initial studies focused on determining the similarities between learners and describing universal patterns and processes of language development (Skehan 1989). In the early 1970s, however, an alternative research tradition came to the fore: the study of the differences between learners. This change in focus arose in part from a strand of psychology research commonly referred to as individual differences (ID) research. IDs are defined by Dörnyei (2005, p.1) as "...characteristics or traits in respect of which individuals may be shown to differ from each other".

In the field of SLA, it is widely acknowledged that learners vary significantly in how successful they are at learning a language. Based on this observation a line of research investigated the 'good language learner' (GLL). The GLL studies sought to identify the characteristics and learning strategies common to those who are successful at becoming proficient in a language. This research was based on the premise that an understanding of what good language learners are like and how they go about learning a language would help improve the quality of language teaching and serve as a basis for learner training (i.e., providing guidance in how best to learn; Ellis 2004). Stern (1975), Rubin (1975), and Cohen (1977) carried out the first studies in which they speculated about distinctive learning strategies of GLLs. Naiman *et al.* (1978) carried out one of the first empirical investigations of the characteristics and learning strategies of successful language learners. Naiman and colleagues examined the experiences of both adults and schoolchildren in different learning contexts. Through this process, they identified five strategies employed by good adult language learners and a number of ID variables (e.g. personality characteristics, attitudes, cognitive style) that characterize successful learners. Perhaps one of their most interesting findings was that "...the successful or good language learner, with predetermined overall characteristics, does not exist" (Naiman *et al.* 1996). Although this study was not the first of its kind, it is credited with boosting interest in the study of IDs in the field of SLA (Dörnyei 2005). Today an extensive

body of research exists regarding IDs in SLA as researchers attempt to describe and address the acknowledged differences in language learning achievement among learners.

2.4.1.1 Taxonomy of Individual Differences (ID)

Everyman is in certain respects: a) like all other men, b) like some other men, c) like no other man

(Kluckhohn and Murray 1948, p. 35)

People differ from each other in respect of a large number of characteristics. Traditionally, ID research has only focused on personal characteristics that are enduring, assumed to everybody and on which with people differ by degree (Dörnyei 2005). Within these parameters, SLA researchers have identified a plethora of individual learner variables that influence learning outcomes. Table 2.3 lists the main variables mentioned in three prominent surveys.

There are a number of ID variables common to the taxonomies listed in Table 2.3, for example, learner aptitude, motivation, learning styles and learning strategies. The first three chapters of Skehan's (1989) book are devoted to what he considers well-defined areas in which language learners differ: language aptitude, motivation and language learning strategies. A fourth chapter briefly accommodates additional cognitive and affective influences on language learning. In a follow-up article, Skehan (1991) adds learning styles to this list. Dörnyei (2005) claims that '... the concept of IDs is rather loose, containing certain core variables and many optional ones' (p. 7). Accordingly, Dörnyei's (2005) classification identifies five core variables and a number of optional variables grouped under the heading of 'other'. With the exception of motivation, it is observed that affective factors are not central to either Skehan or Dörnyei's taxonomies, being perhaps symbolically inserted at the end of each taxonomy. Both authors imply that this omission is because their relation to SLA is not as well researched as the other factors. In this respect, Ellis (2004) presents a more balanced view. Ellis' (ibid) categorisation identifies key variables that figure repeatedly in the literature and groups them into abilities (cognitive capabilities for language learning), propensities (cognitive and affective qualities), learner cognitions (perceptions and beliefs about L2 learning), and learner

actions (learning strategies), with no hierarchical differentiation assumed among the variables.

Table 2.3 ID variables listed in three surveys

Skehan 1989	Dörnyei 2005	Ellis 2004
Language aptitude Motivation Learning strategies Cognitive and Affective factors <ul style="list-style-type: none"> • Extroversion/Introversion • Risk-taking • Intelligence • Anxiety • Field Independence Learning Styles (Skehan 1991)	Personality Language aptitude Motivation Learning styles Learning strategies Other <ul style="list-style-type: none"> • Anxiety • Creativity • Willingness to communicate • Self-esteem • Learner beliefs 	Abilities <ul style="list-style-type: none"> • Language aptitude • Intelligence • Memory Propensities <ul style="list-style-type: none"> • Learning style • Motivation • Anxiety • Personality • Willingness to communicate Learner cognitions about L2 learning <ul style="list-style-type: none"> • Beliefs Learner Actions <ul style="list-style-type: none"> • Learning strategies

In review, traditional ID research regarded motivation, and to a lesser extent anxiety, to be the affective variables that were central to success in SLA. Emotions, beyond anxiety, were disregarded, only considered indirectly by Dörnyei (2005) under the heading of ‘emotion control strategies’ within the sections on motivation and learning strategies. Dörnyei and Ryan (2015, p.11) acknowledge this omission in their book, *The Psychology of the Language Learner Revisited*, where it is hailed the “greatest omission of the classic ID paradigm”.

2.4.1.2 *A Changing Perspective*

Despite being a vibrant research area, the traditional ID paradigm has been subjected to many criticisms and as a result, has begun to change. Studies assumed that individual learner characteristics were stable, distinct, monolithic and independent of external influences (Dörnyei 2009a). A growing number of researchers have come to reject these assumptions (Pavlenko 2002; Dewaele 2009; Dörnyei 2009a). The new perspective determines that individual learner variables are i) under constant change, varying situationally and over time, and ii) made up of different components that interact with each other and the environment (Dörnyei 2009). In this regard, statements such as ‘John is motivated’ are rarely posed without caveats indicating time and place (Ushioda 2009; Dörnyei and Ryan 2015). This changing mind-set has helped other factors such as interest and emotion qualify for ID consideration (Dewaele 2009; de los Arcos 2010). Dörnyei (2009) acknowledges the growing position of emotion in SLA, by including affect in a dynamic systems framework for explaining individual differences in language learning. Emotion has also been incorporated in more recent models of language learning, such as Oxford’s (2017) strategic self-regulation (S2R) model. The S2R model presents strategies for self-regulation to support L2 learning. These strategies are grouped according to ‘the multiple selves’ of the L2 learner, of which the ‘emotional self’ is acknowledged alongside ‘the cognitive self’, ‘the motivational self’ and ‘the social self’. According to Oxford (ibid), effective learning requires the integration and regulation of all these aspects of the learner. With regard to emotion, Oxford (ibid) predominantly focuses on emotional intelligence, detailing learner strategies for being aware of and controlling emotions, underscoring the important link between emotion and language learning strategies.

While learning a language, and hence while using learning strategies, new or expanded personal identities are born, midwifed by emotion. Identities, emotions, and learning strategies are engaged in the process of symbolically – and sometimes physically – crossing borders during the language learning process.

(Oxford 2017, p. 230)

In line with more recent perspectives, emotions are viewed as dynamic and interactive elements in the overall L2 learning process. The following review details the growing interest in emotion among SLA researchers.

2.4.2 A Focus on Negative Emotion: Anxiety in SLA

It is fair to say that anxiety is the most extensively documented emotion in the field of SLA (MacIntyre and Gardner 1991; Horwitz 2001; Dewaele 2007; Gkonou, Daubney and Dewaele 2017; MacIntyre 2017 and for a review see Horwitz 2010). Learners may experience anxiety as an in-built feature of their personalities (trait anxiety) but they may also, irrespective of their personalities, experience anxiety in particular contexts (situational anxiety) (Spielberger 1983). Horwitz, Horwitz and Cope (1986) defined language anxiety as a situational anxiety unique to L2 language learning. In their view, it is “distinct complex of self-perceptions, beliefs, feelings, and behaviours related to classroom language learning arising from the uniqueness of the language learning process” (Horwitz, Horwitz and Cope 1986, p. 128). In order to make the construct researchable, they also introduced the Foreign Language Classroom Anxiety Scale (FLCAS), a 33-item, 5-point Likert scale type instrument. This quantitative instrument was widely adopted in FLA research and has greatly influenced the way in which anxiety has been investigated in the field.

Anxiety has been identified as having a debilitating effect on second language learning and achievement (Horwitz, Horwitz and Cope 1986; Philips 1992; Aida 1994; Saito and Samimy 1996; Coulombe 2000; MacIntyre and Gregersen 2012b). Indeed, Arnold and Brown (1999, p.8) state, “anxiety is quite possibly the affective factor that most pervasively obstructs the learning process”. Gardner, Tremblay and Masgoret (1997, p. 345) summarise that anxiety is associated with “deficits in listening comprehension, impaired vocabulary learning, reduced word production, low scores on standardised tests, low grades in language courses or a combination of these factors”. MacIntyre and Gardner (1994) investigated the effects of anxiety on performance in both the first and second language among a group of Canadian students during three stages of cognitive processing: (1) language input, (2) processing stage, and (3) output stage, where knowledge of the language is demonstrated. They illustrated that anxiety can disrupt language acquisition and production during all three phases of the language-learning process.

A considerable number of potential sources or causes of anxiety have been identified in the literature. These include harsh error correction (Young 1991; Gregersen 2003), fear of making errors (Gregersen 2003); difficulties with authentic self-presentation (Horwitz, Horwitz and Cope 1986), incompatibility between student and teacher (Gregersen and MacIntyre 2014), competitiveness (Bailey 1983), and many others (Horwitz 2010). With regard to the specific aspects of language learning, studies mainly associate anxiety with oral aspects of language use (Young 1990; Aida 1994; Cheng, Horwitz and Schaller 1999; Horwitz 2001). Researchers have also investigated anxiety associated with listening (Vogely 1998), writing (Cheng, Horwitz and Schaller 1999), and reading (Saito, Horwitz and Garza 1999) in a second language, albeit not as comprehensively.

The majority of research has focused on the negative face of anxiety. Alpert and Haber (1960), however, distinguished between facilitating and debilitating anxiety. Importantly, they viewed them as different but related concepts, claiming that “an individual may possess a large amount of both anxieties, or of one but not the other, or of none of either (ibid, p. 213)”. Other researchers suggest that a certain degree of anxiety can be helpful for language learning (e.g. Brown 1987). From this perspective, anxiety is viewed as a tension or arousal that challenges the learner and keeps them alert (Ehrman and Oxford 1995). In an interview conducted by Young (1992), foreign language specialists, Terrell, Rardin and Omaggio Hadley, attest to the need for a certain level of attentiveness and alertness in language learners that comes from facilitating anxiety.

Another strand of research questions whether anxiety is a cause, or a result, of lower achievement in second language learning (Sparks and Ganschow, 1991; Ganschow *et al.* 1994; Sparks and Ganschow, 1995). Sparks, Ganschow and colleagues propose the Linguistic Coding Differences Hypotheses (LCDH), which describe how foreign language (FL) learning can be enhanced or limited by the degree to which students have control over their language codes (i.e. the phonological, syntactic, and semantic components of language). Sparks, Ganschow and Javorsky (2000, p. 251) argue that anxiety is the manifestation of a deficiency in one or more of these components:

FL learning is based primarily on one’s native language learning ability (i.e., language aptitude), students’ anxiety about FL learning is likely to be a consequence of their FL learning difficulties, and students’ language learning ability is a confounding variable when studying the impact of affective differences (e.g., anxiety, motivation, attitude) on FL learning.

In response, MacIntyre (1995a, 1995b) and Horwitz (2000) concede that processing difficulties may cause anxiety in some learners. However, they also argue that since anxiety is a well-known impediment to all kinds of learning, not just language learning, and since advanced and highly successful learners experience anxiety, it cannot be implied that cognitive deficits are the sole cause of language anxiety. Perhaps most importantly, they also point out that “language learning is more than acquiring the technical skill necessary to encode and reproduce sounds” (MacIntyre 1995a, p. 245) and thus they claim that the LCDH is based on an overly simplified view of language learning. Horwitz (2000, p. 258) concludes, “Language learning is a complex interpersonal and social endeavour and to reject the role of affective factors is myopic and ultimately harmful”. In an attempt to reconcile the argument, Ellis (2004) calls for a more dynamic model that incorporates both perspectives.

More recently, studies have begun to consider language anxiety from a contextualized and dynamic perspective, investigating how it changes over time and interacts with other learner and situational variables that affect language learning (MacIntyre 2017). For example, Gregersen, MacIntyre and Meza (2014) investigate anxiety at a moment-by-moment level among six pre-service teachers as they participate in a video-recorded classroom presentation in their L2 (Spanish) while wearing heart rate monitors. Following the presentation, the participants reviewed the video-recordings and, using an idiodynamic procedure developed by MacIntyre (2012), self-rated the moment-to-moment changes in their levels of foreign language anxiety. The results showed a number of interesting fluctuations in the data that were explained partially in follow up interviews. For example, spikes in anxiety occurred when speakers forgot words or got confused with the flow of their presentation. This focus on the dynamics of language anxiety is reflective of the changing approach to researching individual difference variables more generally (see section 2.6.1.2).

2.4.3 A Move to Positive Emotions

The overwhelming concentration on negative emotion in the literature has begun to shift because of the influence of Positive Psychology. One of the leading theoretical developments in this regard came from Frederickson’s work (1998, 2001, 2004) on the broaden-and-build theory, which argues for a clear differentiation between the functions of positive and negative emotions. The function of specific emotions is often linked to the

concept of specific action tendencies (Frijda 1986; Smith and Lazarus 1990). For example, fear leads to protective behaviours such as the urge to escape. Fredrickson (1998, 2001) argues that while this model works well for negative emotions it does not sufficiently describe the form and function of positive emotions. Therefore, the broaden-and-build theory proposes a different type of response for positive emotions:

[The broaden-and-build] theory states that certain discrete positive emotions – including joy, interest, contentment, pride, and love – although phenomenologically distinct, all share the ability to broaden people’s momentary thought-action repertoires and build their enduring personal resources, ranging from physical and intellectual resources to social and psychological resources.

(Fredrickson 2001, p. 219)

MacIntyre and Gregersen (2012a, 2012b) introduced this idea to the field of SLA. They proposed a two-dimensional model to explain the different functions of positive and negative emotions in language learning, with positive-broadening and negative-narrowing continua. According to this model, the effects of positive emotion go beyond pleasant feelings: they broaden a person’s perspective making them more susceptible to absorbing a language. Positive emotion also helps dissipate the lingering effects of negative emotion. This relation is important as negative emotion tends to narrow an individual’s focus, restricting the range of potential language input (MacIntyre and Gregersen 2012a). Positive emotions also promote resilience and encourage learners to explore and play. As MacIntyre and Gregersen (2012a, p.209) point out “what could be healthier for language growth than learners who want to play, explore, integrate and establish relationships?” While it was not the first time that positive emotions had been considered in SLA, this study instigated the wave of interest in emotion research that the field is currently experiencing.

2.4.3.1 *Enjoyment and Anxiety Studies*

Among positive emotions that are potentially relevant to the learning process, enjoyment, the natural converse to FLA, has been investigated more than other positive emotions (Frenzel, Pekrun and Goetz 2007). Consistent with research on emotions in education (Frenzel Pekrun and Goetz 2007), Dewaele and associates (Dewaele and MacIntyre, 2014; Dewaele *et al.* 2016) found a pattern of greater levels of enjoyment compared to anxiety among foreign language learners in large international surveys. An important point to consider when conceptualising enjoyment and anxiety is whether they are two

distinct constructs or opposite ends of the same spectrum. Dewaele and MacIntyre (2014) examined this question using a foreign language enjoyment scale they developed and found that anxiety and enjoyment are not two ends of the same emotion continuum but instead are independent emotions that may be correlated. This finding was supported in a separate study conducted by Dewaele *et al.* (2017).

Dewaele and MacIntyre (2014) also found that higher levels of foreign language enjoyment or FLE were associated with multilingualism, more advanced levels of language mastery, a higher perception of relative level of proficiency, and higher levels of education. Further open-ended feedback from the sample revealed that specific classroom activities could boost FLE. Usually these activities empowered the students and allowed them to express their creativity through, for example, debating or creating a short video. The classroom environment, as influenced by the teachers and peers, was also found to contribute to students FLE. The strong relationship between the teacher and FLE was also supported in other studies. More specifically, positive attitudes towards the teacher, as well as more use of FL by the teacher in class contributed to higher levels of FLE (Dewaele *et al.* 2017; Dewale and Alfawzan 2018). Meanwhile, higher levels of teacher predictability were found to be linked to *lower* levels of FLE (Dewaele *et al.* 2017). Dewaele and Macintyre (2016) identified two independent dimensions of FLE: social FLE and private FLE. Social FLE related to the role that a good atmosphere among teachers and peers played in producing enjoyment. Private FLE, on the other hand, materialized in reports of the internal sense of enjoyment, often associated with a sense of accomplishment in the face of a challenge.

Gender has emerged as a variable that correlates significantly with differences in students FLE and FLA. Females have been found to experience significantly more FLE and more FLA than their male counterparts, suggesting stronger emotional reactions among female learners (Dewaele and Macintyre 2016; Dewaele *et al.* 2017). Dewaele *et al.* (2016) investigated what it is that women fear and enjoy more in the FL class. They found that the female participants had significantly more fun, felt they were learning interesting things and were prouder than their male peers of their FL achievement. However, they also worried more than their male peers and were less confident in using the FL, resulting in higher levels of FLA among the female participants. The authors argue, however, that the heightened emotionality among the females benefited the acquisition and use of the FL.

Age is another prominent demographical variable that influences the level of FLE and FLA experienced. Studies found that older learners (i.e. those in their thirties, forties, fifties and sixties) reported significantly higher levels of FLE and significantly less FLA than the younger learners did (Dewaele and Macintyre 2014, 2016; Dewaele *et al.* 2017). Dewaele *et al.* (2017) hypothesise that this is due to the different motivations of older learners. Both of these factors may be important in the current study given high level of learner diversity found in MOOCs (Breslow et al. 2013). Thus, both age and gender are considered in this study as potential factors that influence learners' emotions.

Studies have also begun to look at how these emotions change over time. As previously discussed, taking a dynamic approach to the study of emotion is a growing trend in research on affective variables more generally. Dewaele and Dewaele (2017) conducted a pseudo-longitudinal investigation to examine how FLE and FLA, and their interactions with predicting variables changed across three different age groups. They found that while FLE changed significantly among the groups, FLA remained stable. Furthermore, different variables predicted variances in FLE and FLA across the different age groups. While the students' personal assessment of their relative standing among their peers predicted FLE in Group 1 (12-13yrs) it was predominantly the teachers' behaviour that predicted FLE in Group 2 (14-15yrs) and in group 3 (16 -18yrs). With respect to FLA, the teacher had less of a significant impact. Relative standing in the class was the strongest predictor of FLA among groups 2 and 3 and language level predicted FLA in groups 1 and 2. Thus, it seems that the sources of FLE and FLA are constantly evolving.

Boudreau, MacIntyre and Dewaele (2018) take this approach a few steps further, measuring FLE and FLA at a moment-by-moment level during a language task. This approach facilitates the fleeting nature of emotional experiences and allows for a more fine-grained understanding of how these two emotions rise and fall, within persons and among persons, during a specific period. Using specialised computer software, participants provided retrospective moment-by-moment ratings of their FLE and FLA while watching a video recording of their engagement with a language-learning task. Analyses revealed that the two emotions can interact in convergent and divergent patterns over time, or they can operate independently, often following unpredictable trajectories. While the idiodynamic method adopted here by Boudreau, MacIntyre and Dewaele provides results that could not be obtained by a questionnaire or interview,

participants still report on their emotions after the fact. Thus, the limitations of human memory can come into play.

Overall, these studies show that enjoyment is central to the language learning experience and warrants attention from researchers due to its strong effect on achievement. However, it appears that research focusing on positive emotion alone is futile; there is a need to look simultaneously at both positive and negative emotion. Interpreting low levels of enjoyment or anxiety alone is ambiguous; their independence from one another means that the absence of enjoyment does not automatically imply a high level of anxiety and vice versa. This finding suggests that in addition to investigating the presence of both positive and negative emotion in the same study it may also be pertinent to investigate their intensity. Similarly, Dewaele and MacIntyre (2014) suggest that the ratio of positive to negative emotion might be more important than the presence or absence of either type of emotion.

Nevertheless, anxiety and enjoyment are only two emotions in a much longer list of potential emotions that people can experience. What are the other emotions, both positive and negative, that language learners experience?

2.4.3.2 *Increased Emotional Granularity*

In the past couple of years, emotion research in the field of SLA has begun to consider a wider spectrum of emotional states. Emotions such as shame (Cook 2006; Wang 2016; Galmiche 2017), guilt (Teimouri 2018), and pride (Ross and Stracke 2016) have been the focus of such studies. Others have investigated a much wider range of both positive and negative emotions simultaneously (MacIntyre and Vincze 2017; Piniel and Albert 2018; Ross and Rivers 2018).

Interestingly, with regard to the categorically negative emotions, their effects on learning are not necessarily all negative. Guilt was found to have a positive effect, motivating corrective actions to undo behaviours (Teimouri 2018). This influence is similar to findings in the anxiety literature (Alpert and Haber 1960; Young 1992). In the same way, with the positive emotion, pride, Ross and Stracke (2016) found that some learners had a negative perception of the emotion. This was when the learners felt they should be feeling it but they were not. It also appears that certain emotions can have a more profound effect on learning compared to others. Palevescu and Petric (2018) found that love was the

driving force in the learning process, creating effective coping mechanisms even when there was a lack of enjoyment.

Deducing learners' emotions from written narratives, Piniel and Albert (2018) found that the majority of the emotions identified could be attributed to each of the four categories of academic emotion: achievement, social, topic, and epistemic. Other emotions included feeling nothing or feeling special. They also found that emotions varied according to skill type (listening, reading, writing, and speaking). For instance, learners tended to report topic emotions most often in the context of reading, social emotions in the context of speaking and achievement emotions in the context of listening. Thus, the use of different language skills may induce different emotions in learners.

While promising, this research is only scraping the surface, more studies are needed that explore the array of emotions learners experience while learning a language.

2.4.4 Summary

Overall, this section demonstrates that emotion research in the field of SLA is undergoing significant change. In addition to the consideration of a much wider range of emotions, new methodological approaches are being adopted, and the overall conceptualisation of emotion is beginning to shift. Influenced from the beginning by the development of the FLCAS, the field of SLA has primarily employed quantitative scales for measuring learners' emotions. More recent studies, however, have used qualitative measures such as interviews (Ross and Rivers 2018) and written narratives (Piniel and Albert 2018) to explore the emotional experience of learners.

Furthermore, as noted by Gregersen, MacIntyre and Meza (2014, p.575), "research into the emotional dimensions of language learning has tended to take a retrospective, summative, trait-orientated approach" with questionnaires examining typical experiences or analysing emotion as a moment frozen in time (MacIntyre 2017). This approach is beginning to change, however, as researchers begin to consider emotions as fluctuating, contextualised states and investigate them accordingly (for an example see Boudreau, MacIntyre and Dewaele 2018). This dynamic perspective reflects the true nature of emotional experiences and aligns with the conceptualisation of emotion recognised by this study (see section 2.2.2).

2.5 Emotion in Online Language Learning

While it is important to be aware of developments in emotion research in classroom-based language learning environments, this study is focused on emotion in the context of online language learning. An initial scoping review of the literature in this specific context, however, indicated that very little emotion research had been conducted to date. Therefore, in order to obtain a true representation of current understanding regarding emotion research in online language learning, a formal systematic review of the literature was conducted. This process and the subsequent findings are discussed in the following sub-sections.

2.5.1 Systematic Review

The aim of the systematic review was to identify the emotions investigated in online language learning contexts to date. Studies were also classified according to their methodological approaches and theoretical frameworks. This review followed the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines where applicable (Moher *et al.* 2009). Preliminary guidelines produced by Polanin, Maynard and Dell (2017) following their critique of research syntheses in the field of education were also taken into consideration, in particular, when reporting on the review methodology and eligibility criteria.

2.5.1.1 Eligibility Criteria

Papers were restricted to peer-reviewed journal and conference papers published in the last two decades (2000 to March 2019) in the English language.

Types of Participants

Only studies that focused on learners/students were included. Participant gender, race, age, and other demographic information were not subject to limitation. Studies focusing on teachers' emotions were excluded.

Types of Studies

All studies were required to examine the presence, antecedents, or effects of students' discrete emotions while learning a language in an online or web-based course. Studies

based in technology-enhanced classroom settings, flipped, blended or hybrid learning environments, or which only investigated other affective phenomena such as motivation or attitudes were excluded. Intelligent tutoring systems (ITS) and distance learning environments (DLE) that utilised technology or online tools for learning were included as many of their characteristics overlap with those of exclusively online learning contexts. Summary and review papers were excluded.

Table 2.4 Summary of inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
Investigates discrete emotional states	Other affective phenomena e.g. motivation
Learner emotions are investigated	Teachers emotions are investigated
Articles in English	Articles not in English
Language learning domain	All other subjects
Online Web-based DLE ITS	Networked Language learning Tandem learning Blended learning Intercultural communication Technology situated in a classroom
Empirical papers, defined as those that analyse primary or secondary data	Theoretical, conceptual or review papers
Sample of more than one	Studies that track a single student
Peer-reviewed	Non peer-reviewed articles
Journal articles from 2000 onwards	Journal articles before 2000
Conference Proceedings from 2000 onwards	Conference proceedings before 2000

2.5.1.2 Search Strategy

First, key search terms were identified (Table 2.5) and a search strategy was developed. To limit unnecessary results, searches focused on articles that contained the keywords in the title or abstract. The following databases were explored: Web of Science, ERIC (Ebsco) and PsycINFO (ProQuest) (please see Appendix A.1 for the results obtained from each database). These databases were chosen to ensure a wide coverage of topic areas. The searches were undertaken in February and March 2019.

Table 2.5 Keywords Identified

Topic	Possible Key Words
Learning Context	Distance Education Distance Learning Online Learning Online Education Technology-enhanced Computer-assisted Digital Learning Web-based
Language Learning	Language learning Language acquisition Language learner Language education Language course Language instruction
Emotion	Emotion Affect Sentiment Feeling Anxiety Enjoyment

2.5.2 Results of Systematic Review

The initial database search resulted in 613 findings. These articles were then screened at two levels for relevance and eligibility using the inclusion/exclusion criteria detailed in Table 2.4. Notably, the term 'affect' produced a number of false results due to its use as a verb instead of a noun. Following screening, 21 studies remained. The reference lists of these articles were checked to identify any other studies of relevance. This resulted in the addition of two further studies to the list. Figure 2.1 outlines this process. A full list of excluded studies with reasons for exclusions are found in Appendix A.2, while a summary is provided in Table 2.6.

In total, the systematic review yielded 23 empirical studies with a research focus on emotions in online and distance learning contexts published between 2005 and 2019. Table 2.7 provides an overview of the 23 studies. The subsequent discussion focuses on some of the key between-study differences.

Table 2.6 Reasons for exclusion from review

Reason for Exclusion	Reason
Inapplicable learning context	49
No SLA Focus	4
Emotion not investigated	23
Teacher emotion	3
Not an empirical study	18
Unable to locate paper	6
Total	103

Figure 2.1 Flow diagram of review process

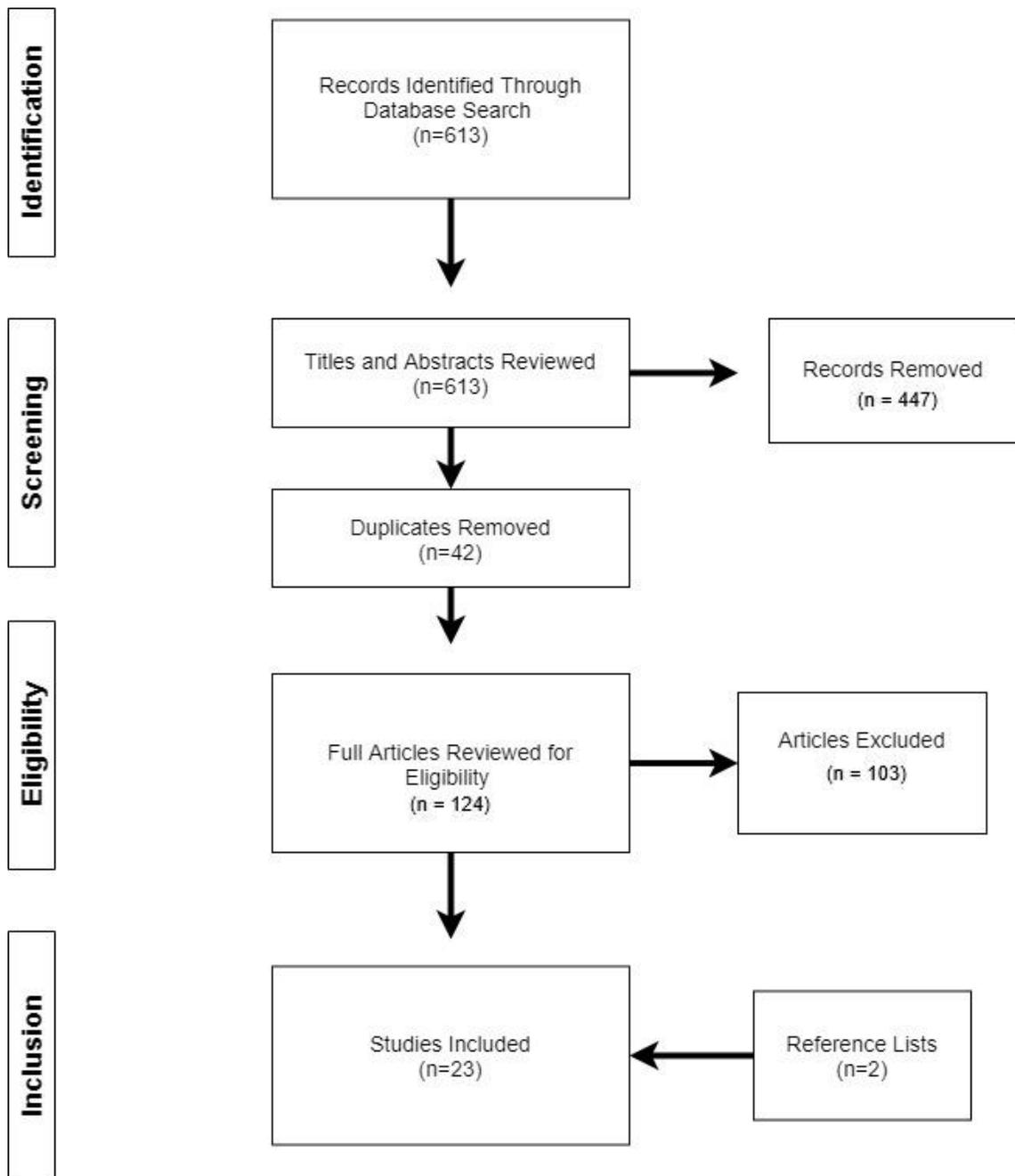


Table 2.7 Summary of studies included in review

Author(s)	Year	Country	Aim/Focus	Context	Emotion	Method	Target Language	Sample
Bárkányi	2018	UK	Presence of Anxiety in MOOCs	Distance-Online	Anxiety	Questionnaire Discussion Forums	Spanish	Adults (n=200)
Bosmans and Hurd	2016	UK	Anxiety and phonological attainment	Distance-Mix	Anxiety	Questionnaire	French	Univ. Stud. (n=87)
Chen and Lee	2011	China	Affect Detection and Interventions (Experiment)	Distance-Online	Range	Physiological signals	English	-
Chen, J. <i>et al.</i>	2016	China	Affect Detection and Interventions (Experiment)	ITS	Range	Behavioural & Physiological cues	English	Students
Chen, C.M. <i>et al.</i>	2016	China	Affect Detection and Interventions (Experiment)	ITS	Anxiety	Questionnaire	English	High Sch. Stud. (n=114)
Chen, Zhang and Liu	2014	China	Effect of anxiety on strategy use	Online Platform	Anxiety	Questionnaire	English	Univ. Stud. (n=82)
Coleman and Furnborough	2010	UK	Learner Characteristics and Learning Experience	Distance-Online	Enjoyment	Questionnaire	Spanish	Univ. Stud. (n=1345)
Coryell and Clark	2009	UK	Sources of Anxiety	Distance-Online	Anxiety	Interview	Spanish	Adults (n=12)
de los Arcos	2009	UK	Anxiety during CMC	Distance-Online	Anxiety	Interview	Spanish	Univ. Stud. (n=7)
Hauck and Hurd	2005	UK	Sources and managing anxiety	Distance-Online	Anxiety	Questionnaire Interview	French	Univ. Stud. (n=277)
Hurd	2007	UK	Sources and managing anxiety	Distance-Mix	Anxiety	Questionnaire TAP Interview	French	Univ. Stud. (n=277)
Hurd and Xiao	2010	China	Sources and managing anxiety	Distance-Mix	Anxiety	Questionnaire Interview	English	P/T Univ. Stud. (n=408)

Jung	2014	Korea	Determinants of Satisfaction and Performance	Distance-Online	Enjoyment	Questionnaire	English	Students (Elementary-Postgrad) (n=2000)
Kelsey and Mayers	2019	US	Motivation and outcomes (Duolingo)	Distance-Online	Enjoyment	Questionnaire	Italian	Univ. Stud. (N=64)
Li	2018	China	Affect Detection and Interventions (Experiment)	Online Platform	Sentiment	Sentiment Analysis	English	Students
Martin and Valdivia	2017	Spain	Anxiety and feedback	Distance-Online	Anxiety	Questionnaire	English	Univ. Stud. (n=50)
Ng, Seeshing-Yeung and Yuk Hung Hon	2007	Hong Kong	Learner Perceptions of Interaction	Distance-Online	Anxiety	Questionnaire	English	High Sch. Stud. (n=60)
Pichette	2009	Canada	Online versus Classroom Anxiety Profiles	Distance-Mix	Anxiety	Questionnaire	English Spanish	Univ. Stud. (n=186)
Santos <i>et al.</i>	2016	Spain	Affect Detection and Interventions (Experiment)	ITS	Range	Behavioural & Physiological cues Questionnaire Interview	English	Adults (n=6)
White, Dorenzo and Bortolotto	2016	New Zealand	Affect and Identity	Distance-Mix	Anxiety	Observation Stimulated Recall Questionnaires Diaries	Spanish	Univ. Stud. (n=2)
Xiao	2012	China	Affective Profile of Successful Learner	Distance-Mix	Anxiety	Interview	English	P/T Univ. Stud. (n=26)
Yuzer, Aydin and Gonen	2009	Turkey	Effect of Environment on Anxiety	Distance-Online	Anxiety	Questionnaire Diaries	English	Univ. Stud. (n=26)
Zhang and Cui	2010	China	Learning Beliefs	Distance-Mix	Anxiety Frustration	Questionnaire	English	Univ. Stud. (n=90)

Country of origin. The geographical location of the studies was determined by the institution in which the first author was located. The majority of authors came from China and the UK, which between them accounted for over 68% of the author affiliations. The authors based in the UK were all affiliated with the Open University.

Learning contexts. The majority of studies (80%) were conducted in authentic online learning contexts. However, the nature of the online contexts varied from study to study ranging from informal environments, such as smartphone applications and MOOCs, to more formal degree courses hosted by learning management systems. In addition, while some courses were based exclusively on the internet, others contained a mix of multimedia, web-based, and print materials. The remaining studies were conducted in laboratory settings, consisting primarily of intelligent tutoring systems (ITS).

Methodologies. The emotions were measured using a variety of methodologies. Most of the papers (64%) used one data collection method, fewer numbers used two (24%), three (4%) and four (8%) data collection methods. Questionnaires/Surveys were used most frequently (68% of the papers used this method). They were either administered as a once off (Pichette 2009; Chen, Zhang and Liu 2014; Martin and Valdivia 2017; Bárkányi 2018) or at two points during the course (usually pre- and post-course) to assess changes in perceptions over time (Hauck and Hurd 2005; Yuzar, Aydin and Gonen 2009; Coleman and Furnborough 2010). The questionnaires generally gathered quantitative data (see Zhang and Cui 2010 for exception). The instruments were either adaptations of the FLCAS or else the researchers developed their own scale. The second most popular data collection method was an interview, which was used by 32% of the papers. In general, participants were interviewed one-on-one, retrospective to the learning session, over the telephone (Hauck and Hurd 2005; Hurd 2007; Coryell and Clark 2009; de los Arcos, Colemand and Hampel 2009; Xiao 2012). Other, less commonly used methods of data collection included, behavioural and physiological measures; sentiment analysis; think aloud protocol; discussion forum mining; diaries and observations. Behavioural and physiological measures tracked learners skin temperature, heartbeat, facial and body movements, and voice (Chen and Lee 2011; Chen, J. *et al.* 2016; Santos *et al.* 2016). Think-aloud protocols asked students to record spontaneous verbal reports of their thoughts during a learning session (Hurd 2007). Observations and stimulated recall measures involved collecting video recordings of students' verbal and non-verbal behaviours during the learning session. For the stimulated recall, the videos were

replayed to the learner after the session and they were prompted to provide their reflections on what was taking place and recall their affective experiences at those points.

Target language. With regard to target language of the studies, 60% of the studies were focused on English language learning contexts. The others focused on other major European languages such as Spanish, French and Italian.

Emotions considered in the studies. As anticipated, anxiety was the most frequently studied emotion. It was the sole focus of over two-thirds of the studies (n=16). Enjoyment was the specific focus of three studies while a further three studies addressed several emotional states. One final study looked at positive and negative sentiment as opposed to discrete emotional states.

2.5.3 Synthesis of Findings

In this section, the findings of the studies are synthesised to create a picture of current understanding regarding emotions in online language learning. Anxiety was the most extensively investigated emotion. Studies looked at both the sources of anxiety in online language learning and its effects on the learning process in this context. Language production, in particular speaking in the target language, was identified as a major source of anxiety by a number of studies (Hauck and Hurd 2005; Hurd 2007; Hurd and Xiao 2010). Hurd (2007) found that learners reported feeling tense when they had to speak in the target language, not being able to retrieve expressions when nervous, and getting upset when they knew how to say something but could not verbalise it. This study was replicated in a Chinese context where Hurd and Xiao (2010) found that it was the use of vocabulary and grammar while speaking that evoked anxiety in learners; the Chinese students were not particularly anxious about speaking in general. Anxiety about speaking was also present in White, Drenzeo and Bortolot's (2016) study during an online synchronous role-play activity. In this case, the anxiety was intensified by lack of preparation for the task. Bárkányi (2018) also found that uploading recordings of themselves speaking was a source of anxiety for learners in an LMOOC, an informal and asynchronous language learning environment.

Certain aspects of the distance context were also found to be anxiety provoking, these included the lack of instant feedback; the nature of the task; the use of technology; unclear task instructions; intimidating answer keys; lack of confidence working alone; and

the lack of opportunities to practice (Hurd 2007, pp. 495-496). Yuzer, Aydin and Gonen (2009) found that using a computer was a source of anxiety for learners prior to the start of the course but this decreased by the end of the course. Zhang and Cui (2010) also found that distance language learners with more distance learning experience had a lower degree of anxiety and frustration than those who were starting out. Conversely, for other learners the distance context made them less anxious (Hauck and Hurd 2005; Hurd 2007). Learners attributed the lower anxiety levels to the fact that learning at a distance gave them more control; less exposure; less competition; and chances to practice in private. Furthermore, those who reported that learning a language at a distance had not caused them any anxiety attributed this to their age; competence in another language; not having to perform in front of others; and the fact that they study at a distance through choice (Hurd 2007, p.497). Furthermore, when asked whether classroom or distance learning was more anxiety provoking, the prevailing response was 'no difference' (Hurd 2007). When comparing traditional and distance learning foreign language classes in a quantitative study, Pichette (2009) also found that the distance factor did not play a role in the anxiety profile of students. There were no statistical differences (positive or negative) between classroom and distance learners in their anxiety profiles. Pichette (2009) attributed the results to the changing nature of distance foreign language classes, which include more oral interaction than before.

Other factors were also found to be associated with anxiety. De Los Arcos, Coleman and Hampel (2009) identified a strong connection between anxiety and learner beliefs. Specifically, they found that learners had existing beliefs pertaining to what it means to be a good language learner. The authors determine that it is when learners judge their behaviour to be in line with these beliefs that anxiety is diminished. Language learning experience is another factor. Pichette (2009) investigated anxiety among first semester and more experienced distance learners. Higher anxiety was reported among first-semester distance learners. Previous language learning experiences in both face-to-face and online settings were also found to have an effect on current anxiety (Coryell and Clark 2009).

A few studies looked at the effects of anxiety on learning in online and distance contexts. Bosman and Hurd (2016) found a significant negative correlation between anxiety and phonological attainment among distance learners of French, indicating that low anxiety is associated with good pronunciation skills. Xiao (2012) found that both successful and

unsuccessful language learners experienced anxiety but that it was more prevalent among the unsuccessful learners. Successful learners were able to deal with the anxiety better than the unsuccessful learners, who often took no action at all to address it. This finding highlights an important link between anxiety and successful language learning in distance contexts. Chen, Zhang and Liu (2013) also found that anxiety affects listening strategy use, indirectly influencing comprehension and success.

Beyond anxiety, some studies explored the positive emotion of enjoyment. Coleman and Furnborough (2010) explored the characteristics and experience of adult language learners online. They found that enjoyment was associated with perceptions of goal achievement. Those who felt like they were making progress towards their goals enjoyed the course more. Characteristics of the online learning environments were also found to influence learners enjoyment. Kelsey and Mayers (2018) found that learners who were using the game-like application, Duolingo, to learn Italian reported more enjoyment compared to those learning the same material from an online slideshow. Jung (2014) found that enjoyment of ubiquitous learning (u-learning) had a positive effect on language learning satisfaction. The author describes u-learning as an extension to e-learning, where learners use smartphones and other wireless devices to access learning materials and interaction at any time anywhere.

Finally, the studies that investigated several emotions focused on how these emotions could inform instructional interventions aimed at improving online language learning. During a one-to-one, synchronous web-based environment, Chen and Lee (2011) used human pulse signals to detect the three emotions of nervousness, peace and joy. Variations in these emotions were immediately reported to the instructor by the system so that appropriate learning assistance or guidance could be given. Experimental results show that the system was helpful in reducing learners' anxiety. Similar approaches were used by the studies in intelligent tutoring systems, however, they developed automated interventions and adaptations to the learning material based on changes in learners' emotional states (Chen, J. *et al.* 2016; Santos *et al.* 2016; Li 2018). Again, these studies were experimental but results showed the accuracy of the affect detection and the potential of such interventions for improving online learning effectiveness and increasing engagement.

2.5.4 Summary

Overall, it is clear that emotion research in online language learning environments is nascent in comparison to classroom-based research. Nevertheless, the above literature shows that learners who learn a language online are subject to the same emotional episodes as their classroom-based peers. However, the sources of these emotions can vary with the studies showing that the online learning context itself can be a source of both positive and negative emotions for learners (Hurd 2007; Kelsey and Mayers 2018). With regard to the emotions investigated, research appears to follow the same trends as classroom-based emotion research, focusing predominantly on anxiety with studies addressing positive emotions such as enjoyment being less common. In addition, studies looking at both positive and negative emotions were scarce and the few that were identified were testing out affect-aware intelligent tutoring systems. Research investigating the antecedents and outcomes of several positive and negative emotions simultaneously was lacking. As established in the previous sections, it is increasingly recognised that discrete emotions have different antecedents and influence learning in different ways. Emotions are also determined to be context-sensitive, emerging from person-environment interactions (Schutz *et al.* 2006; Pekrun *et al.* 2011). As such, more research is needed to disentangle the antecedents and outcomes of different emotions in online language learning contexts. The present research seeks to address this gap in the literature by examining the antecedents of a range of discrete emotions during a language learning MOOC, or LMOOC as it is more commonly called. The particulars of this online language-learning context will be explored in more detail in the next section.

2.6 The Case of LMOOCs

LMOOCs present a unique case in comparison to the wider MOOC domain. From the outset, the field of language learning has been slower than other disciplines to engage with the MOOC educational model. In 2014, Sokolik likened the growth and development of LMOOCs to being 'neonatal' in the context of the wider MOOC field. In the same year, Bárcena and Martín-Monje (2014) conducted a review of the availability of LMOOCs on the major MOOC platforms, revealing 26 MOOCs, with English and Spanish MOOCs dominating. A review of the situation in 2017 saw this number grow to 143 (Beirne, Nic Giolla Mhichíl and Ó Cleircín 2017). An increase in the number of Chinese-language MOOCs was noted, as well as an increase in the availability of MOOCs for non-major

languages such as Sanskrit and Frisian for example (Beirne, Nic Giolla Mhichíl and Ó Cleircín 2017). It is during a time of rapid change, expansion, and diversification, such as this, that concerns regarding quality are at the fore (White 2003). The continued growth of this language-learning model raises important issues for course providers concerning the rationale for adopting a particular pedagogical approach that caters for the specificities of second language learning. This early stage of development also provides an opportunity for course providers to 'get it right', informed by past mistakes and successes (Sokolik 2014).

2.6.1 The specificities of language learning

It is generally acknowledged that learning a language is different from learning other subjects due to the complex nature of its structures and systems and because it involves a significant cultural and social dimension (White 1994; Dörnyei 2003a; Hurd 2005). Language learning not only requires the passive assimilation of vocabulary items and combinatory rules. It also involves putting into practice an intricate array of receptive and productive skills, as well as linguistic, pragmatic and sociolinguistic competencies (following the terminology of The Common European Framework of Reference for Languages [Council of Europe, 2001]) (Martín-Monje, Bárcena and Ventura 2013; Bárcena and Martín-Monje 2014;). Hurd (2005) points out that these aspects are accentuated in a distance-learning context. The distance context, Hurd (*ibid*) says, is inherently non-social; learners are removed from the classroom situation and therefore lack the opportunities for speaking practice and the immediate support from peers and teachers that is readily available in a classroom setting. The challenge, therefore, is to design a course that intertwines a network of both skill- and knowledge-based capabilities, in a process that is recognised as requiring both cognitive involvement and social interaction (Read *et al.* 2010). It is particularly difficult to achieve such design aspirations in a MOOC context, which consists of potentially thousands of heterogeneous students. In addition, the majority of the major MOOC platforms contain templates that promote a transmission-based approach to learning (Morris and Lambe 2011; Conole 2013).

2.6.2 The LMOOC Literature

As a consequence of the design challenges, the nascent LMOOC literature almost exclusively focuses on the design of the courses. Reflecting on best practices, Sokolik

(2014) discusses the characteristics of an ideal LMOOC. Similarly, Perifanou and Economides (2014) propose a list of the core course elements that an LMOOC should have. Both studies agree that learner engagement, autonomy, assessment, and instructor presence are important factors when designing an LMOOC. Read (2014) considers LMOOC design from a more technological perspective and makes recommendations on how the courses should be built in terms of selecting an appropriate MOOC platform and associated toolset, and preparing the most effective resources and activities for the course. More recently, Gimeno-Sanz, Navarro-Laboulais and Despujol-Zabala (2017) reported on their experience of adapting an xMOOC model to facilitate the specificities of language learning during their LMOOC, 'Learn Spanish: Basic Spanish for English Speakers', which had around 150,000 learners in its first iteration. Alternatively, Moreira Teixeira and Mota (2014) suggest a new pedagogical approach for LMOOCs that they call iMOOC. The iMOOC is based on a synthesis of cMOOC and xMOOC, combining autonomous self-study and reflection with interaction with other participants in an open, social context. The 'i' represents individual responsibility, interaction, interpersonal relationships, innovation and inclusion.

However, Colpaert (2014, p. 170) recognises that many of these studies are taking a checklist approach to design and warns against "trying to sum up the boxes to be ticked as required features to determine the value of an LMOOC", advocating instead for more nuanced LMOOCs. To achieve this, Colpaert (ibid) calls for more rigorous approaches to research aimed at improving LMOOC design, which is similar to Conole's (2013, p.13) statement that "we need to make more informed design decisions that are pedagogically effective, leading to an enhanced learner experience". In order to make informed decisions, the MOOC learning experience itself must be investigated. However, among the already limited number of LMOOC studies, those that investigate the actual learning experience are rare. Only two studies were found. First, Beaven, Condreanu and Creuzé's (2014) focused on the psychological aspects of learning. They explored the intrinsic motivational characteristics that learners brought to the French language MOOC, *Travailler en français*, and the corresponding implications for course design. Second, Martín-Monje, Castrillo and Rodríguez (2018) used learning analytics to investigate learner activity in the LMOOC: 'How to succeed in the English B1 Level Exam'. They identified that short video-pills are the learning objects learners engage with most.

Given this paucity of research regarding the learning experience in LMOOCs, it is unsurprising that there has only been one study to date that has investigated emotion in an LMOOC (see Bárkánki 2018).

This gap is particularly significant due to the unique nature of learning in LMOOCs. Furthermore, empirical evidence showing the domain-specificity of emotions in learning (Goetz *et al.* 2006) means that it cannot be assumed that findings from other subject domains will be relevant to language learning. Emotion research specific to LMOOCs is needed to ensure the effective development of this emerging language-learning domain.

2.7 Summary and Contribution

This literature review identifies that although emotion research has filtered down through the fields of psychology, educational psychology, and its various sub-fields such as SLA, emotion research in the online domains of these fields is significantly less advanced. Therefore, the focus of the present study is to contribute to on-going research concerning the relation between emotions and appraisal antecedents in online learning environments.

The current study is unique in that it examines the antecedents of a range of both positive and negative emotions in an emerging delivery mode of language education, an LMOOC. Based on a prominent appraisal theory of emotion (Pekrun 2006), this study explores the critical cognitive appraisal antecedents of emotion in this new online language-learning environment. Focusing specifically on the appraisal constructs of control and value, the study analyses their independent as well as interactive effects on both epistemic and achievement emotions at the within-person level. To date, the empirical evidence pertaining to the intra-individual relations between these cognitive appraisals and emotions have been restricted to achievement emotions and classroom settings. This study will be the first to examine these specific appraisal-emotion relations, not only in the field of online language learning but also in the field of digital learning more generally. In order to further contribute to research, the present study will investigate the moderating effect of task type in evaluating potentially differential patterns of appraisal-emotion relations. Learners' reflections regarding the sources of their emotions are also collected to support and extend on these statistical investigations and probe other unexplored

emotion antecedents in an Irish language MOOC. The next chapter outlines the methodological approach of the study.

3 Methodology

3.1 Introduction

This study investigated the antecedents of learner emotion in the specific case of an Irish language MOOC. The previous chapter explored the background literature and set out the direction of this study. This chapter presents the details of the research design. Measuring learners' emotional experiences during the LMOOC required a multi-method research design, which incorporated two different research strategies, a mixed method questionnaire (mainly quantitative) and a qualitative diary. These two data collection methods were expected to complement each other to better understand the lived experiences of the learners.

In the following sections, this research design is explained in detail. The chapter begins by outlining the paradigm under which this study is conducted, pragmatism. This is followed by the research questions, which were the basis for all methodological decisions. Each method is then described in detail, along with the research case for the study, which is an Irish language MOOC. The chapter further describes the various stages of the research process, which includes the selection of participants, and a description of the data collection instruments and procedures. The chapter ends with a discussion of validity and reliability with regard to both the quantitative and qualitative data.

3.2 Research Questions

Using Pekrun's (2006) Control-Value Theory of Achievement Emotions (CVT) as the guiding theoretical framework, this study seeks to investigate the antecedents of learners' emotions in an LMOOC. In order for this objective to be met, the following research questions were formulated to guide the research process:

1. What emotions do learners experience during an Irish language LMOOC?
2. What are the within-person relations between control and value appraisals and emotions in an LMOOC?
3. What is the relation between LMOOC content and emotion?
4. Does LMOOC content moderate the relations between control and value appraisals and emotions?
5. What do learners perceive as the sources of their emotions?

In answering these questions, this study will attempt to:

- Identify the emotions related to Irish language learning in a MOOC
- Test the assumptions of the Control-Value Theory of Achievement Emotions (Pekrun 2006) at both a situational and person level in an LMOOC
- Establish the influence of course content on emotions
- Gain an insight into the learner perspective regarding the sources of their emotions during the course

Firstly, it is assumed that learners will report a wide range of both positive and negative emotions during the Irish language MOOC. With regard to the relations between cognitive appraisals, emotions and task types, it is expected that the propositions outlined by Pekrun (2006) will be confirmed. Hypotheses regarding these relations are outlined below. Finally, no hypotheses were formulated for the fifth research question. The fifth question was an exploratory question allowing for the participants' own perspectives.

Hypothesis 1

It is expected that control will positively predict positive emotions and negatively predict negative emotions. More specific hypotheses regarding specific appraisal-emotion relations are not formulated because the relevant literature is limited.

Hypothesis 2

It is expected that value will positively predict positive emotions and negatively predict negative emotions.

Hypothesis 3

In addition to analysing the independent effects of these appraisals on emotions, the interactive effect of perceived control and value on emotion is investigated. In this regard, it is expected that control and value will combine multiplicatively to predict the intensity of emotion experiences.

Hypothesis 4

It is expected that the different tasks will predict different emotions

Hypothesis 5

It is expected that the tasks will have a moderating effect on control/value and emotion relations

3.3 Approach to Research

It is important to recognise the philosophical assumptions that underlie research. Creswell and Plano Clark (2007, p.21) state, “all research needs a foundation for its inquiry, and inquirers need to be aware of the implicit worldviews they bring to their studies”. Many authors, such as Guba and Lincoln (1994, p.105) refer to this underpinning philosophy as ‘paradigms’, defining the term as “the basic belief system or worldview that guides the investigator”. Creswell (2003), on the other hand opts to use the term ‘worldview’. Other common terms include epistemologies and ontologies (Crotty, 1998), or broadly conceived research methodologies (Neuman 2009). In this thesis, the term ‘paradigm’ will be used to refer to the philosophical framework at hand.

Many researchers have attempted to categorise the different types of paradigms that exist. Table 3.1 outlines the four major types identified by Creswell (2003) and the major elements of each view.

Table 3.1 Four paradigms used in research

Post-Positivism	Constructivism
Determination Reductionism Empirical observation and measurement Theory verification	Understanding Multiple participant meanings Social and Historical Construction Theory Generation
Advocacy and Participatory	Pragmatism
Political Empowerment and Issue orientated Collaborative Change orientated	Consequences of actions Problem –centred Pluralistic Real world practice orientated

Creswell (2003, p. 6)

Adopting a pragmatic stance means to believe that “the essential criteria for making design decisions are practical, contextually responsive and consequential” (Datta 1997).

Pragmatism assumes that there are both singular and multiple realities open to empirical inquiry (ontology) and accepts both objective and subjective points of view (epistemology) (Feilzer 2009). Dewey (1925, p.40) claims that the pragmatist's view of the measurable world relates to an existential reality or an experiential reality with different layers, some objective, some subjective, and some a mixture of the two. Consequentially, much of mixed method enquiry is conducted under the umbrella of pragmatism (Feilzer 2009). However, many authors have been criticised for trivialising the term 'pragmatism' by adopting a 'what works', a-paradigmatic approach to mixed method evaluation (Greene 2007; Denzin 2012; Hall 2013). Denscombe (2008) claims that such approaches replace reflective mixed methods practice with convenience, which "can damage the credibility of research design, implementation and reporting" (Lipscomb 2008, p.33). Denzin (2012, p.81) points out that pragmatism is more than a methodology:

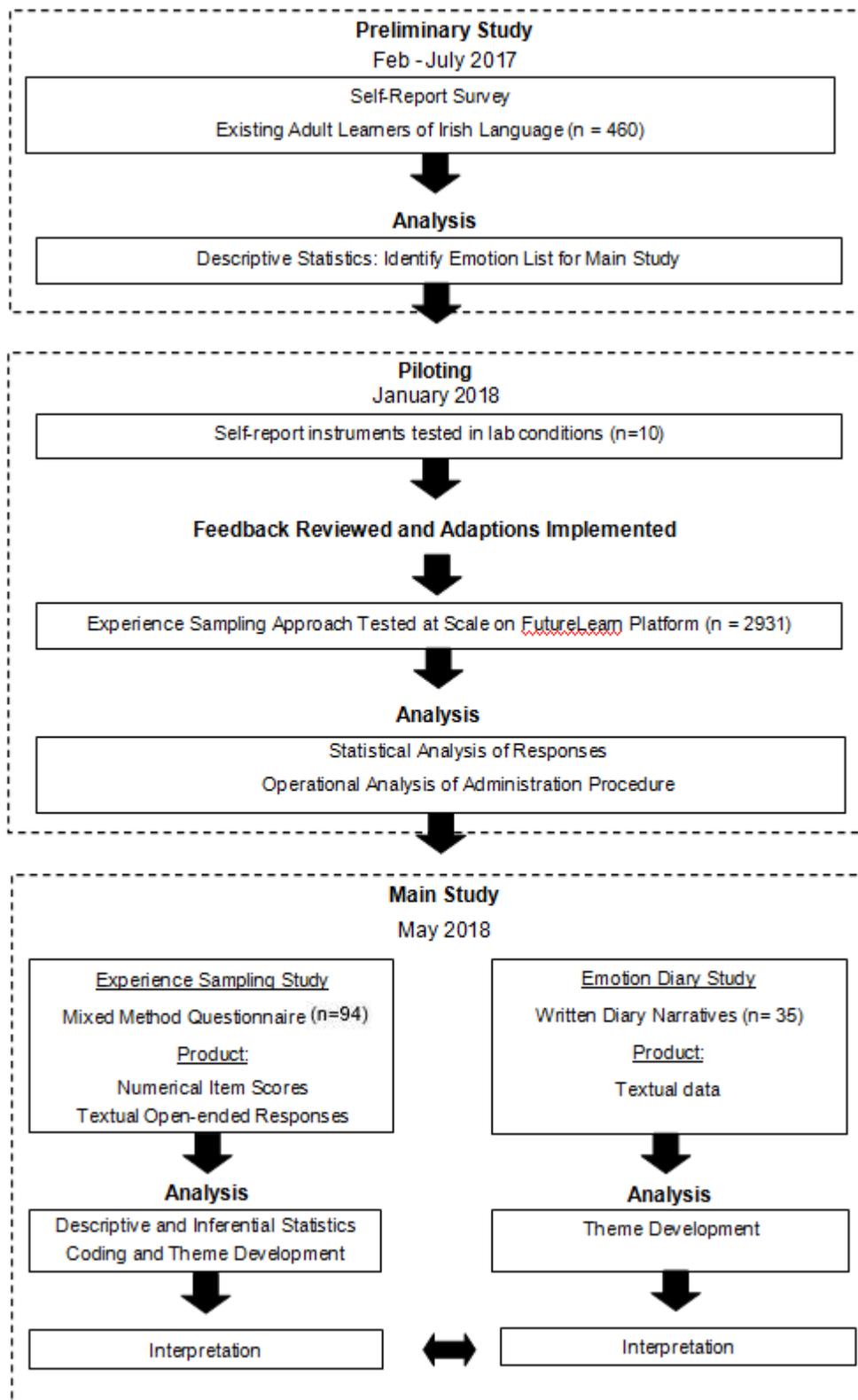
[Pragmatism] is a doctrine of meaning, a theory of truth. It rests on the argument that the meaning of an event cannot be given in advance of experience. The focus is on the consequences and meanings of an action or event in a social situation. This concern goes beyond any given methodology or any problem-solving activity.

In order to minimise the risk of such criticisms researchers advise that the research questions should drive decisions regarding research methods (Tashakkori and Teddlie 2003; Mertens 2015; Robson and McCartan 2016). In line with this recommendation, the data collection and analysis methods for this study were chosen based on their suitability and efficacy to address the research problem at hand. This decision process is outlined in the following sections.

3.4 Research Design

This research adopts a multiple methods case study design. The design process was iterative in nature comprising three phases (see Figure 3.1). The first phase consists of a preliminary study designed to identify a list of emotions relevant to an Irish language-learning context. Second is the piloting phase, which includes two pilot studies, one to test the instruments and the other to test the feasibility of conducting an experience sampling study on a MOOC platform. The third and final phase comprises the main research project, which adopts a multimethod design. The findings from each phase inform the design and implementation of the subsequent phase. Each phase is explored in more detail later in the chapter. The following sections outline the rationale for the research design.

Figure 3.1 Overview of research design



3.4.1 Case Study

There are a number of definitions and descriptions for case study research presented throughout the literature. In collating these definitions, Merriam (2009, p.40) determines that “the single most defining characteristic of case study research lies in delimiting the object of study, the case”. Stake (2005, p.443) proposes that a case study is less of a methodological choice than 'a choice of what is to be studied'. The 'what' referred to by Stake (ibid) represents the case itself. Creswell (2007 p.73) describes a case as 'a bounded system'. The phenomenon under investigation in this study is intrinsically bound in an Irish language MOOC. Yin (2009, p.18) determines that a case study design should be adopted when the phenomenon under study and the context in which it is investigated are not readily distinguishable from one another:

A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.

The investigation of language-learning emotion is one such phenomenon that is bound within a context. Furthermore, the case study approach “provides an opportunity for one aspect of a problem to be studied in some depth” (Bell 2014, p.10). In this study, the issue at hand is the identification of learners’ emotions while learning Irish online.

3.4.1.1 *Type of Case Study*

Several different types of case study exist and categorical variations differ depending on the author. Yin (1993) identifies three different types: exploratory, descriptive and explanatory. Merriam (1998) also identifies three: descriptive, interpretive and evaluative. Stake (1994) names two: intrinsic and instrumental. The type of case study undertaken in this research is best described as an intrinsic case study, as defined by Stake (1994). An intrinsic case study is chosen because of an intrinsic interest in the case itself. The focus is on gaining an understanding of the particular case in all “its particularity and ordinariness” (Stake 2006, p. 437). An instrumental case study, in comparison, is chosen to illustrate a greater issue or problem, or in other words, to understand something other than the case itself (Stake 2006). Concerning this study, the case of learner emotion in an Irish language MOOC, was chosen because it is of particular interest to the researcher, in and of itself.

3.4.1.2 *A Single Case*

This study explores a single case. The choice of a single case may be explained, as it stands for both a critical case and a unique case, according to Yin (2014, p.51). The case under investigation may be described as a unique case as no other online Irish language courses of this nature currently exist. It is a critical case as it represents a significant contribution to knowledge by testing the CVT (Pekrun 2006) in an LMOOC environment. A single case study can be further categorised as either a holistic or an embedded case study (Yin 2014). In this study, data is analysed at an individual level, at a group level, and at a course or program level, thus presenting multiple units of analysis. This research, therefore, falls under the definition of an embedded case study design (Yin 2014, p.55). The case is described in more detail in Section 3.5.

The case in this study is investigated using multiple methods. Many researchers advocate for the use of multiple methods within case study research in particular (Stake 2006; Merriam 2009; Yin 2014). This view is emphasised by Denscombe (2010, p.54):

One of the strengths of the case study approach is that it allows the researcher to use a variety of sources, a variety of types of data and a variety of research methods as part of the investigation. It not only allows this, it actually invites and encourages the researcher to do so.

In researching this case study, a variety of data types and methods are used. The methods used will be explored in more detail in the subsequent sections. The following section provides a rationale for the use of multiple methods.

3.4.2 Selecting a Method

From an intuitive perspective, it should be easy to determine whether someone is experiencing a particular emotion. Taking a rigorous analytical approach to the measurement of emotion, however, is significantly more problematic. As illustrated in Chapter 2, the literature presents a wide range of approaches for studying these types of affective variables. However, it is important that the researcher considers their own epistemological, ontological and theoretical standpoint when choosing a method as well as practical constraints or opportunities associated with the learning environment in question (Rienties and Alden-Rivers 2014). Picard, Vyzas and Healy (2001) identified five factors associated with affective data collection. These factors could influence the quality of the data obtained and therefore should be considered by researchers when designing

emotion-related studies.

Table 3.2 Five factors that influence affective data collection

Factor	Consideration
Subject-elicited versus event-elicited	Does subject purposefully elicit emotion or is it elicited by a stimulus or situation outside the subject's efforts?
Lab setting versus real-world	Is subject in a lab, or in a special room that is not their usual environment?
Expression versus feeling	Is the emphasis on external expression or on internal feeling?
Open-recording versus hidden-recording	Does subject know that anything is being recorded?
Emotion-purpose versus other-purpose	Does subject know that the experiment is about emotion?

(Picard, Vyzas and Healy 2001, p.6)

3.4.2.1 A Self-Report Approach

This study adopts a self-report approach to measuring emotion. This choice was underpinned by the fact that the research questions in this study relate to the human experience, which indicates the need to account for the individual perspective. Emotions are subjective experiences (Shuman and Scherer 2014) that can be verbally communicated (Pekrun and Linnenbrink-Garcia 2014). Pekrun (2016, p.50) tells us that self-report provides “a more differentiated assessment of emotion than any other method available”. Furthermore, the organic online context in which this study is being conducted necessitates a self-report data collection method due to the wide geographical distribution

of a large sample and the corresponding infeasibility of alternative methods such as behavioural or physiological observation.

3.4.2.2 Quantitative versus Qualitative

In order to statistically investigate the relationships between phenomena, a quantitative measure was an obvious choice. A quantitative measure also facilitates the investigation of a large sample such as the thousands of learners that typically enrol in MOOCs. The short-lived nature of emotions and their context-dependency (Rosenburg 1998) rule out a retrospective measure. Moreover, this study is particularly interested in investigating within-person trends and variability. Hence, a quantitative measure is necessary for obtaining real-time, repeated measures while also ensuring minimum disruption to the learning process. However, an understanding of the experience of emotion from the learners' personal perspectives was also sought, thus, incorporating a qualitative element was also critical. It was, therefore, deemed necessary that a triangulation of both quantitative and qualitative methods was needed to address the aims of this study.

3.4.3 A Multimethod Design

The logic of triangulation is based on the premise that:

No single method ever adequately solves the problem of rival causal factors. Because each method reveals different aspects of empirical reality, multiple methods of observation must be employed. This is termed triangulation. I now offer as a final methodological rule that multiple methods should be used in every investigation.

(Denzin 1978, p. 28)

Denzin (ibid) further differentiates between four types of triangulation: a) data triangulation, b) investigator triangulation, c) theory triangulation, and d) methodological triangulation. This study will adopt methodological triangulation, which is the use of multiple methods to study a program of research (ibid).

Multiple methods research has a variety of definitions and terminology variations in the literature. Brewer and Hunter (2006, p. 63) define a multimethod strategy as:

...the use of multiple methods with complementary strengths and different weaknesses in relation to a given set of research problems. But these criteria

don't imply that one must always employ a mix of qualitative and quantitative methods in each project. This may sometimes be the case, but some research problems might be better served by combining two different types of quantitative methods...or of qualitative methods.

Other researchers base their definitions on typologies, differentiating between different design approaches. For example, Caracelli and Greene (1997) identified two basic types of mixed method designs, which they called 'component' and 'integrated' designs. Component designs are ones in which "the methods are implemented as discrete aspects of the overall inquiry", while integrated designs involve "a greater integration of the different method types" (Caracelli and Greene 1997, pp. 22-23). Teddlie and Tashakkori (2003) present a different typology, based on qualitative and quantitative approaches. They differentiate between mixed methods designs and multimethod designs. According to this typology, multimethod designs combine two different types of either quantitative or qualitative methods, while mixed method designs use both quantitative and qualitative data collection procedures (ibid). Teddlie and Tashakkori (ibid) further differentiate between mixed methods research, which is the combining of methods alone, and mixed model research, which combines qualitative and quantitative approaches at all phases of the research process.

This study accepts the definition proposed by Morse (2003, p. 190), who determines that a multimethod design is one that involves two or more research methods that are relatively complete on their own but they form components of one research program when combined. Morse (ibid) also differentiates between a multimethod design and mixed method design. According Morse (ibid, p.199), the major difference is that in multimethod designs all projects are "complete in themselves". In line with this definition, the research program in this thesis consists of two discrete components: (1) a momentary questionnaire study and (2) a diary study.

Each of these studies provide a different perspective on the emotional experience of learners by collecting different levels and types of data. The questionnaire measures the statistical relations between cognitive appraisals, emotions, and tasks at a within-person level. The diary study delves deeper into the individual experience. It complements the questionnaire by gaining a deeper insight into learners' subjective interpretations of their learning experience each week.

3.4.3.1 *The Momentary Emotion Questionnaire*

The Momentary Emotion Questionnaire (MEQ) was administered using the Experience Sampling Method (ESM), as described in the literature review (section 2.2.6) and above (section 3.4.2). The ESM i) reduces memory filtering bias, ii) captures the momentary emotional experiences of students in the actual learning environment and iii) facilitates the identification of intra-individual associations between variables and the examination of variability *between* and *within* learners. Research has long highlighted the limitations of human memory. Retrospective recall is often impaired by memory biases and aggregation effects that impair the validity of the information assessed (Wilson, Meyers and Gilbert 2003; Kahneman and Krueger 2006; Kahneman 2011). In addition, by assessing participants' experiences in the moment, ESM greatly reduces the retrospective bias inherent in all self-report data. Robinson and Clore (2002) tell us that self-reports of current emotional experiences are likely to be more valid than self-reports of emotion made somewhat distant in time from the relevant experience. The sampling of participants in their natural environment ensures the collection of ecologically valid data (Scollon, Kim-Prieto and Diener 2003). Finally, the repeated nature of the sampling affords a high level of statistical power and allows for the investigation of *within-person* processes in contrast to the *between-person* comparisons that researchers are usually limited to (Zirkel, Garcia and Murphy 2015). As Hektner, Schmidt and Csikszentimihalyi (2007, p.7), summarise, experience sampling "combines the ecological validity of naturalistic behavioural observation with the non-intrusive nature of diaries and with the precision of scaled questionnaire measures".

We must also consider some of the limitations associated with the method. The intensive nature of the investigation could lead to issues regarding representativeness, attrition and the quality of responses received. The repeated measurements can be a limitation as well as a benefit. Brandstaetter (1983) outlines that participants may repeat their responses over time or, alternatively, their responses may become more accurate. Stone, Keesler and Haythornwaite (1991) determine that the quality of data will decline after 2-4 weeks. It is also possible that the phenomenon under study will change because of measurement or reporting. While this is a common consideration in social and behavioural research, it is particularly relevant to ESM because the repeat assessments may lead people to pay unusual attention to their internal states and own behaviour (Riediger 2010). The intrusiveness of the method in itself may have adverse effects on

participants' moods and that may be reflected in the data. In addition, self-report biases are not eliminated. Social desirability, cognitive biases and cultural norms might influence responses even at the momentary level of reporting (Scollon, Kim-Prieto and Diener 2003).

In this research program, the MEQ takes the form of a mixed method questionnaire that is used to collect data at the content/task level at multiple points during the course. This approach allows for the examination of emotions as temporally fluctuating states. While the instrument consists primarily of scale items measuring emotions and cognitive appraisals, two open-ended questions also prompt learners to report in their own words on the source of their emotions. In this way, qualitative data is used to validate the quantitative data. This format aligns with the data-validation variant of the convergent parallel design (Creswell and Plano-Clark 2011). Notably with this approach:

Because the qualitative items are an add-on to a quantitative instrument, the items generally do not result in a complete context-based qualitative data set. However, they provide the research with emergent themes and interesting quotes that can be used to validate and embellish the quantitative findings.

(ibid, p. 81)

In line with a pragmatic approach to research, the decision to add the qualitative items to the questionnaire was made following the pilot study (Appendix C).

3.4.3.2 *Emotion Diaries*

In diary studies, participants provide frequent reports on the events and experiences in their daily lives (Bolger, Davis and Rafaeli 2003). Used predominantly within the field of psychology, the diary method has also emerged in educational research. The self-report aspect of the method makes it useful for measuring the subjective aspects of learning. Research on test anxiety (Beidel, Neal and Lederer 1991), student well-being (Hascher 2007, 2008), and emotion and motivation (Mendez-Lopez 2011) have proven diaries to be a suitable method to record affective experiences during learning. As Hascher (2008, p. 95) explains:

[Diaries] are a useful qualitative approach to explore students' emotions...they offer a precise view on an individual's perspective and they enable a context- sensitive understanding of emotions in schools.

The diary method was adopted for the second component of this study for a number of reasons. Similar to experience sampling, a diary approach gains access to emotions during the learning process. In addition, the diaries address many of the shortcomings of a quantitative instrument. They account for aspects of the individual affective experience and allow for the contextual framing of reported emotions in the individuals own words. Moreover, diaries do not limit students to a predetermined list of emotions, ensuring that the emotional experiences students consider important are not missed. While a quantitative questionnaire is quick to administer and can be used with extensive samples, the qualitative diary offers an enriched view of the individual's perspective whilst also enabling a context-sensitive understanding of emotions in an educational context.

It is important to note, however, that this method is reliant on self-reporting. In addition to the common limitations of self-report, such as memory bias, a critical factor that must be considered is the students' commitment/motivation and ability to write and elaborate on their emotions (Hascher 2008). These requirements may lead to problems associated with sampling bias. Furthermore, the very nature of diaries allows for a strong individualistic perspective that is open to interpretation. As noted by Hascher (2008), there is also the danger that important emotions may be missed, in particular those that are suppressed, not easily reflected upon and thus difficult for the individual to report.

The diary component of this research program obtains qualitative data pertaining to learners' emotional experiences at week-level during the course. The diaries elicit in detail emotional experiences by allowing learners to report unrestrictedly on their emotions each week.

3.4.3.3 *The Integration of Methods*

The two projects were conducted simultaneously. In adopting a simultaneous design, one project usually drives the research theoretically (Morse 2003, p199). In this case, the base project is the experience sampling study, which has a deductive drive, testing assumptions of the CVT in an LMOOC context. The diary study is the 'supplemental' project that elicits information regarding the subjective experience that is not accessed through the experience sampling survey. The experience sampling study uses a quantitative sample (large and randomised), while the qualitative sample for the diary study is drawn from the quantitative sample. The two studies in this research program

are interdependent and the findings of each study are triangulated in the interpretation phase to provide a more comprehensive picture than either study alone.

3.4.4 Ethics Approval

This study has followed standard procedures outlined by Dublin City University (DCU), regarding research ethics. Research ethics applications were submitted to the DCU Research Ethics Committee for each phase of the study. Table 3.3 presents the associated ethical approval information.

Table 3.3 Ethical approval information

Study	Approval Received	Reference
Preliminary Study		
<ul style="list-style-type: none"> • Gaeltacht & Evening Classes • University classes • Duolingo 	4 th July 2017 7 th February 2017 29 th March 2017	DCU/REF/2016/096 DCU/REF/2017/013 DCU/REF/2017/024
Pilot Study	3 rd January 2018	DCU/REF/2017/205
Main Study	20 th March 2018	DCU/REF/2018/044

Copies of the approval letters are available in Appendix B.1, C.1 and D.1. As required, informed consent was received from all participants in this study. All recruitment correspondence stressed that participation was voluntary. In addition, at all data collection points, participants were given the option to exit the study.

3.5 Irish 101: A Unique Context

The chosen case for this study is a single cohort of the Irish language learning MOOC, Irish 101. The case is limited to the participants who enrol in a specific run of this course.

Irish 101 is a language orientated MOOC or LMOOC. It is aimed at *ab initio* learners of the Irish language, i.e. those who have no prior experience of learning the language. The course is three weeks long and consists of three hours of learning per week. Based on the view that a language cannot be learned in isolation, Irish 101 addresses both the linguistic, and cultural and historical elements of the language. The linguistic elements are designed for the acquisition of specific learning outcomes as described by the Council

of Europe (2001) in the Common European Framework of Reference (CEFR) for language learning. Irish 101 is the first in a series of eight courses designed by DCU in 2018. The syllabus of the eight courses is compatible with an A2 level of proficiency according to the CEFR.

To structure a further, more comprehensive description of the Irish 101 MOOC, Conole's (2014) twelve dimensional framework for classifying MOOCs will be used. The framework classifies MOOCs in terms of twelve dimensions: i) the degree of openness, ii) the scale of participation (massification), iii) the amount of use of multimedia, iv) the amount of communication, v) the extent to which collaboration is included, vi) the type of learner pathway (from learner centred to teacher-centred and highly structured), vii) the level of quality assurance, viii) the extent to which reflection is encouraged, ix) the level of assessment, x) how informal or formal it is, xi) autonomy, and xii) diversity. Two additional dimensions, recommended by Beirne, Nic Giolla Mhichíl and Ó Cleircín (2017), to account for the nuances of language learning MOOCs, are included in this description; i) language skills and ii) instructor presence. Table 3.4 gives an overview of this classification as it relates to the Irish 101 MOOC.

Table 3.4 Classification of Irish 101

Dimension	Degree	Detail
Open	High	While the course is primarily based on the FutureLearn platform, open source tools are used to compliment core content. In terms of access, there are no entry requirements or geographical limitations.
Massive	High	The number of participants that can enrol for the course is unlimited. It is based solely on demand. More than 10,000 learners enrolled for the first iteration of Irish 101.

Diverse	Medium	Participants are viewed as a homogenous group of language learners with a specific interest in the Irish language and culture. Participants are assumed to be ab initio learners of the Irish language. While the target population of the course are members of the Irish diaspora from areas such as Northern America, the United Kingdom, Australia and New Zealand, participants hail from all corners of the globe.
Multimedia	High	The course uses a wide range of multimedia and interactive tools. Videos, animations and audio files are central to most steps on the course.
Communication	Medium	Participants are encouraged to interact via discussion forums and social media. The course contains dedicated discussion task types that encourage interaction from learners about set topics.
Collaboration	Low	Participants are not required to collaborate on course tasks.
Reflection	High	Reflection steps are inherent in the course design, participants are encouraged to reflect on their learning continuously throughout the course.

Quality	High	Extensive quality assurance procedures were implemented by both the platform and institution. Language learning content was benchmarked with the CEFR for the acquisition of specific <i>ab initio</i> learning outcomes. The course was subject to rigorous usability testing, conducted prior to the launch of the course, in which both technological and pedagogical learning objects were formally reviewed by a sample representative of final learners.
Certification	Medium	Participants can obtain a certificate of achievement on completion of the course for an additional fee.
Formality	Low	The course is optional and informal.
Autonomy	High	The course adopts an asynchronous approach to learning. Participants are expected to take control of their learning and work through the course at their own pace. Text-based narratives guide learners through the course. Instructors provide feedback on a limited number of discussion posts.
Learning Pathway	Low	The course is designed with a single learning pathway in mind. However, participants are free to access the course material in any order they wish.

Language Skills	Medium	Writing, reading and listening skills are taught and assessed by various activities in the course. Platform limitations prevent the practice and assessment of oral skills. As an alternative, participants are directed to external voice recording tools such as Vocaroo or Speakpipe and are encouraged to share their recordings on the course discussion forums.
Instructor Presence	Low - Medium	Facilitators use feedforward strategies and respond to a limited number of learners' comments on discussion forums. An asynchronous video that responds to common questions and queries is posted weekly by course facilitators.

3.5.1 Course Provider: Dublin City University

Irish 101 was developed by Dublin City University (DCU) as part of the Fáilte ar Líne initiative. The project draws on expertise from Irish language specialists, learning technologists and digital researchers in Fiontar and Scoil na Gaeilge and The National Institute for Digital Learning. The Irish Government, specifically, the Department of Culture Heritage and the Gaeltacht, with support from the National Lottery, co-fund this project under the Twenty Year Strategy for the Irish Language. Neither the researcher nor the funders were involved in the design of the courses.

3.5.2 Course Platform: FutureLearn

Irish 101 is hosted by the social learning platform, FutureLearn. FutureLearn was established in December 2012 by The Open University in the United Kingdom (UK). The number of partner institutions has steadily grown over the years and FutureLearn claims to now support over 95 leading UK and international universities, 56 specialist education providers and 4 multinational corporations¹². With over 10 million learners from over 230 countries around the world, FutureLearn is the largest MOOC provider in Europe. Inspired by Meltzoff and colleagues' (2009) call for the creation of social learning technology, the

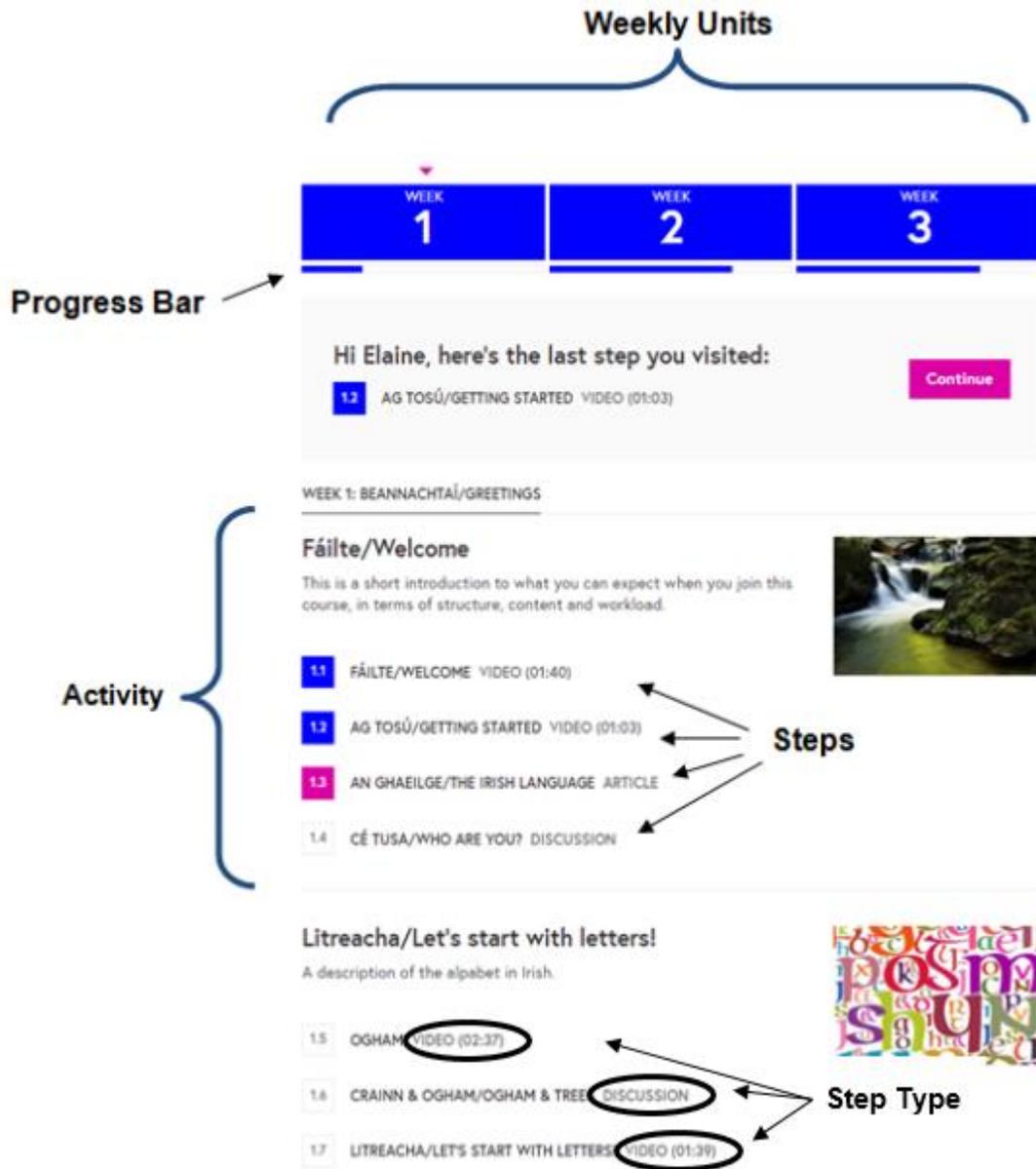
¹² Data from FutureLearn website, sourced 01/07/19 from <https://www.futurelearn.com/>

architecture of the FutureLearn platform is underpinned by a social constructivist pedagogy. FutureLearn (2018) reports that the pedagogical development of the platform is strongly influenced by Pask's (1978) conversation theory, which was further developed by Laurillard (2002) to create the conversational framework. Devised originally to include interactions with and through technology, including large-scale pervasive media, this pedagogical approach places the focus on learning, rather than instruction, and promotes effective learning through conversations with oneself and others (Ferguson and Sharples 2014). Accordingly, the platform provides institutions with a design template that supports social interaction among the learners in their courses. FutureLearn (2018) also acknowledges the pedagogical influence of Hattie's (2008) research with respect to visual learning. In line with Hattie's (ibid) research, learning is made visible on the FutureLearn platform through the inclusion of a number of features that show and track progress (e.g. progress bar, 'mark as complete' button).

3.5.3 Course Structure

An overview of the course structure can be seen in Figure 3.2 FutureLearn courses are divided into weekly units, of which Irish 101 has three. The learning content each week is centred on a theme eg. Beannachtaí/Greetings, Mise/Me, An Teach agus Caitheamh Aimsire/ The House and Hobbies. Each week consists of several activities. The activities are the pedagogical elements of the course and each has a defined learning goal, method and outcome (FutureLearn 2018). Each activity is then comprised of a similar number of steps. There are a number of different step-types available on the platform. Irish 101 contains a combination of video, discussion, quiz and article steps. Each step is linked to an associated discussion board in which the main topic of conversation is focused on the step content. Progress bars are visible under each weekly unit, indicating the learner's progress through the course. When a step is completed, the step number turns blue. The designers determine whether to release all the content at once, or on a week-by-week basis. In the case of Irish 101, all three weeks were released on the start date. While the course is designed to be completed in sequential order, participants are free to access the material in whatever order they desire and at their own pace. Overall, this architecture reflects the following set of pedagogical principles set out by FutureLearn: being open, telling stories, provoking conversations, embracing massive, creating connections, keeping it simple, learning from others, celebrating progress and embracing future learners (Brown *et al.* 2015).

Figure 3.2 Visual overview of course components



3.6 The Preliminary Study

A preliminary study was conducted to establish a range of emotions associated with Irish language learning, and subsequently inform the list of emotions that would be investigated in the main study. To the best of this author's knowledge and research, this was the first study of emotions among beginner learners of the Irish language.

3.6.1 Design and Procedure

Learners of the Irish language, who were learning the language independent of the primary and secondary level education curriculum, were identified to participate in this study. The learning contexts included, i) adult evening classes, ii) a third level course, iii) an informal online platform and iv) an immersion course in an Irish language speaking region of Ireland (also known as a Gaeltacht). Convenience sampling procedures were employed to obtain the sample. Course providers that were accessible to the researcher in terms of both proximity and responsiveness were selected and permission to engage with their students was obtained (See Appendix B.2 for descriptions of the course providers). Irish language learners were contacted via email or, in some cases, they were approached in person during their language class. The final sample consisted of 460 learners with varying degrees of proficiency (See Table 3.5).

A self-report questionnaire was used to collect data pertaining to learners' emotions. The instrument primarily consisted of a pre-selected list of thirty emotions (See Appendix B.4). The list was derived from previous studies on learning-centric emotions (Pekrun *et al.* 2011; D'Mello 2013). Participants were directed to identify the most prominent emotions they had experienced while learning on their respective courses. A further open-ended item allowed respondents to report emotions experienced that were not included in the list. Students enrolled in the evening classes, third level modules and the online course completed an online version of the questionnaire. The online version was distributed via email or, in the case of Duolingo, a link to the questionnaire was posted on the course discussion forum which all members of the Irish language course had access to. Learners enrolled in the Gaeltacht courses completed a pen and paper version of the questionnaire.

Table 3.5 Breakdown of the sample by learning context

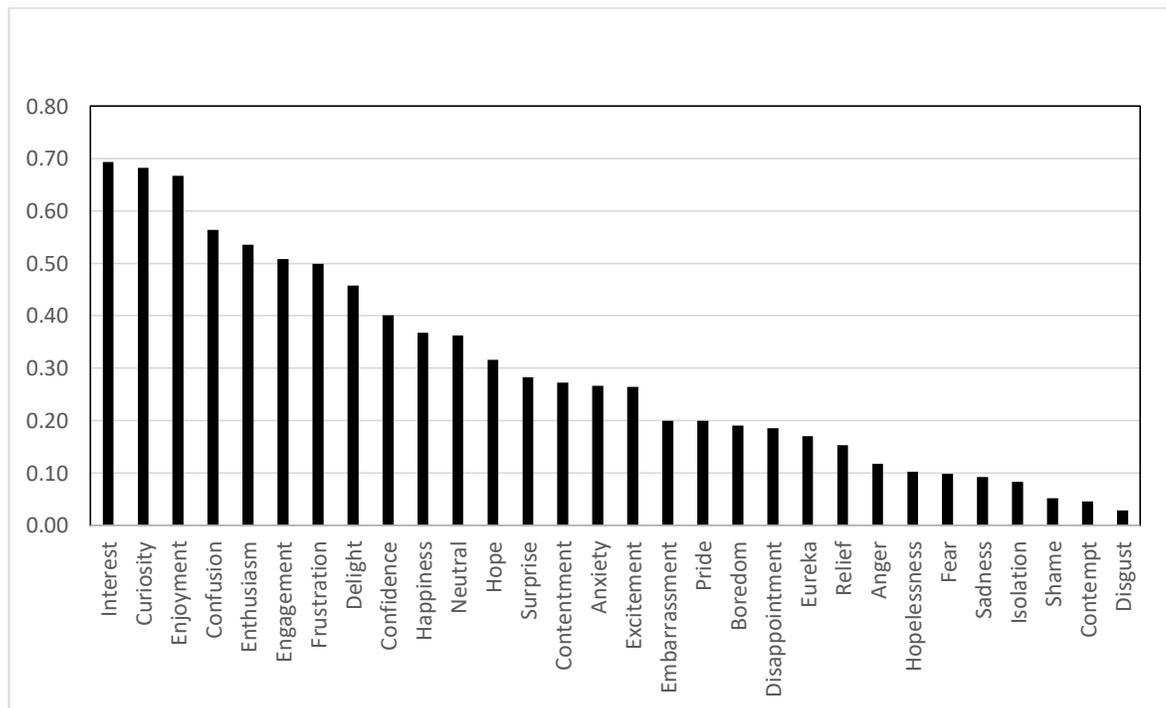
Learning Context	Organisation(s)	Sample Size
Gaeltacht course	Gael Linn & Oideas Gael	123
Evening Classes	Gaelchultúr	64

Third Level	Dublin City University	99
Online	Duolingo	174
		460

3.6.2 Findings and Implications

On average, participants reported nine emotions each. Figure 3.3 presents the distribution of learner reported emotions aggregated across all four learning contexts. The Y-axis shows the percentage of participants that reported a given emotion (on X-axis). These results demonstrate the breath of emotions experienced by learners. The scale is positively skewed in favour of the positive emotions. Confusion is the most negative emotion reported most frequently, followed by frustration and anxiety, while the remaining negative emotions constitute a long tail. A further breakdown of emotion reports by learning context can be found in Appendix B.5.

Figure 3.3 Distribution of reported emotions (preliminary study)



Any emotions that were reported by less than 10% of the respondents in this study were excluded from use in the main study. Thus, the excluded emotions were fear, sadness, isolation, shame, contempt and disgust.

3.7 Piloting

Piloting consisted of two phases. Phase 1 tested whether the self-report instruments were self-contained and self-explanatory. Phase 2 tested the feasibility of an experience sampling approach on the MOOC platform. Combined, the pilot studies had three objectives:

1. Highlight problems pertaining to the content of both the pre-course and in-course questionnaire such as ambiguous wording, clarity of instructions, difficult items, appearance, completion time, etc.
2. Identify problems or potential pitfalls concerning the administration of the in-course survey
3. Assess the frequency of the data collection points on the platform and ensure learning disruption is minimised

3.7.1 Platform Limitations

As indicated previously, this study was conducted on the FutureLearn platform. While planning the study in conjunction with FutureLearn a number of technological and legal constraints associated with the platform were identified. Issues related to i) embedding the questionnaire within the course, ii) obtaining participant demographics and background information and iii) tracking learners' responses using identifier (ID) codes. These issues had an influence on the research design primarily with respect to data collection in this study.

It was initially intended that the questionnaire would appear mid-activity, as a pop up on the screen (see Ainley, Corrigan and Richardson 2005). Emotions would be reported in their natural, spontaneous context and the likelihood of retrospection bias would be reduced as the amount of time elapsed between learning and reporting emotion would be minimised. Technical limitations prevented this. For the same reason it was not possible to embed the questionnaire within the course itself, similar to the approach used by Dillon *et al.* (2016).

Table 3.6 Data collection options

Option	Explanation	Pros	Cons
1 Anonymous Open Run	Anonymous survey included in publicly available iteration of course Participation open to all enrollees	Large Sample Authentic learning environment	Unreliable response tracking Macro, course-level demographics only (not specific to sample) No contact with participants Emotion diary not feasible
2 Open Run	Survey included in publicly available iteration – Respondents would provide unique identifier to track responses Participation open to all enrollees	Large sample Ability to track individual responses Authentic learning Environment	No contact with participants Sample-specific demographic data unavailable Ethical Concerns - Consent difficult to obtain Emotion diary not feasible
3 Learning Manager Run	Participants recruited by researcher to participate in study and invited to enrol in private iteration of course	Improved response rate Learner demographics and background information collected Emotion diary feasible Course progress monitored	Limited Sample Potential sample bias Additional cost

For this study, it was important that learner demographics were obtained from participants in order to identify the characteristics of the sample and determine its representativeness. Background information was also needed to identify criterion variables for the analysis of trends. FutureLearn was only able to provide macro-statistics in this regard. Individual

level data was not accessible. Furthermore, in order to identify within-person trends over the course, participant responses needed to be tracked using ID codes or similar. Again, self-declared technical limitations prevented FutureLearn from sharing anonymised ID codes.

Having identified the preceding constraints, three potential ways to conduct this study were identified. Table 3.6 outlines these options along with the benefits and drawbacks of each. The first option (Anonymous Open Run) was used for piloting. The approach chosen for the main study is discussed in Section 3.8.

3.7.2 Phase 1: Lab-based Pilot

The first phase of the pilot study consisted of a small scale, lab-based pilot that assessed the functionality of both the pre-course, background questionnaire and the in-course, emotion questionnaire.

The background questionnaire inquired about previous language learning experience, first language, current proficiency in the Irish language, experience learning in MOOCs and general demographic details (see Appendix C.2). The in-course emotion questionnaire consisted of quantitative items only at this stage. A Likert-scale, based on Pekun *et al.*'s (2017) Epistemic Emotion Scale (EES) investigated the intensity levels of discrete emotion states, while two further items gauged control and value appraisals respectively (see Appendix C.4). A matrix was developed to determine the locations of 18 data collection points during the three-week course (see Appendix C.7). Surveys appeared as a link at the end of the selected steps.

Participants for this initial phase of the pilot were purposefully and conveniently sampled from the extended DCU community (individuals had to be able to come to the campus in person to participate in the study). Information regarding the pilot study was distributed among international students in DCU and members of the DCU Age Friendly Initiative. Members of these communities were likely to meet the target population criteria of being beginner learners of the Irish language, having never learned the language previously or, alternatively, returning to the language having learned it at school when they were younger. The final sample for this phase consisted of ten participants.

First participants answered the background questionnaire and then they completed a number of steps on the course, some of which contained the emotion questionnaire. At the end, they provided feedback on the clarity of the questions in each questionnaire as well as the structure and format of the instruments (See Appendix C.3 and C.5 for feedback forms). Determining how participants interpreted the terms 'control' and 'value' was of particular importance for establishing the reliability of the single-item measures. Amendments to both the order and wording of the questions were made according to both researcher observations and the feedback received. In addition, navigational problems associated with returning to the course having completed the survey were identified. These problems had the potential to cause major disruption to the learning process and could lead to individuals dropping out of the course. As a result, new survey software was chosen to improve the navigational experience.

3.7.3 Phase 2: Feasibility Pilot

A second pilot study tested the experience sampling approach at scale on the FutureLearn platform during the first iteration of the Irish 101 MOOC. It is recommended that pilot studies be conducted with the same type of respondents who will eventually be surveyed on the finished questionnaire, under the same (or similar) conditions that will exist during the real project (Brown 2001; Dörnyei 2003b). Specifically, this pilot study assessed the frequency of the data collection points, the survey completion times, and the administration procedure.

Figure 3.4 Contents of pilot emotion questionnaire

This study is being undertaken independently by Dublin City University to enhance the learner experience. Your participation in the research will have no effect on your course progress, marks or FutureLearn profile and FutureLearn does not take responsibility for the contents or the consequences of your participation in the study.

How were you feeling while watching this video?

For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity.

	Not at all	Very Little	Moderate	Strong	Very Strong
Anxious	<input type="radio"/>				
Confused	<input type="radio"/>				
Proud	<input type="radio"/>				
Frustrated	<input type="radio"/>				
Excited	<input type="radio"/>				
Curious	<input type="radio"/>				
Angry	<input type="radio"/>				
Bored	<input type="radio"/>				
Surprised	<input type="radio"/>				
Hopelessness	<input type="radio"/>				
Hope	<input type="radio"/>				

Each of the following statements refer to the video you have just watched. Please indicate your level of agreement with each statement.

	Strongly Agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I felt in control during this task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I valued this task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



An amended version of the emotion questionnaire was used following feedback from phase 1 (see Figure 3.4). The survey was administered using new software to address previous navigational issues. Responses were anonymous, although individual response tracking was attempted using IP addresses. Individuals enrolled in the first iteration of the Irish 101 MOOC had the option to answer the questionnaires during the course. Due to the anonymous nature of the surveys, formal consent did not have to be obtained. However, it was made clear that participation was voluntary and that by answering the questionnaire they were providing consent for the data to be used in the study. Individuals could respond to as many or a few of the surveys as they pleased. A total of 2931 learners completed at least one survey. These people became the sample for phase 2 of the pilot study. As well as providing important operational insights, the large sample resulted in significant research findings which are reviewed in Chapter 4. The operational insights and corresponding amendments stemming from this phase of the pilot study are outlined in Table 3.7.

Table 3.7 Pilot study conclusions and adaptations

Pilot Observation	Recommendation	Adaption for Main Study
Inconsistent tracking of individual responses using IP addresses	New tracking method needed	Switch to Learning Manager tool to conduct main study (Option 3)
Issue associated with response fatigue. Response rates declined significantly each week.	Reduce number of data collection points each week	Data collection points reduced from 18 (six per week) to 12 (4 per week)
Survey completion times were less than 30 seconds	Minimal intrusion indicates potential to add further items	Qualitative item added

3.8 Primary Research Program

3.8.1 Learning Manager

In light of the technical limitations associated with the platform (discussed in Section 3.7.1) and the pilot study findings (see Table 3.7), the Learning Manager Run (Option 3; Table 3.6) was chosen as the preferred way to conduct the main study. Learning Manager is a tool provided by the FutureLearn platform that allows partners to invite a pre-recruited cohort of students to enrol in a specific invite-only course. Through the tool, these learners can be managed and tracked as they progress through the course. This option gave the researcher more access to the survey participants, both prior to the course to collect demographic data and during the course to track responses and conduct the diary component.

3.8.2 Research Participants

As discussed previously, the online course on which this study is based is designed for *ab initio* learners of the Irish language from all over the world. Consequently, this became the target population for this investigation. In order to obtain a sample of this population, criterion sampling techniques were employed (Patton 2002). Participants were sampled based on the following predetermined criteria:

- Adult learners
- Interest in learning the Irish language
- *Ab initio* (beginner) level of Irish
- Willingness and ability to learn online

A video was recorded by the researcher to recruit participants. The video outlined the objectives of the study and the details of participation, emphasising its overall importance in the wider context of online course design and improving the online language learning experience. The video was posted along with a link to participate on the project website and on Twitter, LinkedIn and Facebook social media platforms. Initial posts were then shared by various users.

Celtic and Irish Studies programs in universities around the world were identified from the International Association for the Study of Irish Literatures website. The co-ordinators were contacted via email and asked to distribute information on the study to their students. Community groups in the United States of America, Canada and Europe were also targeted directly with study advertisements due to their close links to the Irish diaspora. This dissemination was facilitated through existing contacts and social media searches. The study, however, was open to anyone in the world who met the criteria outlined. Prospective participants self-selected to participate in the study. Participation in the diary study was advertised as an optional extra. Recruitment took place over a two-week period from 18th April 2018 to 4th May 2018. The course began on 7th May 2018.

3.8.3 Background Questionnaire

A background questionnaire was developed to identify the characteristics of the study participants. It consisted of questions relating to the participants' previous language learning experience, their previous experience, if any, learning the Irish language, their learning goals and motivations, as well as their general demographic profile. This information was solicited so any (between-participant) trends in the data that might be attributable to these variables could be investigated. Such information also helps determine the representativeness of the sample. The following items and/or scales were adapted from existing instruments where possible. For the questions particular to this study that have not been addressed in other instruments, new items were developed.

Irish language competency

While the course in this study is designed for *ab initio* learners of the Irish language, it is possible for those with varying levels of proficiency to enrol and learn from the course. Therefore, it was deemed necessary to include a section in the questionnaire that would provide a measure of the learners' proficiency level. To this end, a self-assessment proficiency scale was included. This six-point scale was sourced from The Irish Language Survey 2013 reported on by Darmody and Daly (2015). This scale has been widely used in Irish language surveys in Ireland (CILAR 1975; Ó Riagáin 1997; Harris *et al.* 2006). The wording was adapted slightly to facilitate a global audience; the phrase 'the odd word' was changed to 'a few words'. Participants were also asked to elaborate on the contexts in which they had learnt Irish previously, if relevant.

Motivations

In order to investigate the motivations of learners, open-ended items were used. Quantitative scales, which are based on presupposed dimensions and the pre-set wording of items, can omit the context-sensitive facts and meanings the participants might describe in their own words.

Demographic Questions

The final section of the questionnaire elicits personal information from participants such as age, gender, country of origin and first language. The decision to place these

demographic questions at the end of the questionnaire stemmed from Dillman’s (1978) recommendation. Dillman (ibid, p.127) believed that recipients would be more likely to answer a questionnaire if the initial questions were perceived to be “interesting and socially useful”.

This background questionnaire was delivered through the web-based survey software, Qualtrics. A link to the questionnaire was distributed via email to all registered participants prior to the start of the course.

3.8.4 The Recurrent Questionnaire Component

The questionnaire component of this research project was designed to incorporate quantitative measures of learners’ emotions and cognitive appraisals as well as a section that elicits qualitative data by asking the respondent to provide additional information in their own words. The contents of the questionnaire have evolved from an iterative design process discussed in previous sections. This final version of the instrument is referred to as the Momentary Emotion Questionnaire (MEQ).

3.8.4.1 Scale Items

Table 3.8 Summary of appraisal concepts and measures

Concept	Description	Item	Scale
Subjective Value	Usefulness/ Importance of Task	I valued this task	7 – point scale Agree - Disagree
Subjective Control	Expectancies & Competency Perceptions	I felt in control of my performance during this task	7 – point scale Agree - Disagree

Control and Value Items

To measure appraisals of control, participants responded to the statement, ‘I felt in control of my performance during the task’. To measure value appraisals, participants responded

to the statement 'I valued the task'. For both items, responses are measured on a 7- point Likert scale where a rating of 1 indicates that the participant strongly disagrees with the statement and a rating of 7 indicates that the participant strongly agrees with the statement. Previous studies have used similar single-item measures to assess appraisals of subjective task control and value appraisals (Perry *et al.* 2001; Tong *et al.* 2007; Goetz *et al.* 2010; Buhr, Daniels and Goegan 2018).

Emotion items

The emotions learners experienced during the tasks were measured using a short version of the Epistemic Emotion Scale (EES; Pekrun *et al.* 2017), adapted for an Irish language learning context (addition of four further emotions). This scale was chosen based on its suitability to an experience sampling approach. It is also in keeping with Shuman and Scherer's (2014) recommendation to use multi-emotion measures. The adaption of the scale for an Irish language context is reflective of other studies that have adapted existing scales to include emotions that are more context sensitive (Zentner, Grandjean and Scherer 2008).

Table 3.9 Emotion categorisation

Emotion	Epistemic	Achievement
Anger		✓
Anxiety	✓	✓
Boredom	✓	✓
Confusion	✓	
Curiosity	✓	
Excitement	✓	✓
Frustration	✓	
Hope		✓
Hopelessness		✓
Pride		✓
Surprise	✓	

The scale in this study investigates eleven emotions: anger, anxiety, boredom, confusion, curiosity, enjoyment, frustration, hope, hopelessness, pride and surprise. Only the emotions reported by over 10% of the respondents in the preliminary study were considered for use on the scale. In addition, only emotions that have been previously categorised as epistemic or achievement emotions were included (see section 2.2.1).

Table 3.10 Emotions according to the three-dimensional taxonomy

Object Focus	Positive		Negative	
	Activating	Deactivating	Activating	Deactivating
Activity	Curiosity Excitement Surprise		Anger Anxiety Confusion Frustration Surprise	Boredom
Outcome	Hope Pride		Anger Anxiety	Hopelessness

(Adapted from Pekrun and Stephens 2010)

Each emotion is measured by one item on the scale. The order of emotions is designed to change from respondent to respondent in order to reduce any bias that results from the order items are presented in. Emotion adjectives were used as items, which is consistent with the original EES (Pekrun *et al.* 2017). In addition, the instructions provided for completing the scale were adapted from Pekrun *et al.* (2017). The wording of the instructions varied according to the task type (See Table 3.11).

Table 3.11 Questions and instructions for each task type

Task Type	Question & Instructions
Video	<p>How were you feeling while learning from this video?</p> <p>For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity</p>
Quiz	<p>How were you feeling while completing this quiz?</p> <p>For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity</p>
Discussion Forum	<p>How were you feeling while contributing to this discussion?</p> <p>For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity</p>
Article	<p>How were you feeling while learning from this article?</p> <p>For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity</p>

3.8.4.2 Open-ended Items

Two open-ended questions were included alongside the quantitative measures in the questionnaire to accommodate a wider framework of understanding. These questions asked participants i) to clarify which emotion(s) they had felt most strongly and ii) to explain how they came to feel those emotions. Both of these items were designed specifically for this study. They were added following the pilot study.

3.8.4.3 Questionnaire Placement

In line with an experience sampling approach, the participants responded to the questionnaire at multiple points throughout the course, followed an event-focused sampling procedure (Zirkel, Garcia and Murphy 2015). Accordingly, data was collected in response to particular events. In this case, students were prompted to report on their experience in response to four different task types in the course. This approach facilitated an investigation of the relation between task type and learner-reported emotion, while also obtaining *in situ* reports of students' emotional experiences.

A matrix was developed to determine the placement of the questionnaire links (see Table 3.12). The course is designed as a combination of four different task types as per the FutureLearn platform template:

1. Article
2. Quiz
3. Discussion
4. Video

It was important that the data collection points were spread evenly throughout the 3 weeks of the course and that each task type was equally represented in order to be temporally representative of both the case and the task types. Participants were prompted to report on their experience 4 times per week, resulting in 12 data collection points in total.

Table 3.12 Survey distribution matrix

Week	Survey	Step	Task Type	Content	Skill
1	1	1.8	Quiz	Identify Word	Listening
1	2	1.17	Article	Grammar - The Vocative Case	Reading
1	3	1.22	Discussion	Discussion Contribution	Writing/Speaking
1	4	1.28	Video	Vocabulary - Greetings	Listening
2	5	2.12	Quiz	Grammar - Fill in the missing word	Writing
2	6	2.19	Article	Vocabulary - Numbers	Reading/ Listening
2	7	2.23	Video	Vocabulary - The Family	Listening
2	8	2.29	Discussion	Discussion Contribution	Writing/Speaking
3	9	3.3	Video	Vocabulary - The House	Listening
3	10	3.10	Article	Vocabulary - Directions	Reading/ Listening
3	11	3.20	Quiz	Vocabulary - Listen and Identify	Listening
3	12	3.30	Discussion	Discussion Contribution	Writing/Speaking

3.8.4.4 *Research in Practice*

The questionnaire was inserted in the course as an external link. The reason for this was mainly due to platform limitations, as discussed earlier. The in-course appearance of the survey was dictated by legalities enforced by the Platform provider. A disclaimer (see Figure 3.5) had to be included at the course exit point and within the survey itself, the wording of which was approved by the FutureLearn legal team.

Figure 3.5 Participation disclaimer

Can you help us?

Dublin City University (DCU) is investigating the emotional experiences of learners whilst learning the Irish language online. This research will inform the design of our future Irish language courses. This is an optional study that you can take part in. Findings will be published as part of academic and doctoral research by the course educators. The use of survey data adheres to Dublin City University's **stringent ethical research practices**, and the privacy of respondents will be respected and protected according to DCU's **Data Protection Policy**. Institutional ethical approval was received: 03/01/2018.

[Click here to complete survey 1](#)

This study is being undertaken independently by Dublin City University to enhance the learner experience. Your participation in the research will have no effect on your course progress, marks or FutureLearn profile, and FutureLearn does not take responsibility for the contents or the consequences of your participation in the study.

The questionnaire was delivered through Qualtrics. Qualtrics was the survey software of choice for this study, supporting both the pre-course and in course questionnaires. It was chosen based on recommendations from fellow researchers in the National Institute for Digital Learning (NIDL) due to its user-friendly interface and rich set of features and design options.

Contact was maintained with participants via email and the course discussion forum throughout the three weeks of the course reminding them to complete the questionnaire and providing informal updates and words of encouragement.

3.8.5 The Emotion Diary Component

The emotion diary component of this research project consisted of written or oral narratives that provided qualitative data pertaining to the individual experience of learners.

3.8.5.1 *Qualitative Instrument*

A prompt sheet was provided to direct the reflection (see Appendix D.8). It consisted exclusively of open-ended questions to allow the participants to answer in their own words. Items were adapted from the Students Emotional Experience Journal used by Mendez-Lopez (2011) in a study of emotion and motivation among English language learners in a Mexican University context. Participants were prompted to identify the emotions they felt during the week (What emotions have you felt this week while learning Irish during the course?), and describe the sources/ environmental and/or personal factors that caused these emotions (Can you explain what happened and how you came to feel this way?). Students were free to report any emotion they felt. They were not restricted to a set of specific emotions.

3.8.5.2 *Research in Practice*

Data collection followed a fixed sampling approach (Zirkel, Garcia and Murphy 2015). Participants were encouraged to submit one diary entry per week. Entries could be submitted in written or audio format. Participants were provided with the prompt sheet at the end of each week. Reminders and words of encouragement were sent to participants via email once a week. Written accounts were submitted via Qualtrics. Alternatively, participants could record their responses orally using a device of their choice and submit it via email.

3.9 Validity, Reliability and Trustworthiness

3.9.1 Single-item Scales

In line with the principles of ESM methodology (Hektner, Schmidt and Csikszentmihalyi 2007), learners' emotions and their control and value appraisals were measured using single-item scales. Although multi-item measures are generally considered to have more satisfactory psychometric properties, they are not always suited to ESM; they take more

time to complete than single-item measures and could compromise the validity of the appraisals. More specifically, longer self-report measures could negatively influence participants' responses by providing more time to reflect and prompting recall biases. Regarding emotion research in particular, the additional response time needed for multi-item measures, might result in the assessment of participants' emotional response to completing the questionnaire, rather than their emotions concerning the activity that they were currently engaged in. Previous experience sampling studies on academic emotions support the viability of this approach (Goetz *et al.* 2010; Nett, Goetz and Hall 2011; Goetz *et al.* 2014, 2016). In addition, the reliability and validity of single-item scales has been supported by an analysis conducted by Gogol *et al.* (2014) focusing on emotional and motivational constructs in education.

3.9.2 Ensuring Validity and Reliability

Reliability and validity are central issues in all scientific inquiry and need to be addressed to ensure high-quality findings. Consistency is a useful synonym for the term reliability in research. According to Bryman (2016, p. 157), reliability refers to the “consistency of a measure of a concept”. Thus, a study with a high degree of reliability can be repeated among a sample with little variation in the results obtained. Validity, on the other hand, relates to the idea of truthfulness and refers to how well an idea ‘fits’ with actual reality (Neuman 2014, p. 212). When referring to validity, key concepts include face validity, content validity and construct validity. Face validity is essentially a subjective judgement (usually made by members of the scientific community) that a proposed measure reflects the construct under investigation (*ibid.*, p. 216). Closely related is content validity, which is a determination of the extent to which a measure captures the entire meaning of the construct (*ibid.*). Finally, construct validity determines whether measures with multiple indicators for the same construct are consistent (*ibid.*). Construct validity is not of relevance to this study due to the use of single-item measures for each construct.

While perfect reliability and validity are impossible to achieve (*ibid.*), every effort was made during each phase of this research project to maximise the reliability and validity of the data. Firstly, instrument items were adapted from existing instruments that have been empirically tested and well documented in the literature. This is a testament to their reliability and validity. Changes made to the instruments for this study were merely context-based as discussed in Section 3.8.4.1. Face and content validity were established through consultations with the supervisory panel to seek agreement that the

item matched the construct it was attached to. Feedback from participants in the pilot study phase also ensured there was no issues regarding the interpretability of the items.

3.9.3 Establishing Trustworthiness

While reliability and validity are important criteria in establishing and assessing the quality of quantitative research, these terms and the connotations they hold are not as relevant to qualitative research. Lincoln and Guba (1985) proposed the concept of trustworthiness, comprising the four criteria of i) transferability, ii) dependability, iii) confirmability, and iv) credibility, to parallel the conventional quantitative assessment criteria of validity and reliability. While other researchers have proposed alternative markers of quality for qualitative research (e.g. Tracy 2010), the criteria proposed by Lincoln and Guba (1985) will be used as the framework for determining the trustworthiness of the qualitative findings in this study.

The *transferability* of the findings refers to their generalisability. However, as qualitative research tends to be bounded within a specific context and time, it is difficult for a researcher to specify the generalisability of an inquiry. As Lincoln and Guba (1985, p. 316) put it, whether findings hold “in some other context at some other time, is an empirical issue”. Thus, the responsibility of the researcher lies in providing thick descriptions so that those who seek to transfer the findings to their own context can judge the transferability (Lincoln and Guba 1985; Firestone 1993; Bryman 2016). In this thesis, detailed descriptions of the context, research methods and participants are provided. The theme write-ups also contain direct quotes from participants so that alternative interpretations can be considered.

Dependability is the parallel to reliability, while *confirmability* refers to the neutrality or objectivity of the data. Both of these criteria can be achieved by documenting an audit trail of the decisions made during the research process (Lincoln and Guba 1985). In this study, the raw data was stored electronically so that it could be accessed when needed. NVIVO provides a record of the decisions made during the coding and theme development phase. Furthermore, the use of ‘query tools’ found in NVIVO helps an individual to audit the findings. The researcher also kept a journal to record logistics, decisions made, rationales and personal reflexivity insights throughout the data collection and analysis. Finally, it is important to note that the researcher was not involved in the

design or implementation of the Irish 101 MOOC. The researcher's involvement with the course was entirely research-based.

The final criterion of *credibility* refers to the believability of the findings. To achieve this, Bryman (2012, p.390) summarises that research should be "...carried out according to the canons of good practice and submitting research findings to the members of the social world who were studied". In other words, participants should validate the findings a researcher arrives at. This process is called member checking (Lincoln and Guba 1985). In some cases, researchers also get participants to review the raw data to ensure it has been accurately recorded and therefore credible (Nowell *et al.* 2017). With respect to this study, findings from a thematic analysis are often synthesised, decontextualised and abstracted from individual participants. Thus, asking participants for feedback on the reported data following analysis would be problematic as it would be difficult for individuals to recognise themselves or their particular experiences. With respect to obtaining respondent validation prior to analysis, participants in this study submitted an account of their experience, written by themselves in their own time. Participants could review and revise the content as they pleased before submitting, which helped improve the accuracy of the accounts without the need for a formal respondent validation process.

In addition, at the end of the study, the participants were sent copies of the diaries they had submitted. Participants were given the option of contacting the researcher with any concerns or reservations about the contents of the diaries. None of the participants raised any concerns or reservations.

3.9.4 Triangulation

In addition to ensuring the quality of the qualitative and quantitative data separately, combining the two types of data through methods triangulation is another way to enhance research quality (Patton 2002). In this study, the comparison and integration of data collected through qualitative methods and data collected through quantitative methods not only provides diverse ways of looking at the same phenomenon but also adds credibility by strengthening confidence in whatever conclusions are drawn.

3.10 Summary

This chapter has outlined the decisions and practical steps taken to investigate the research problem. Understanding the methodological choices and processes of the project is important before being presented with the results. In this regard, the chapter has provided a rationale for the specific methods chosen, has detailed the learning context in question, has explained how the pilot and preliminary studies contributed to the final design and has provided a detailed depiction of the instruments and data collection procedures for each of the two phases of the study. In the following two chapters the analytical processes for each phase of the study will be outlined followed by a presentation of the results in each case.

4 Analysis and Results: The MEQ

As Brown (2001) rightly points out, collecting the data is only half the battle. The following two chapters will address the other half, processing and analysing the data. Robson (2011, p. 408) explains that analysis is central to the research process because “...data in their raw form do not speak for themselves. The messages stay hidden and need careful teasing out”. In line with the research design outlined in the previous chapter, the experience sampling study and the diary study were analysed independently of each other. The current chapter presents the analytic strategy and results for the Momentary Emotion Questionnaire (MEQ) study.

4.1 Data Management

Data obtained from the MEQ for both the pilot and the main study, as well as data obtained from the background questionnaire (BQ) were all prepared in the same way.

The electronically submitted responses were initially compiled in an Excel spreadsheet. The first step of screening involved the removal of blank questionnaires, where the individual had not answered any question. For the main study, MEQ responses were also cross-checked with informed consent statements using email identifiers provided by the participants. Responses for which consent was not explicitly received were removed ($n=19$).

Individual identification codes were then sequentially assigned to each response (see Table 4.1). This step had the additional function of anonymising the data. Response codes for the pilot study did not include a participant ID. Participant IDs for both the BQ and the MEQ in the main study were linked.

Table 4.1 MEQ response description

Response Identifier: #001/DS/1.8/P001	Description of each element
#001	Response number (1-542)
/DS	/Step Type, i.e. Discussion Step (DS), Article Step (AS), Quiz Step (QS), Video Step (VS)
/1.8	/Week Number(1).Step Number(8)
/P001	/Participant ID (1-95)

The data was then transferred to the statistical software package, SPSS. Each questionnaire item was entered as a separate variable. For the main study, the datasheet in SPSS was set up to include demographical data for each participant. This data was obtained from the background questionnaire.

Further visual screening involved reviewing raw data to detect for impossible scores, response inconsistencies across variables, and input errors. Responses were also aggregated to person level to ensure there was an adequate amount of data for each respondent. This step resulted in the removal of one participant from the sample (n=94).

The following coding procedures were then conducted:

Closed-ended items

Respondents answers were converted to numbers for scoring purposes (e.g. 'not at all' =1, 'very little' = 2, 'moderate' = 3, 'strong' = 4, 'very strong' = 5).

Open-ended items

One-word responses (e.g. nationality and first language) were reviewed for typos and amended accordingly. Specific open-ended items that elicited factual data from respondents (e.g. previous language learning contexts) were condensed into a limited number of categories. These categories were then numerically coded and entered into the data file to be treated as numerical data. More substantial open-ended items were transferred to the computer software package, NVIVO, for coding.

Missing Data

Cells with missing values were left empty.

4.2 Pilot Insights

Before presenting the analysis and results of the MEQ, this section reports some preliminary statistical results from the second phase of the pilot study. Given the

substantial number of responses obtained from the pilot study and the fact that the instrument remained unchanged for the main study, it was deemed pertinent to include these results to provide some insights for comparison with the main study, which consists of a considerably smaller sample. However, it is important to keep in mind that this dataset contains nested data that cannot be identified so the inferences that can be drawn from the data are limited.

The aim of the second phase of the pilot study was to test the quantitative instrument at scale on the FutureLearn platform. It was carried out during the first iteration of the Irish 101 MOOC in January 2018. Anyone enrolled in the course had the option to answer the 18 questionnaires distributed throughout the three weeks of the course. Table 4.2 provides a breakdown of the participation figures for this iteration of the course, which were supplied by FutureLearn.

Table 4.2 Irish 101 participation breakdown

Participation Measure	Number	Percentage
Enrolled	10,654	
Viewed one step	7378	69%
Completed one step*	5969	56%
Completed \leq 50% of the steps*	1591	15%
Completed \leq 90% of the steps*	905	8%

** figure based on learners clicking button 'marked as complete' for each step*

FutureLearn course level statistics pertaining to age and country of origin are also provided in Table 4.3 and Table 4.4. The country data is based on the IP addresses of enrollees collected at the time of their enrolment. The age data is based on those who participated in the FutureLearn pre-course survey and responded to the question, 'what year were you born?' Thus, these figures provide a limited insight into the learners on the course.

Table 4.3 Country of origin (top ten)

United States	24%
Ireland	22%
United Kingdom	22%
Australia	5%
Canada	4%
Russia	2%
Germany	2%
Spain	2%
France	2%
New Zealand	1%

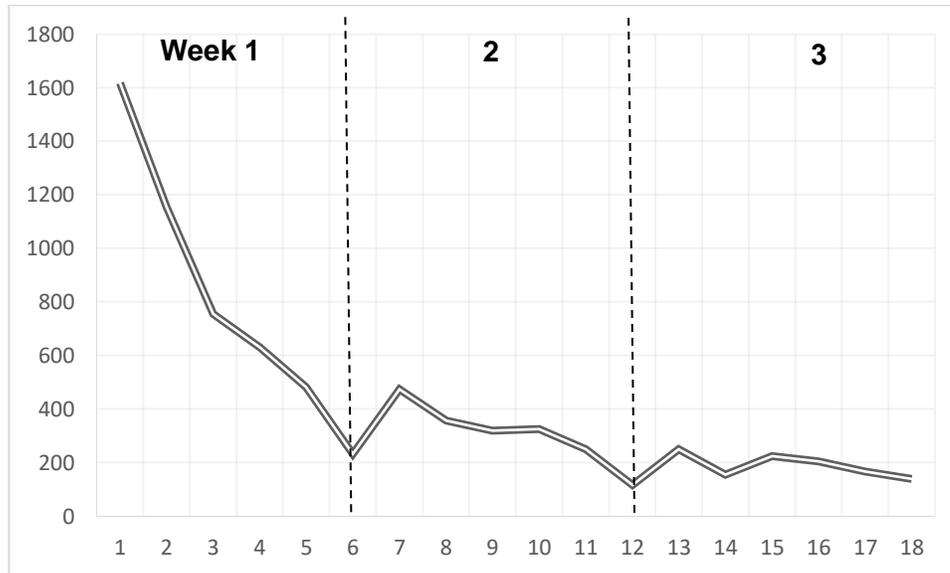
Table 4.4 Age profile

Under 18	1%
18-25	6%
26-35	11%
36-45	11%
46-55	14%
56-65	24%
Over 65	28%

During the pilot study, 7853 discrete responses were obtained over the 18 data collection points. However, due to the anonymity of the responses and the expectation that many individuals responded to more than one questionnaire, it is impossible to ascertain the actual sample size. In addition, for these and other reasons previously outlined, the characteristics of the sample were also inaccessible to the researcher. With regard to response rates, the survey responses declined significantly over the first week of the course and then stabilised for the following two weeks (see Figure 4.1). This trend may be the result of a high rate of dropout in the first week of the MOOC. Another interesting pattern shows responses increasing relatively at the beginning of each week, which may

be due to survey fatigue at the end of a week. This issue was addressed in the main study by reducing the number of data collection points per week.

Figure 4.1 Number of responses per questionnaire (pilot)



4.2.1 Descriptive Statistics

The eleven dependent variables (surprise, curiosity, excitement, confusion, anxiety, frustration, boredom, pride, anger, hope and hopelessness) and the two predictor variables (control and value) were analysed for frequency distributions and central tendency. Each of the emotions were measured with a 5-point Likert scale. Table 4.5 identifies the frequency of each Likert scale response: very strong, strong, moderate, very little, and not at all. The participants felt each of the emotions to varying degrees at different points in time. The three emotions experienced mostly intensely (i.e. strong or very strong) by participants over the duration of the course were curiosity (55%), excitement (32%) and hope (28%). Overall, stronger reports of negative emotions were less frequent.

Table 4.5 Frequency of scaled responses - Emotions

	Very Strong		Strong		Moderate		Very Little		Not at all	
Surprised	303	(4%)	829	(11%)	1968	(25%)	1732	(22%)	2799	(36%)
Curious	1605	(20%)	2726	(35%)	2318	(30%)	588	(7%)	458	(6%)
Excited	880	(11%)	1619	(21%)	2677	(34%)	1290	(16%)	1218	(16%)
Confused	243	(3%)	514	(7%)	1157	(15%)	1694	(22%)	4020	(51%)
Anxious	130	(2%)	310	(4%)	917	(12%)	1446	(18%)	4834	(62%)
Frustrated	203	(3%)	412	(5%)	945	(12%)	1329	(17%)	4737	(60%)
Bored	36	(0.5%)	86	(1%)	375	(5%)	1000	(13%)	6118	(78%)
Proud	816	(10%)	1237	(16%)	2291	(29%)	1189	(15%)	2124	(27%)
Angry	27	(0.3%)	58	(1%)	182	(2%)	379	(5%)	6966	(89%)
Hopeful	644	(8%)	1555	(20%)	2863	(36%)	1094	(14%)	1474	(19%)
Hopeless	112	(1%)	232	(3%)	485	(6%)	720	(9%)	6046	(77%)

Table 4.6 Frequency of scaled responses - Control and Value

	Control		Value	
Strongly Agree	3252	(41%)	2598	(33%)
Agree	2773	(35%)	2316	(29%)
Somewhat agree	935	(12%)	1117	(14%)
Neutral	484	(6%)	746	(9%)
Somewhat disagree	170	(2%)	514	(7%)
Disagree	87	(1%)	289	(4%)
Strongly Disagree	112	(1%)	232	(3%)

Note. Neutral is neither agree nor disagree

The control and value variables were measured with a 7-point Likert scale. Table 4.6 identifies the frequency of each Likert scale response: strongly agree, agree, somewhat agree, neither agree nor disagree, somewhat disagree, disagree, and strongly disagree. The majority of the responses for each appraisal were: strongly agree, agree, and

somewhat agree. Very few responses were neutral and even fewer disagreed to some extent.

Means and standard deviations for the study variables are reported in Table 4.7. Participants reported higher levels of positive emotion overall, with means for the positive emotions higher than those for the negative emotions. Curiosity was the emotion felt most strongly by participants, closely followed by excitement, hope and pride. The rank order of the mean is as follows: curiosity (3.58), excitement (2.95), hope (2.84), pride (2.66), surprise (2.23), confusion (1.86), frustration (1.69), anxiety (1.62), hopelessness (1.37), boredom (1.28) and anger (1.13).

Table 4.7 Means and standard deviations for study variables

Emotion	Mean	SD	Variance	Skewness		Kurtosis	
				Statistic	Z-Score	Statistic	Z-Score
Surprise	2.23	1.17	1.365	0.558	19.93	-0.668	-11.93
Curiosity	3.58	1.08	1.171	-0.588	-21.00	-0.088	-1.57
Excitement	2.95	1.21	1.469	-0.062	-2.21	-0.817	-14.59
Confusion	1.86	1.10	1.214	1.163	41.54	0.452	8.07
Anxiety	1.62	0.96	0.924	1.556	55.57	1.761	31.45
Frustration	1.69	1.05	1.105	1.471	52.54	1.29	23.04
Boredom	1.28	0.65	0.426	2.698	96.36	7.969	142.30
Pride	2.66	1.32	1.74	0.187	6.68	-1.069	-19.09
Anger	1.13	0.50	0.253	4.485	160.18	22.449	400.88
Hope	2.84	1.20	1.433	-0.076	-2.71	-0.811	-14.48
Hopelessness	1.37	0.85	0.722	2.469	88.18	5.609	100.16
Value	5.99	1.23	1.516	-1.742	-62.21	3.523	64.05
Control	5.50	1.59	2.539	-1.122	-40.07	0.504	9.16

4.2.2 Correlations

The data obtained by the variables in this study were ordinal in nature, thus it was not anticipated that they would demonstrate a normal distribution. This assumption was confirmed by the results of the Kolmogorov-Smirnov test (Appendix C.9) as well as the

skewness and kurtosis z-scores (See Table 4.7). It was concluded, however, that some variables reached approximate normality based on the visual examination of variable histograms (Appendix C.8).

Consequently, associations between variables were investigated using a Spearman's Rho correlation matrix to address the non-normal distributions (Warner, 2013, p. 316). Table 4.8 shows the correlations between the cognitive appraisals of control and value and the eleven emotions. The correlations ranged from $|.004|$ to $|.656|$ for emotions, while control and value appraisals were significantly and positively correlated at $r = .544$. With regard to the correlations between the cognitive appraisals and emotions, control and value were associated significantly with all eleven emotions. Both control and value were negatively correlated with all six negative emotions and positively correlated with the four positive emotions. However, surprise, which can be categorised as having both positive and negative connotations, was negatively correlated with control and positively correlated with value.

Table 4.8 Correlations between appraisals and emotions

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Surprise													
2 Curiosity	.39**												
3 Excitement	.39**	.61**											
4 Confusion	.17**	-.05**	-.13**										
5 Anxiety	.18**	-.006	.004	.49**									
6 Frustration	.08**	-.13**	-.22**	.66**	.50**								
7 Boredom	-.04**	-.20**	-.19**	.13**	.10**	.22**							
8 Pride	.28**	.41**	.64**	-.21**	-.05**	-.26**	-.13**						
9 Anger	.09**	-.10**	-.11**	.29**	.30**	.40**	.29**	-.10**					
10 Hope	.32**	.49**	.64**	-.08**	.06**	-.13**	-.15**	.62**	-.09**				
11 Hopelessness	.10**	-.10**	-.15**	.53**	.46**	.58**	.21**	-.20**	.40**	-.12**			
12 Value	.14**	.34**	.41**	-.21**	-.11**	-.29**	-.36**	.36**	-.22**	.37**	-.23**		
13 Control	-.04**	.15**	.27**	-.52**	-.34**	-.52**	-.15**	.35**	-.26**	.25**	-.44**	.54**	

*Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

4.3 The Sample

4.3.1 Demographics

The background questionnaire was distributed via email to all those who indicated an interest in participating in the study. Over 178 individuals completed the background questionnaire but, of those, only 94 went on to participate in the study. This group became the sample for the study and all other responses were discarded. The main aim of this questionnaire was to collect general, as well as some specific background information about the study participants. This information is summarised in the following sections.

Table 4.9 Personal characteristics of respondents

<i>Characteristic</i>	N=94
Gender (%)	
Female	73.4
Male	26.6
Nationality (%)	
European	41.5
North American	50.0
South American	1.1
Middle Eastern	1.1
Australian	4.3
Asian/ Pacific Islander	1.1
First Language (%)	
English	72.3
Other European Languages	24.5
Non-European Languages	3.2
Age (%)	
18-25 Years	16.0
25-34 Years	18.1
35-44 Years	22.3
45-54 Years	23.4
55-64 Years	13.8
65+ Years	6.3

Table 4.9 shows the biographical data of the sample. The gender distribution is skewed towards females with 69 females and 25 males. The age range in the sample is diverse, however, the largest proportion of participants are aged between 35 and 54 (46%¹³). Just over half of the sample are North American (34 American, 9 Canadian and 4 Mexican), ten are Irish, twenty are from other European nations (including fourteen Italian, eight British, one Belgian, one Dutch, one French, one German, one Greek, one Hungarian and one Spanish) and a further four are Australian. Among the three remaining participants, one is Israeli, one is Argentinian and the other is Filipino. Nearly three-quarters of the sample speak English as their first language, while the remaining are native speakers of one of the following: Dutch/ Flemish, Filipino, French, German, Italian, Hebrew, Greek, Hungarian, Russian and Spanish.

4.3.2 Other Language Learning Experiences

Data was also collected on the additional languages spoken by participants. 64% ($n=60$) of the sample indicated that they speak at least one language other than their first language (to varying degrees of proficiency). The average number of additional languages spoken is two; however, some participants speak up to five additional languages. Naturally, the 25 participants who do not speak English as their first language listed English as an additional language. This figure is unsurprising given that English is the language of instruction in the course. Other popular languages included French ($n=28$), Spanish ($n=26$) and German ($n=15$). Interestingly, three participants claim to speak another Celtic language, i.e. Welsh. These figures show the multilingual nature of the participants that make up the sample for this study.

Learners were also asked to indicate where they learned their additional languages. The responses show that the most common learning context was in formal education with 40 participants (61%) saying that they learned an additional language at school. The other contexts mentioned were university or college courses ($n=28$), living abroad ($n=9$), adult

¹³ All percentages in the body of text are rounded to the nearest whole number. Tables contain percentages rounded to the first decimal. In some cases, figures may not add up to exactly 100%.

language classes ($n=6$), online/app ($n=6$), self-study ($n=5$), family ($n=4$) and incidental¹⁴ ($n=2$).

4.3.3 Irish Language Learning Experiences

In order to ascertain participants' prior levels of proficiency regarding the Irish language, participants were asked to indicate their level of Irish at the time they completed the questionnaire. These self-assessments were measured on a six-point scale: 'no Irish', 'a few words', 'a few simple sentences', 'parts of conversations', 'most conversations', 'native speaker ability'. This scale is a commonly used in Irish-language research. This measure was discussed in the previous chapter (See Section 3.8.3). The responses received were wide-ranging. Despite the fact that this course was aimed at complete beginners, only 30% of the participants indicated that they had 'no Irish'. The majority of participants (36%) evaluated themselves as being at the 'a few words' level, while 29% rated themselves as having 'a few basic sentences' in Irish. A much smaller number of participants (5%) indicated that they were at the 'parts of conversations' level. None of the participants rated themselves at the two highest levels: 'most conversations' or 'native speaker ability'.

Participants were also asked to elaborate on where they had learned their Irish previously. Surprisingly, learning online or via an app was the most popular answer among the respondents ($n=19$). Duolingo was frequently mentioned as the learning app of choice. Other learning contexts included language classes ($n=16$), school ($n=9$), incidental ($n=9$), self-study ($n=3$) and university/college ($n=1$).

4.3.4 Motivations

The questionnaire investigated participants' motivations for taking the course. Responses to open-ended questions were thematically analysed using a procedure outlined by Braun and Clarke (2006). This procedure is described in more detail in Section 5.2. The analysis identified five themes: All Things Irish, Means to an End, Intrinsic Interest in Irish Language, Love of Learning and Family and Friends. From these accounts, it appears it was predominantly intrinsic motivations that led participations to enrol in the course. In addition, a large number of the respondents had more than one motivation. The following

¹⁴ In this context the term 'incidental' is used to denote language learning that take places outside formal teaching or learning situations e.g. watching TV, travelling etc.

abstract from one response summarises the variety of motivations that participants expressed:

So many reasons... my heritage, encountering genealogy records as Gaeilge [Irish], language learning is fun, it's a minority language, I want to be bilingual, I want to understand the unique Irish perspective of the world (P059)

The following are brief descriptions of each theme supported by relevant examples quoted directly from participants' responses:

Means to an End

Some participants decided to enrol in the course and learn the Irish language to help with or compliment another endeavour in some way. Such endeavours were either work, study or hobby-related.

I want to study Irish in college so I chose to participate in this study to try Irish before committing to a full college course (P043)

I study archaeology and wish to know learn more Irish to better understand both old texts (like myths, annals, etc) and place names (P001)

Statements common to this theme usually specified an end-goal or something they wanted to achieve with the language. While goals and motivations are not conceptually the same, this shows that they can be linked.

I love history and would like to be able to read primary Irish language sources in the original (P071)

All things Irish

This was a pervasive theme, which encapsulates motivations that are associated with Ireland and 'Irishness' in the socio-cultural sense. A number of sub-themes are interpreted in relation to this theme. *Irish culture* is the first sub-theme. An interest in Irish culture, music and literature motivated certain participants to enrol in the course.

I want to learn Irish as I am deeply interested in the Irish culture and particularly its literature (P002)

I grew up listening to Irish music (despite not having an Irish bone in my body) and Irish culture is fascinating to me (P030)

A second sub-theme is *Ireland*. Links to the country itself were identified, with many people wanting to learn the language having visited Ireland previously or because they are intending to do so in the future.

Upon travelling to Ireland a couple of years ago, I gained a new appreciation and motivation to learn the language (P007)

Specific references to a desire to understand place names and bilingual signage were also singled out.

I want to be able to [...] read the signs when traveling, and connect with the ancient Irish place names (P066)

A final sub-theme is *Irish Heritage and Ancestry*. Many participants enrolled in the course to connect with their Irish heritage and ancestors. These participants do not appear to live in Ireland nor are they Irish citizens. However, they do have Irish ancestors or a history of familial relations in Ireland. For these participants, learning the language is their way to connect with being Irish or to honour their ancestors.

It's part of my history and culture and something I feel I should know and be proud of (P044)

I have Irish roots, so learning the language resonates with me (P068)

I want to know some of my ancestors' language (P019)

Love of Learning

Many participants enrolled in the course because they enjoy learning new things. They are not primarily attracted by the Irish language aspect of the course; it is a secondary factor. Learning on the course is anticipated to be “*a bit of fun*” (P051) or invokes their curiosity: “*First of all, I'm curious...*” (P057).

Driven by their passion for languages more generally, or a more specific interest in minority languages, this theme reflects those who enrolled in the course to add to their linguistic repertoire.

I really enjoy learning other languages, and Irish is one I don't have a lot of experience with. (P030)

This theme also encapsulates those who enrolled in the course for the intellectual challenge or as an opportunity for personal development.

...also because I was looking for a new linguistic challenge (P053)

To expand my horizon (P029)

Overall, enjoying the experience of learning is the undercurrent of this theme.

Intrinsic Interest in Irish Language

Many participants enrolled in the course because they are interested in the Irish language in and of itself, and not because of its connection to other things. Some voiced their appreciation for the aesthetics of the language, commenting in particular on how it sounds.

Irish interests me because of the differences in the way the language is written and how words are pronounced. (P024)

Gaelic seems a mysterious language full of symbolism. An ancient language with wonderful sounds. (P076)

Others feel a strong emotional connection to the language, which drives their desire to learn it. Participants even feel dutiful in their endeavour and some equate their learning with preserving the language.

I am a bit embarrassed that I don't have any Irish. I would like to change that. (P077)

I would like to contribute to preserving the Irish language and keeping it part of everyday life in Ireland (P040)

Family and Friends

This theme reflects those whose motivation is driven by a connection to friends or family members who speak the language already or who are also learning it. In comparison to

the subtheme of *Irish Ancestry and Heritage*, reference is made to living individuals and current connections as opposed to a historical link.

I am inspired by an Irishman, that's why I wanted to learn his first language.
(P044)

I have many friends who are Irish speakers and they encourage me to learn the language so that we can communicate in Irish. (P037)

My daughters are learning it in school and I would like to be able to help them/ learn with them. (P017)

4.3.5 Online Language Learning Experiences

A final question sought to determine whether participants had any experience of learning online, for language learning purposes or otherwise. 57% of the respondents indicated that they had taken an online course previously, 38.7% reported that they had not, while 4.3% were not sure.

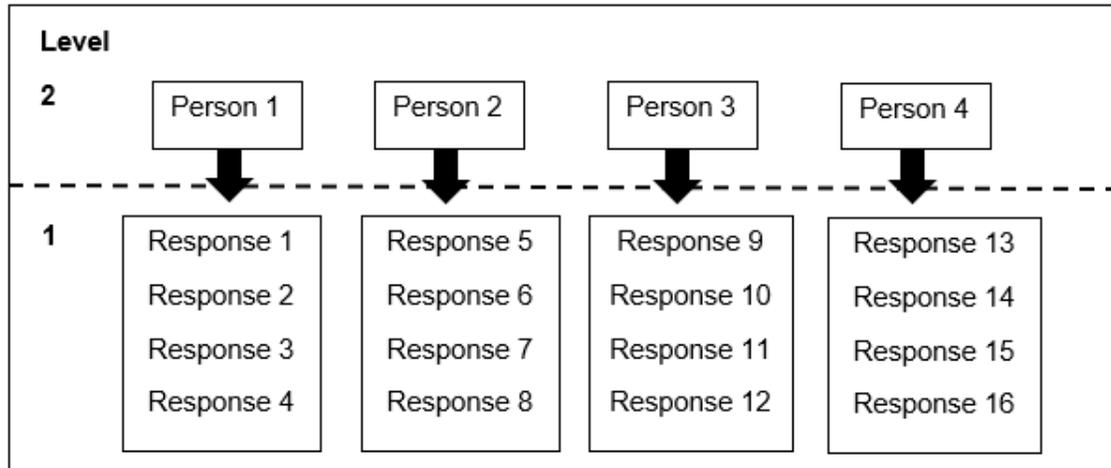
4.4 Quantitative Analysis

This section outlines the steps taken in the analysis of the quantitative data obtained from the MEQ.

4.4.1 Multilevel Modelling

The repeated-measures design of this study generates what is referred to as a multilevel data structure in which people constitute one level of analysis (Level 2) and the repeated measures they provide constitute another level (Level 1; see Figure 4.2). This type of data is also called nested data (Nezlek 2012, p358). This multilevel or nested structure needs to be taken into account when analysing the data, otherwise incorrect inferences can be made (Snijders and Bosker 1999, p. 1).

Figure 4.2 Example of nested data structure



An assumption common to other statistical analyses such as ANOVA and ordinary least-squares (OLS) multiple regression is that the observations or data subject to analysis are statistically independent. With nested data the Level 1 observations are not independent; the responses each person provides have in common the characteristics of that person. When this is the case, the assumption of independence is violated leading to the underestimation of the standard errors for parameter estimates and inflating Type 1 errors (Peugh 2010; Nezlek 2011). Thus, single level statistical analyses such as those mentioned above cannot be used.

Multilevel models, however, are able to model these dependencies and examine how higher-level individual characteristics (e.g. gender) explain variance in individual or lower-level outcomes over time (Snijders and Bosker 1999; Nezlek 2001). Moreover, multilevel models do not require complete data sets; parameters can be estimated with available data (Hox 2010). Thus, they can handle an unequal number of observations or missing data. While other approaches such as aggregated means, dummy-coded least squares and subgroup analyses have also been used to analyse nested data, they are not as accurate, according to Nezlek (2001, p.772).

Consequently, multilevel modelling, particularly two-level models, were used to analyse the data in this study. Nezlek (2008) summarises that the benefits of multilevel modelling are most pronounced when i) the researcher is interested in within-unit relationships (e.g.

within-person relationships) and ii) when the data structure is irregular, (e.g. when people provide different numbers of responses). Both of these conditions are applicable to this study.

Conceptually, multilevel analyses are relatively straightforward. Regression equations are estimated for each level of analysis. These equations are functionally equivalent to a standard OLS regression (Nezlek 2008). First, a Level 1 equation is estimated for every level 2 unit (e.g. person), the resulting coefficients then become the dependent variables for the Level 2 regression equation (Nezlek 2008). In practice, equations for all levels are estimated simultaneously.

The data in this study has a two-level structure, with points of time for the ESM assessments (Level 1; $N=540$) nested within persons (Level 2; $N=94$). Thirteen variables, eleven emotions and two cognitive appraisals, were measured at 12 points during the course across four different types of content (video, discussion, quiz and article); these constitute the Level 1 data. Data describing the participants (e.g. age, gender etc.) and the aggregated appraisal scores for each participant constitute the Level 2 data. Data at Level 1 can also be described as situation-level data while data at Level 2 can be described as course-level data.

4.4.2 Analysis Steps

In the subsections that follow, the approaches taken to analyse the quantitative data are outlined in detail, including both descriptive and inferential statistical analyses.

4.4.2.1 *Descriptive Statistics*

Following data screening and preparation, descriptive statistics were produced to gain an overall picture of the data pattern before progressing to the subsequent phases of analysis. These descriptive statistics included frequency distributions, means and standard deviations. The frequency distribution tables summarised the number of occurrences for each of the Likert scale categories across both the predictor and dependent variables. Cross-tabulation was also used to extend the frequency tables and explore the relationships between variables. The mean described the central tendency for each variable while the standard deviations described the variability or dispersion of scores.

4.4.2.2 *Inferential Statistics*

This phase of analysis specifically addresses the second, third and fourth research questions, which inquire as to the relationship between control-value appraisals, content, and emotions.

Assumption Testing

The main assumptions of linear models include linearity, normality, homoscedasticity and independence. However, with multilevel models, the assumptions of independence and homogeneity are not applicable as dependencies and variability in regression slopes can be accounted for by the models (Field 2018). Therefore, multilevel regression analysis assumes normality and linearity. In order to determine whether assumptions of linearity and normality are met in this study, the procedures outlined in Hox (2002) were followed for examining the model residuals. The extent to which the data displayed a normal distribution was also examined prior to any statistical analyses to determine the most appropriate tests and estimation parameter for the model. This was done by i) using the empirical Kolmogorov-Smirnov and Shapiro-Wilks tests, ii) plotting the sample distribution and iii) examining skewness and kurtosis values.

Centering

The predictor variables in this study were measured using interval scales, thus a score of zero has no meaning. In multilevel models, predictor variables such as these need to be centered to facilitate the interpretation of the coefficients (Enders and Tofighi 2007). Centering involves rescaling the variable so that a value of zero can be interpreted meaningfully. Centering decisions for Level 2 predictors generally mimic prescribed practice from the OLS regression literature and are always centered at their grand mean (Aiken and West 1991; Enders and Tofighi 2007). Level 1 predictors can be group-mean centered or grand-mean centered and deciding which form of centering is most appropriate should be based on the study's research questions (Enders and Tofighi 2007). In this study, the association between Level 1 variables is of particular interest. Interactions at Level 1 and cross level interactions are also examined. Thus, based on the guidelines developed by Enders and Tofighi (2007), it was determined that group-mean centering was the most appropriate form of centering for the Level 1 predictor variables.

Factor Analysis

In order to model the interrelationships among the emotions, an exploratory factor analysis was performed in which the factors were extracted using the principal component extraction method and then rotated using the varimax method. Coefficients smaller than .4 were suppressed.

Correlations

Intra-individual and inter-individual correlations were computed to obtain and compare information on the strength of association between variable pairings and the direction of the relationships at the two levels. Inter-individual correlations between cognitive appraisals and emotions were based on aggregated Level 1 data (assessments within students, n=540).

Multilevel Regression

A multilevel regression analysis was then undertaken to determine the predictive relationship between the independent variables and the emotions at each level. The approach taken for building the multilevel model for this study is derived from procedures outlined by Heck, Thomas and Tabata (2014) and Hox (2010), who present the process as a series of steps, starting with the simplest model and building it up.

Step 1: Between- and within-person variance

First, a series of unconditional models (null models), with no predictors at either level of analysis, were developed for each of the 11 dependent variables. The unconditional models provide important information on the sources of variance in the variables by partitioning the variability into within-person (Level 1) and between-person (Level 2) components (Heck Thomas and Tabata 2014).

The models can be shown by the following equations. A subscript for observations (i) and persons (j) is included. The Level 1 (within-person) null model can be written as:

$$Y_{ij} = \beta_{0j} + \varepsilon_{ij} \quad (1)$$

where Y_{ij} represents daily emotion ratings for each student, β_{0j} is a random coefficient (intercept) representing the mean of Y across all emotion ratings, and ε_{ij} represents error. The Level 2 (between-person) null model can be written as:

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (2)$$

where β_{0j} represents coefficients from the level one model, γ_{00} represents the grand mean of those coefficients/level 2 fixed-effect coefficient, and u_{0j} represents error at person level. Then substituting equation (2) with equation (1) yields the combined unconditional model, which can be written as:

$$Y_{ij} = \gamma_{00} + u_{0j} + \varepsilon_{ij} \quad (3)$$

These estimates were then used to calculate the intraclass correlation (ICC) for each variable. The ICC is the proportion of variance between persons (Level 2 variance) relative to the total variance (Level 1 and 2 variance; Heck, Thomas and Tabata 2014). A high ICC indicates high similarities between values in the same group. Many researchers use the ICC to determine whether multilevel modelling is needed based on the premise that a low ICC (values from the same group are not similar) justifies the assumption of independence (Peugh 2010; Heck, Thomas and Tabata 2014). Nezlek (2008, p. 856-857), however, states that researchers should always use multilevel modelling when they have a multilevel structure, irrespective of ICCs.

Step 2: Adding predictors

The unconditional models were then extended by adding predictor variables. At Level 1, the control (C) and value (V) appraisals as well as the three dummy variables accounting for the task types (article (A), quiz (Q), discussion (D)), were included as predictors of emotions (video was the reference variable).

At Level 2, age and gender were included as covariates to ensure that observed relations were not just the product of other plausible variables. These specific variables were included, as they have been shown to influence students' emotions in learning contexts (Frenzel, Pekrun, and Goetz 2007; Goetz *et al.* 2007; Dewaele and Macintyre 2016;

Dewaele *et al.* 2017). Additionally, in order to investigate whether the effects of control and value ‘compound’ at the person level, mean levels of control and value were computed per person. These new variables then served as Level 2 predictors of emotion, investigating whether a person’s mean level of value or control during the course predicts their emotions at the situation level (Level 1).

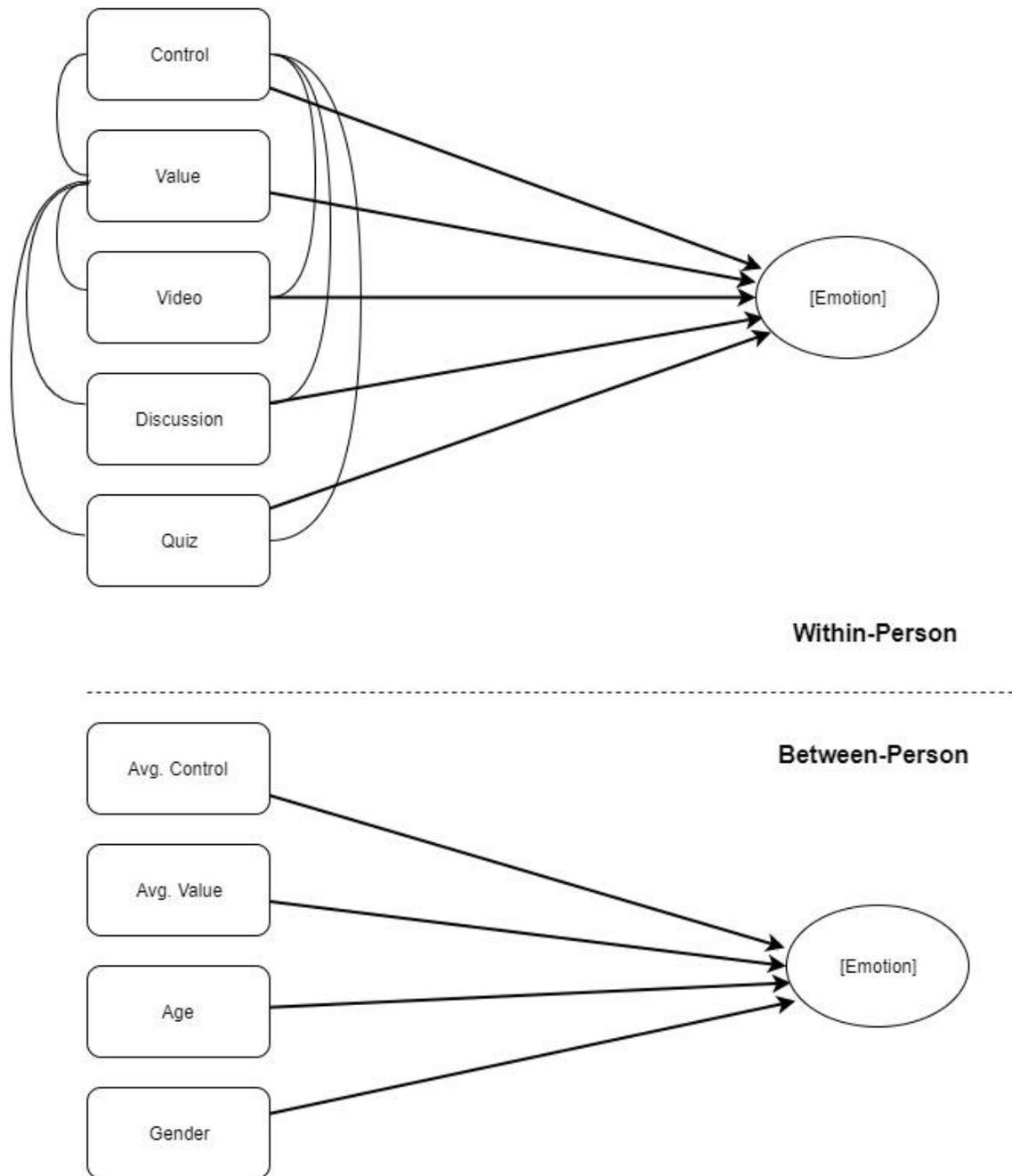
Next, all possible interaction terms between the independent variables at Level 1 were included (C x V, C x A, C x D, C x Q, V x A, V x Q, V x D). A significant C x V interaction would indicate that control and value combine multiplicatively in predicting emotional experiences. The other six interaction terms investigate whether situational characteristics play a role in moderating appraisal/ emotion relations. For instance, a significant interaction involving the quiz dummy variable and the control variable (C x Q) would demonstrate that in comparison to videos, quizzes moderate the relation between control and the emotion in question.

The extended model including Level 1 and Level 2 independent variables can be written as:

$$\begin{aligned}
 & Emotion_{ij} \\
 & = \gamma_{00} + \gamma_{01}(Control_{mean})_j + \gamma_{02}(Value_{mean})_j + \gamma_{03}(Age)_j \\
 & + \gamma_{04}(Gender)_j + \gamma_{10}(Value)_{ij} + \gamma_{20}(Control)_{ij} + \gamma_{30}(Article)_{ij} + \gamma_{40}(Quiz)_{ij} \\
 & + \gamma_{50}(Discussion) + \gamma_{60}(Control)_{ij}(Value)_{ij} \\
 & + \gamma_{70}(Control)_{ij}(Quiz)_{ij} + \gamma_{80}(Control)_{ij}(Discussion)_{ij} + \gamma_{90}(Control)_{ij}(Article)_{ij} \\
 & + + \gamma_{x0}(Value)_{ij}(Quiz)_{ij} + \gamma_{x0}(Value)_{ij}(Article)_{ij} + \gamma_{x0}(Value)_{ij}(Discussion)_{ij} + u_{0j} \\
 & + \varepsilon_{ij}
 \end{aligned}$$

An illustration of this model is provided in Figure 4.3.

Figure 4.3 Multilevel model



To recapitulate, this section has provided a detailed breakdown of the multi-level approach adopted for analysing the quantitative data obtained from the MEQ. In Section 0, the results obtained from this analysis are presented.

4.5 Quantitative Results

This section presents the results of the multilevel analysis in accordance with the strategy outlined in the previous section.

4.5.1 Learner participation

The Learning Manager Tool provided access to data regarding the number of steps completed by each participant in the sample for this study. Table 4.10 groups participants according to their levels of participation. Positively, nearly 50% of the sample completed 50% or more of the steps in the course and approximately 30% of those completed between 90 -100% of the steps in the course. It is important to note, however, that these percentages are abnormally high, with FutureLearn reporting that the average number of learners who complete over 90% of the steps in a course is 14.1%. As previously mentioned, the participants of this MOOC are atypical having self-selected to participate in the research study.

Table 4.10 Course participation rates

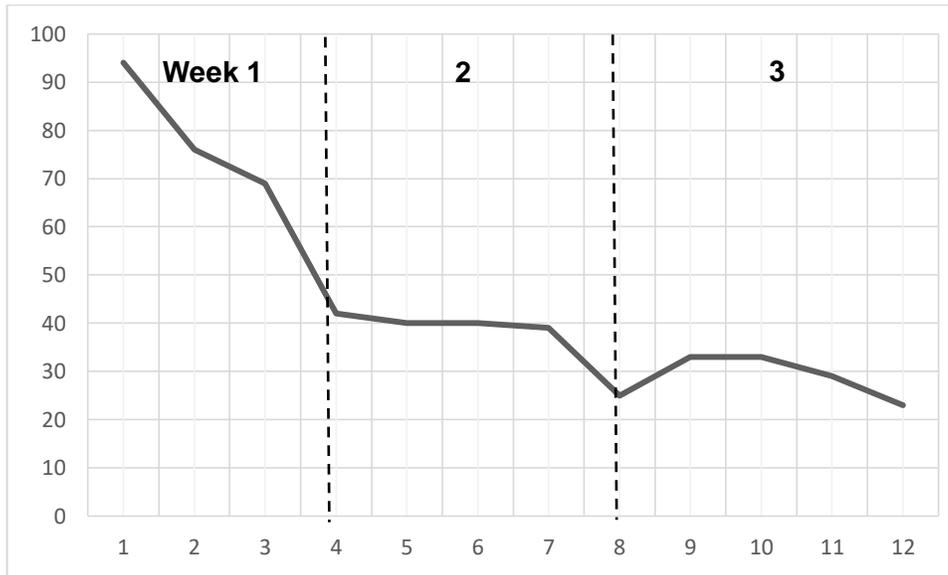
% of Steps Completed	Number of Participants (n=94)
0-9%	6 (6.4%)
10-49%	44 (46.8 %)
50-89%	14 (14.9%)
90-100%	30 (31.9%)

4.5.2 Response rate

Figure 4.4 outlines the survey response rate for the 12 data collection points. Similar to the pilot study, week one saw a significant decrease in survey responses, but this levelled out in the following weeks. Overall, the decline was not as severe as the pilot study. The improved response rate may be attributed to the reduced number of data collection points and the fact that the participants in this run were more cognisant of the surveys having agreed in advance to participate in the research. Overall, there were 540 unique responses. Only 12 participants completed all 12 surveys, while 19 participants completed just one survey. The remaining participants responded to varying numbers of surveys between 1 and 12 (see Appendix E.2 for breakdown). Even though some of the

participants only completed one survey, they contribute to the model. Multilevel models do not require complete data sets; parameters can be estimated with available data (Hox 2010). Thus, they can handle unequal number of observations or missing data.

Figure 4.4 Number of responses per questionnaire



4.5.3 Assumption of Normality

Each of the eleven variables in this study are scale variables, thus it was not expected that the resulting data would be normally distributed. Nevertheless, the normality of the data was explored both statistically and visually to confirm this. First, frequency distributions were evaluated for significant deviation from a normal distribution using the empirical tests, Kolmogorov-Smirnov and Shapiro-Wilks (Warner 2013, p. 178). As expected there was a statistically significant result for all variables in both tests proving that the data for each of the thirteen variables is not normally distributed (See Table 4.11).

Table 4.11 Kolmogorov-Smirnov and Shapiro-Wilks tests

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Surprised	.188	532	.000	.875	532	.000
Curious	.204	536	.000	.894	536	.000
Excited	.176	534	.000	.914	534	.000
Confused	.261	531	.000	.814	531	.000
Anxious	.310	528	.000	.766	528	.000
Frustrated	.324	526	.000	.748	526	.000
Bored	.444	526	.000	.553	526	.000
Proud	.159	536	.000	.907	536	.000
Angry	.520	527	.000	.324	527	.000
Hopeful	.227	531	.000	.905	531	.000
Hopeless	.479	526	.000	.480	526	.000
Value	.261	539	.000	.717	539	.000
Control	.247	535	.000	.805	535	.000

a. Lilliefors Significance Correction

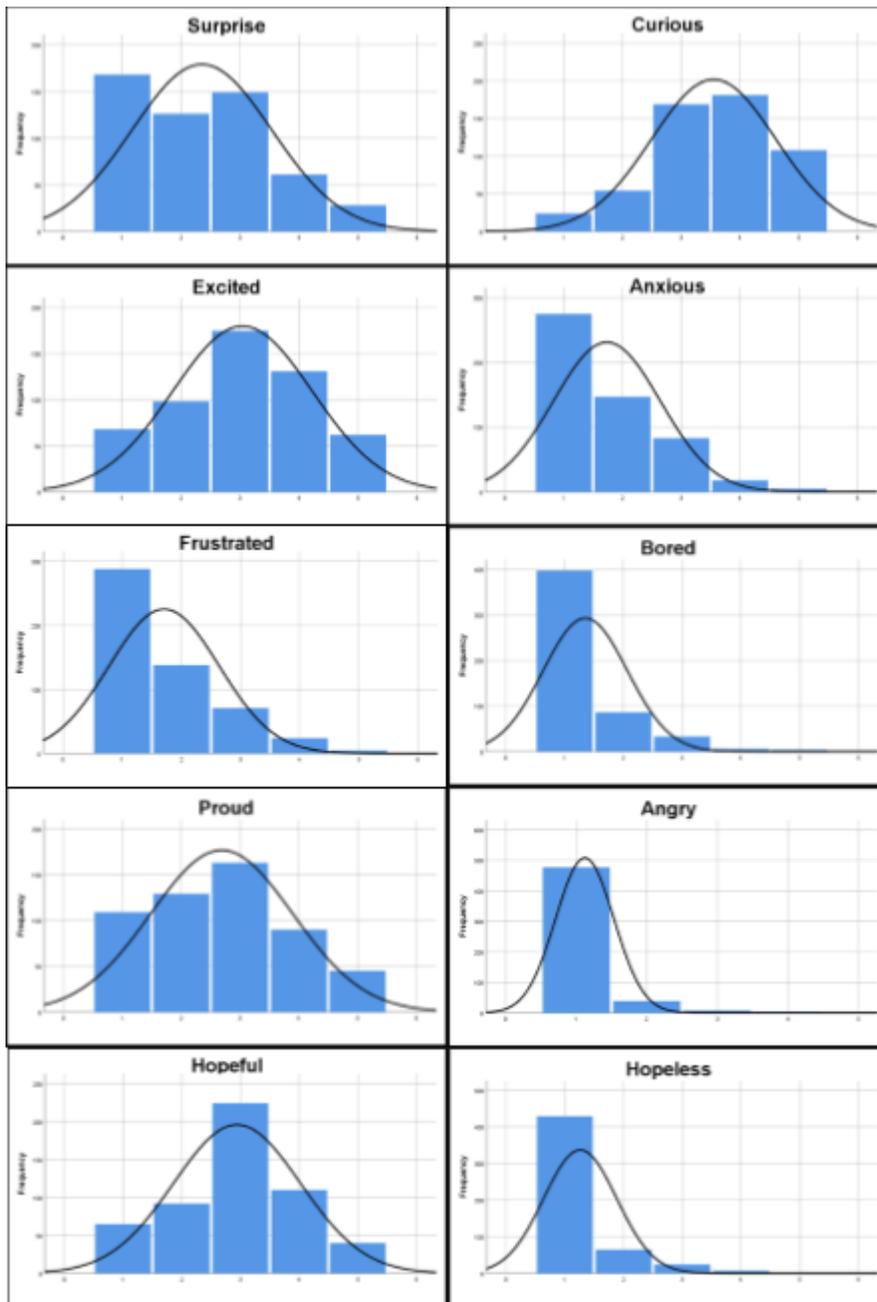
To explore further, skewness and kurtosis values of the frequency distribution for each variable were analysed for values of '0' and z-scores more than ± 1.96 . Based on skewness z-scores, univariate normality was tenable for excitement ($z = -1.10$), pride ($z = 1.97$) and hope ($z = -0.98$). Based on kurtosis scores, univariate normality was tenable for curiosity ($z = -1.31$) and confusion ($z = -0.67$)

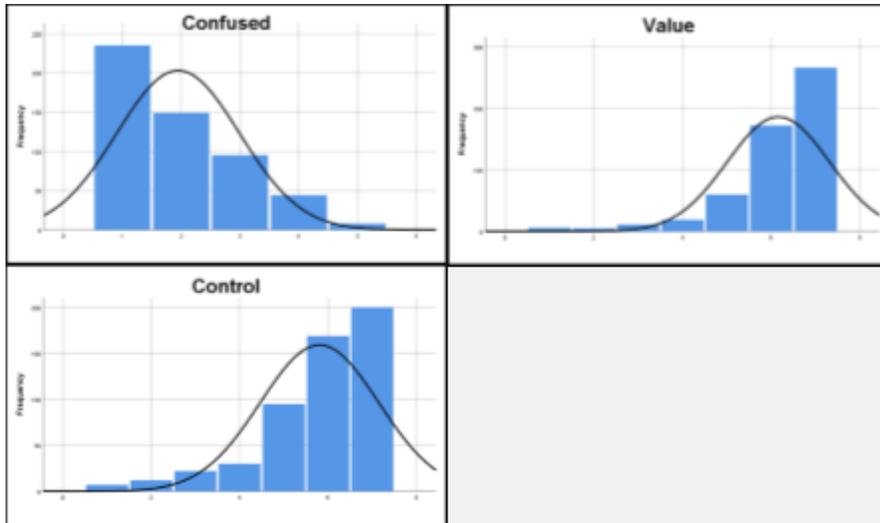
Table 4.12 Skewness and kurtosis for thirteen variables

	N	Mean	SD	Variance	Skewness		Kurtosis	
					Statistic	z-score	Statistic	z-score
Surprised	532	2.35	1.186	1.407	0.469	4.42	-0.693	-3.28
Curious	536	3.55	1.06	1.123	-0.445	-4.20	-0.277	-1.31
Excited	534	3.04	1.185	1.404	-0.117	-1.10	-0.785	-3.72
Confused	531	1.95	1.043	1.088	0.867	8.18	-0.143	-0.67
Anxious	528	1.73	0.911	0.83	1.127	10.63	0.715	3.37
Frustrated	526	1.71	0.931	0.867	1.239	11.69	0.889	4.17
Bored	526	1.35	0.717	0.515	2.372	22.38	6.183	29.03
Proud	536	2.69	1.21	1.463	0.209	1.97	-0.839	-3.98
Angry	527	1.12	0.414	0.172	4.034	38.06	18.48	87.17
Hopeful	531	2.94	1.082	1.17	-0.104	-0.98	-0.436	-2.06
Hopeless	526	1.26	0.623	0.388	2.689	25.37	7.575	35.56
Value	539	6.16	1.155	1.334	-2.004	-19.09	4.893	23.30
Control	535	5.81	1.341	1.797	-1.411	-13.31	1.895	8.98

Warner (2013) determines that in many cases a visual examination of the distribution shape is sufficient to show whether the distribution of sample scores is similar enough to a normal distribution to be tenable. Therefore, histograms of scores for each variable were also examined to assess normality of distribution shape (Figure 4.5). The histograms indicate that normality is potentially tenable for surprise, curiosity, excitement, hope and pride. However, confusion, anxiety, frustration, boredom, anger, hopelessness, control and value are non-normal with visible right skewness. Another way to assess normality visually is to use a probability plots such as P-P and Q-Q Plots (Warner, 2013, p. 147; See Appendix E.1).

Figure 4.5 Histograms of outcome and predictor variables





As anticipated, the variables in this study are non-normally distributed. In order to address this, non-parametric tests were used for conducting correlation analyses and a robust estimation parameter was utilised for the regression model. Both of these are discussed in more detail in the relevant sections.

4.5.4 Factor Analysis

Three factors with eigenvalues > 1 were extracted from the factor analysis (Table 4.13). The three-factor solution accounted for 65.70% of total variance and the three factors were internally consistent yielding Cronbach Alpha's of .83, .76 and .63, respectively. Also, the Kaiser-Meyer-Olkin measure of sampling adequacy (.803) and Bartlett's Test of Sphericity ($p=.000$) indicate that factor analysis is appropriate. Notably, the results are very similar to those obtained in the pilot (See Appendix C.10).

The first factor contained surprise, curiosity, excitement, pride and hope, and was named *Positive Emotion*. Similar to the pilot, surprise demonstrated a lower load in comparison to the other emotions. This may be because surprise can be either positively or negatively valenced.

The second factor contained confusion, anxiety, frustration and hopelessness. Hopelessness demonstrates a significantly lower load in comparison to the other emotions. This may be because hopelessness is a deactivating emotion while the other emotions are generally categorised as activating emotions. Frustration, anxiety and confusion are also epistemic emotions; they are associated with the process of

comprehending new information or working through a task (Boekaerts and Pekrun 2016). This factor is named *Adaptive Negative*.

Hopelessness appears to be a complex item, also loading on to the third factor, albeit to a slightly lower degree. The third factor also contains boredom and anger. Boredom, anger and hopelessness are all achievement-related emotions and are also generally considered to be detrimental to learning. It is also important to note that learners in this study did not frequently report instances of these emotions. The third factor is named *Maladaptive Negative Emotion*.

Overall, the three factors can be differentiated not only by valence but also by their impact on motivation and other related cognitive functioning. In other words, whether they enhance or inhibit the learning process. The results of this factor analysis highlight some of the complexities of negative emotions, a view supported by existing literature (Rowe and Fitness 2018).

Table 4.13 Results of factor analysis for emotion variables

	Rotated Component Matrix ^a		
	Component		
	1	2	3
Surprised	.674		
Curious	.730		
Excited	.853		
Confused		.841	
Anxious		.723	
Frustrated		.813	
Bored			.845
Proud	.802		
Angry			.769
Hopeful	.807		
Hopeless		.594	.521
Cronbach Alpha	.837	.778	.632

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

4.5.5 Descriptive Statistics

Two predictor variables (control and value) and eleven outcome variables (surprise, curiosity, excitement, confusion, anxiety, frustration, boredom, pride, anger, hope and hopelessness) were analysed for frequency distribution and central tendency. Table 4.14 shows the frequency of each Likert scale response for the eleven emotions. Participants experienced positive emotions most intensely; the three emotions experienced most intensely by participants (i.e. strong and very strong) were curiosity (53%), excitement (36%) and hope (28%). Table 4.15 was developed to bring visual clarity to the emotions being reported more intensely, less intensely and not at all. From the table it can be observed that strong reports of negative emotions are less frequent compared to the positive emotions. Hopelessness, anger and boredom were rarely felt at all by the participants. For the majority of the other emotions, the largest proportion of the reports were *Very little* and *Moderate*. This finding demonstrates the value in obtaining ratings of emotion intensity.

Table 4.14 Frequency distributions of Likert scales for outcome variables

	Very Strong		Strong		Moderate		Very Little		Not at all	
Surprised	28	(5%)	61	(11%)	149	(28%)	126	(23%)	168	(31%)
Curious	108	(20%)	181	(33%)	169	(31%)	54	(10%)	24	(4%)
Excited	62	(11%)	131	(24%)	175	(32%)	98	(18%)	68	(13%)
Confused	8	(1%)	44	(8%)	95	(18%)	149	(28%)	235	(43%)
Anxious	5	(1%)	18	(3%)	83	(15%)	147	(27%)	275	(51%)
Frustrated	5	(1%)	24	(4%)	71	(13%)	138	(26%)	288	(53%)
Bored	4	(1%)	6	(1%)	33	(6%)	86	(16%)	397	(73%)
Proud	45	(8%)	90	(17%)	163	(30%)	129	(24%)	109	(20%)
Angry	0	(0%)	3	(1%)	8	(2%)	39	(7%)	477	(88%)
Hopeful	40	(7%)	110	(20%)	224	(41%)	92	(17%)	65	(12%)
Hopeless	1	(0.2%)	7	(1%)	24	(4%)	65	(12%)	429	(79%)

Table 4.15 Frequency distributions of combined scale points

	Combined Strong and Very Strong		Combined Very Little and Moderate		Not at all	
Surprised	89	(16%)	275	(51%)	168	(31%)
Curious	289	(53%)	223	(41%)	24	(4%)
Excited	193	(36%)	273	(50%)	68	(13%)
Confused	52	(10%)	244	(45%)	235	(43%)
Anxious	23	(4%)	230	(42%)	275	(51%)
Frustrated	29	(5%)	209	(39%)	288	(53%)
Bored	10	(2%)	119	(22%)	397	(73%)
Proud	135	(25%)	292	(54%)	109	(20%)
Angry	3	(1%)	47	(9%)	477	(88%)
Hopeful	150	(28%)	316	(58%)	65	(12%)
Hopeless	8	(1%)	89	(16%)	429	(79%)

Table 4.16 displays the frequency of each Likert scale response for the two predictor variables, control and value. The majority of the responses for each appraisal were strongly agree, agree, and somewhat agree. Very few reports were neutral and even fewer disagreed to some extent.

Table 4.16 Frequency distributions of Likert scales for predictor variables

	Value		Control	
Strongly Disagree	6	(1%)	7	(1%)
Disagree	5	(1%)	12	(2%)
Somewhat disagree	11	(2%)	22	(4%)
Neutral	19	(4%)	30	(6%)
Somewhat agree	60	(11%)	95	(18%)
Agree	172	(32%)	169	(31%)
Strongly agree	266	(49%)	200	(37%)

Note. Neutral is neither agree nor disagree

Analysis of the means shows that positive emotions - curiosity, pride, excitement and hope - scored higher ($m=3.13$) than negative emotions ($m=1.54$) - confusion, anxiety, frustration, boredom, anger and hopelessness (see Table 4.17). Surprise was excluded

from these calculations because it can be considered both a positive and negative emotion.

An independent samples t-test showed that anxiety is the only emotion that is significantly different for males ($M=1.49$, $SD=0.770$) and females ($M=1.81$, $SD=.939$); $t(525) = 3.422$, $p = .000$. These results suggest that females report higher levels of anxiety than males. The effect size for this relationship is moderate (Cohen's $d = .355$).

Table 4.17 Means and standard deviations for all study variables

	Total		Video		Discussion		Quiz		Article	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Surprise	2.35	1.19	2.35	1.08	2.20	1.28	2.37	1.17	2.43	1.24
Curiosity	3.55	1.06	3.58	0.98	3.19	1.23	3.67	1.04	3.62	1.01
Excitement	3.04	1.19	2.95	1.14	2.99	1.20	3.17	1.25	3.01	1.15
Confusion	1.95	1.04	1.95	0.94	1.73	0.91	1.77	1.07	2.28	1.11
Anxiety	1.73	0.91	1.67	0.89	1.75	0.90	1.71	0.91	1.81	0.95
Frustration	1.71	0.93	1.72	0.96	1.67	0.79	1.64	0.98	1.80	0.93
Boredom	1.35	0.72	1.38	0.72	1.35	0.77	1.41	0.78	1.26	0.59
Pride	2.69	1.21	2.36	1.17	2.80	1.15	3.18	1.19	2.39	1.11
Anger	1.12	0.41	1.09	0.37	1.09	0.36	1.15	0.49	1.14	0.39
Hope	2.94	1.08	2.87	1.04	2.94	1.07	3.07	1.17	2.86	1.02
Hopelessness	1.26	0.62	1.23	0.54	1.29	0.71	1.18	0.55	1.37	0.71
Value	6.16	1.16	6.14	1.24	6.16	1.24	6.06	1.20	6.28	0.93
Control	5.81	1.34	5.74	1.40	5.63	1.48	6.06	1.20	5.69	1.31

N=540 assessments within students

The values are also reported separately for the four content types of article, quiz, discussion and video. The figures show that emotions varied in response to certain task types. For instance, pride and hope increased during quizzes, while frustration and confusion increased during videos and articles. Discussions appear to evoke less curiosity in learners compared to the other task types. With respect to the cognitive appraisals, participants reported high levels of control and value overall. Articles however stand out as a task type that evoke comparatively higher value appraisals, while videos evoke the highest control appraisals.

Table 4.18 Means and standard deviations for each week of course

	Week 1		Week 2		Week 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Surprised	2.44	1.22	2.31	1.11	2.20	1.19
Curious	3.72	1.01	3.47	1.04	3.25	1.12
Excited	3.14	1.20	3.04	1.13	2.81	1.18
Confused	1.97	1.09	1.98	1.05	1.85	0.92
Anxious	1.74	0.99	1.76	0.84	1.68	0.80
Frustrated	1.67	0.94	1.86	0.96	1.61	0.84
Bored	1.38	0.75	1.35	0.66	1.29	0.72
Proud	2.73	1.22	2.78	1.17	2.49	1.21
Angry	1.11	0.39	1.20	0.54	1.05	0.26
Hopeful	2.97	1.11	2.98	1.06	2.83	1.04
Hopeless	1.23	0.59	1.36	0.65	1.22	0.67
Value	5.96	1.15	6.33	1.14	6.42	1.11
Control	5.71	1.40	5.85	1.33	5.97	1.20

Table 4.18 reports the means and standard deviations for each of the study variables separately for each of the three weeks of the course. Positive emotions remained dominant throughout the course. However, slightly higher levels of negative emotions were reported in week 2. Interestingly, pride was also highest in Week 2. Overall, emotion levels decreased over the duration of the course. In comparison, appraisals of value increased gradually from week to week. The same tables were calculated for the pilot study with similar results (See Appendix C.11). The differences between means, however, were more pronounced in the pilot study.

4.5.6 Bivariate Correlation

To explore further, a bivariate correlation was conducted at two levels for all eleven emotions plus the two appraisals, control and value. Correlations at Level 1 are presented in Table 4.19 and are based on the intra-individual distributions of variables. Correlations at this level show whether a higher score on a variable in a given situation is associated with a higher score on the other variable in the same situation. Correlations at Level 2 are presented in Table 4.20 and are based on the inter-individual distributions of variables. Correlations at this level show between-person correlations between the

aggregated variables. Thus, they show whether individuals who have higher scores on one variable also have higher scores on the other variable across situations.

Table 4.19 Correlations between appraisals and emotions (within-person)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Surprised													
2 Curious	.42**												
3 Excited	.52**	.57**											
4 Confused	.26**	.11**	.02										
5 Anxious	.17**	.11*	.09*	.42**									
6 Frustrated	.25**	.06	-.07	.67**	.39**								
7 Bored	-.05	-.17**	-.26**	.10*	.01	.22**							
8 Proud	.40**	.41**	.62**	-.09*	.01	-.12**	-.10*						
9 Angry	.09*	-.05	-.09	.29**	.24**	.38**	.33**	-.04					
10 Hopeful	.39	.47**	.62**	.06	.14**	-.00	-.12**	.58**	-.03				
11 Hopeless	.05	-.09	-.15**	.42**	.35**	.47**	.32**	-.16**	.42**	-.08			
12 Value	.05	.22**	.35**	-.17**	-.04	-.24**	-.42**	.28**	-.29**	.30**	-.28**		
13 Control	-.10*	.06	.16**	-.46**	-.38**	-.46**	-.16**	.24**	-.29**	.13**	-.37**	.47**	

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.20 Correlations between appraisals and emotions (between-person)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Surprised													
2 Curious	.47**												
3 Excited	.69**	.56**											
4 Confused	.17	.11	.10										
5 Anxious	.26*	.10	.28**	.52**									
6 Frustrated	.11	.03	-.12	.72**	.37**								
7 Bored	-.27**	-.19	.50**	.17	-.04	.36**							
8 Proud	.55**	.41**	.60**	-.03	.17	-.13	-.33**						
9 Angry	.05	-.07	-.15	.39**	.21	.49**	.38**	-.15					
10 Hopeful	.54**	.44**	.63**	-.00	.27**	-.08	-.24*	.65**	-.07				
11 Hopeless	-.02	-.24*	-.19	.41**	.34**	.50**	.37**	-.21*	.57**	-.09			
12 Value	.19	.17	.43**	-.15	.12	-.27**	-.40**	-.37**	-.34**	.36**	-.27**		
13 Control	.01	.00	.13	-.53**	-.39**	-.54**	-.14	.29**	-.35**	.16	.40**	.41**	

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

At Level 1 and Level 2, control and value were significantly correlated at .47 and .41, respectively. The moderate strength correlation between these two predictor variables raises the question of multicollinearity that will need to be considered further at a later stage.

With regard to the correlations between the appraisals and emotions, associations were generally in line with expectations. At Level 1, value was positively correlated with curiosity, excitement, pride and hope, and negatively correlated with confusion, frustration, boredom, anger and hopelessness. These correlations ranged from $|.17|$ to $|.42|$. Value was not significantly correlated with surprise or anxiety. Control was positively correlated with excitement, pride and hope, and negatively correlated with surprise, confusion, anxiety, frustration, boredom, anger and hopelessness with correlations ranging from $|.10|$ to $|.46|$. Control was not significantly correlated with curiosity. At Level 2, while the independent variables were significantly correlated with fewer emotions, the correlations were much stronger at this level. Value was positively correlated with excitement, pride, and hope, and negatively correlated with frustration, boredom, and hopelessness. The strength of the correlations ranged from $|.27|$ to $|.43|$. Control was positively correlated with only one emotion, pride at $|.29|$. Control was negatively correlated with confusion, anxiety, frustration, anger, and hopelessness. These correlations ranged from $|.29|$ to $|.54|$.

As for the correlations between emotions, there were distinct clusters of positive and negative emotions. The four positive emotions (excitement, pride, hope, curiosity) were positively associated with each other at both within- and between-person levels. The six negative emotions (confusion, anxiety, frustration, boredom, anger, hopelessness) were positively associated with each other, at both levels. Notably, surprise showed positive correlations with both positive and negative emotions. This ambivalence is not difficult to comprehend. Surprise is an emotion that has both positive and negative connotations depending on the situation. However, stronger correlations existed between surprise and positive emotions, at both Level 1 and Level 2, compared to the negative emotions.

There were fewer significant correlations between positive and negative emotions. Some associations were as expected. For example, boredom was inversely related to excitement, curiosity, pride and hope. Other relationships were more unexpected. Anxiety, for instance was positively correlated with excitement, curiosity and hope.

Correlations at Level 1 and Level 2 are statistically independent from each other as they refer to different distributions (within vs. between persons). These results discussed here show that some of the correlations do in fact show differences across the two levels.

4.5.7 Multilevel Regression

Mplus (version 8) was the software used to conduct this analysis. The syntax for an exemplar emotion is available in Appendix E.3. As mentioned previously, the dataset for this analysis contains missing data and variable levels of skewness and kurtosis. Therefore, Maximum Likelihood Estimation with robust calculation of standard error (MLR) was the estimation procedure adopted for this analysis. MLR provides robust results in the face of violations of normality with a minimal loss of power (Yuan, Chan, & Bentler, 2000).

4.5.7.1 Null Model Results

Table 4.21 shows the variance components and intra-class correlations (ICC) for both the predictor (appraisals) and outcome variables (emotions). All the within- and between-learner variance estimates were found to be statistically different from zero. Overall, there is a significant amount of variability at each level.

Table 4.21 Variance components and ICCs for variables

	Intercept Coeff.	Within-person variance	Between-person Variance	ICC
Surprise	2.46	0.697	0.795	0.53
Excitement	3.07	0.665	0.784	0.54
Curiosity	3.65	0.608	0.484	0.44
Pride	2.70	0.832	0.625	0.43
Hope	2.97	0.574	0.611	0.52
Frustration	1.73	0.549	0.347	0.39
Confusion	1.96	0.706	0.413	0.37
Anxiety	1.78	0.558	0.354	0.39
Hopelessness	1.26	0.250	0.135	0.35
Boredom	1.39	0.319	0.228	0.42
Anger	1.12	0.125	0.049	0.28

Note. ICC: Variance on Level 1 divided by total variance. $N_{\text{Level 1}} = 540$ (assessments within learners), $N_{\text{Level 2}} = 94$ (learners)

ICCs for the eleven emotions range from .28 to .54. As previously discussed, the ICC assesses the level of variance in the observed variable that is attributable to membership in its cluster. In this analysis, the amount of variance attributable to cluster membership ranges from 28% to 54%. ICC values reported in multilevel studies usually range from 5% to 30% (Mathieu *et al.* 2002; Hedges and Hedberg 2007; Peugh 2010). These percentages indicate that for many of the emotions in this study, the ICCs are very high. High ICCs provide support for a nested data structure and the use of multilevel modelling rather than a single level data analytical approach (Peugh 2010). In general, a higher percentage of the variance for positive emotions tends to be at the between-person level, while negative emotions tend to vary more at the within-person level. Taken together, the unconditional models suggest that learners' emotions vary from situation to situation as well as from person to person.

4.5.7.2 Fixed Slope Model Results

The multilevel regression findings for the eleven models are combined in Table 4.22. The eleven models show the effects of the cognitive appraisals, control and value, and task types as antecedents of each emotion. The results for each emotion are explained individually below.

The significant interactions in each model are also plotted as necessary to facilitate their interpretation (Aiken and West 1991). The hierarchical linear model (HLM) version of an online tool developed by Preacher, Curran, and Bauer (2006) was used to generate the interaction plots¹⁵. Continuous moderators (e.g. value) were split using the mean and values 1 *SD* above and below the mean, as recommended by Cohen and Cohen (1983). For dichotomous moderators (e.g. tasks) values of the dichotomy were used to split the data (0 and 1). It is important to note that it was decided to consistently depict the interaction effects with control as the predictor and value as the moderator for the sake of clarity, however, the reverse relationship could exist as well. It was beyond the scope of this study to determine which appraisal antecedent was the true moderator and there were no theoretical assumptions in the CVT to help clarify the nature of this relationship.

¹⁵ Tool is available at <http://www.quantpsy.org>

Model Fit

A number of goodness-of-fit indicators can be used to assess model fit (Schreiber *et al.* 2006). Mplus produces RMSEA, CFI and SRMR model fit statistics in addition to the chi-square (χ^2) test of model fit. A non-significant χ^2 indicates that the model is a good fit (Tabachnik and Fidell 2014). However, the χ^2 test is sensitive to sample size (such that large samples often return statistically significant χ^2 values) and non-normality in the input variable (Tabachnik and Fidell 2014). The Root Mean Square Error of Approximation (RMSEA) is not as sensitive to large sample sizes. According to Hu and Bentler (1999), RMSEA values below .06 indicate satisfactory model fit. Other model fit indicators provided by Mplus include the Comparative Fit Index (CFI) and the Standard Root Mean Squared Residual (SRMR). CFI values greater than .95 and SRMR values below .08 indicate satisfactory model fit (Hu and Bentler 1999).

A summary of the model fits for this study are presented in Appendix E.4. As illustrated, the models are saturated so model fit statistics are all at the highest values. However, the Log likelihood value, which tends towards zero when the model has a better fit, and the R^2 values are also presented to show the overall quality of the models. The R^2 values represent the proportion of variance explained by the model at each level of analysis, or in other words how well the model fits the data. In the frustration model, for example, the model explains 20% of variance at the within-person level and 55% of variance at the between-person level.

Table 4.22 Multilevel analysis on the antecedents of emotions

	Frustrat.	Confusion	Anxiety	Anger	Boredom	Pride	Curiosity	Surprise	Excit.	Hope	Hopeless
<i>Within</i>											
<i>Cognitive Appraisals</i>											
Control	-0.321**	-0.310**	-0.312**	0.030	0.090	0.175*	0.029	0.033	0.145	0.117	-0.288*
Value	-0.120	-0.083	-0.120	-0.175	-0.468**	0.101	0.125	-0.154	0.169	0.133	-0.106
<i>Task Types</i>											
Article	0.039	0.313**	0.097	0.110	-0.218*	0.027	0.016	0.052	0.067	-0.024	0.222*
Discussion	-0.072	-0.264**	0.083	0.025	-0.165	0.408**	-0.498**	-0.201	0.030	0.044	0.076
Quiz	0.061	-0.064	0.217*	0.214	-0.068	0.805**	0.169	-0.022	0.279**	0.258*	0.010
<i>Interactions</i>											
Control*Value	-0.226**	-0.232**	-0.082	-0.188*	-0.286**	0.229**	0.167*	0.102	0.201	0.163**	-0.207**
Control*Article	-0.003	-0.140**	-0.008	-0.104	0.047	-0.053	-0.070	-0.159**	-0.030	-0.017	0.049
Control*Quiz	-0.212**	-0.112	-0.044	-0.161	0.011	0.117	0.036	0.069	0.028	-0.021	-0.022
Control*Discussion	-0.015	-0.066	-0.098	-0.048	-0.143**	0.079	0.024	-0.048	0.040	0.037	-0.041
Value*Article	-0.029	0.017	0.138**	0.042	0.020	0.075	0.178**	0.143*	0.101	0.021	-0.007
Value*Quiz	0.135	0.109	0.208**	0.083	-0.018	-0.039	-0.043	0.131	0.038	0.014	-0.008
Value*Discussion	0.080	0.112	0.188**	-0.008	-0.112	0.021	0.103	0.178**	0.025	0.067	0.026
<i>Between</i>											
Avg. Control	-0.604**	-0.617**	-0.739**	-0.262	0.105	0.068	-0.134	-0.243	-0.131	-0.065	-0.500**

Avg. Value	-0.266*	-0.200	0.304*	-0.566**	-0.740**	0.508**	0.364**	0.410**	0.607**	0.504**	-0.296
Age	0.137	0.023	0.182	0.070	-0.024	-0.132	-0.002	-0.284**	-0.167	-0.090	0.052
Sex	-0.101	-0.123	0.158	0.194	-0.028	-0.126	0.103	-0.386	-0.018	-0.070	0.007

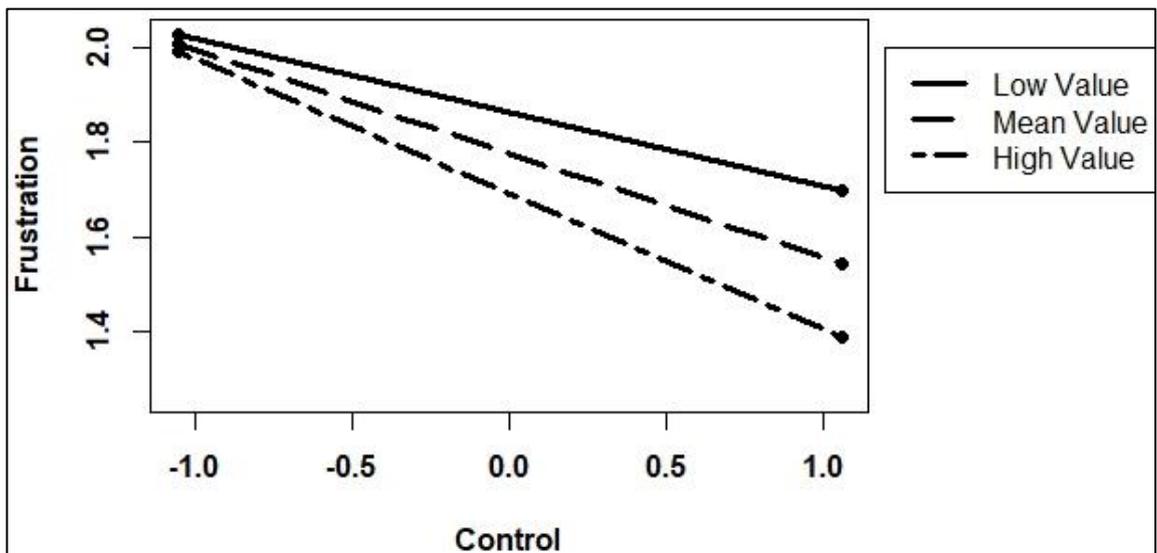
Note. Separate models are estimated for each emotion. All coefficients are standardised. Sex was coded 0 for female 1 for male. Task Types were dummy coded with video as a reference variable. All Level 1 variables are group-mean centered, that is, for each individual for their mean

*p<.05, **p<.01

Frustration

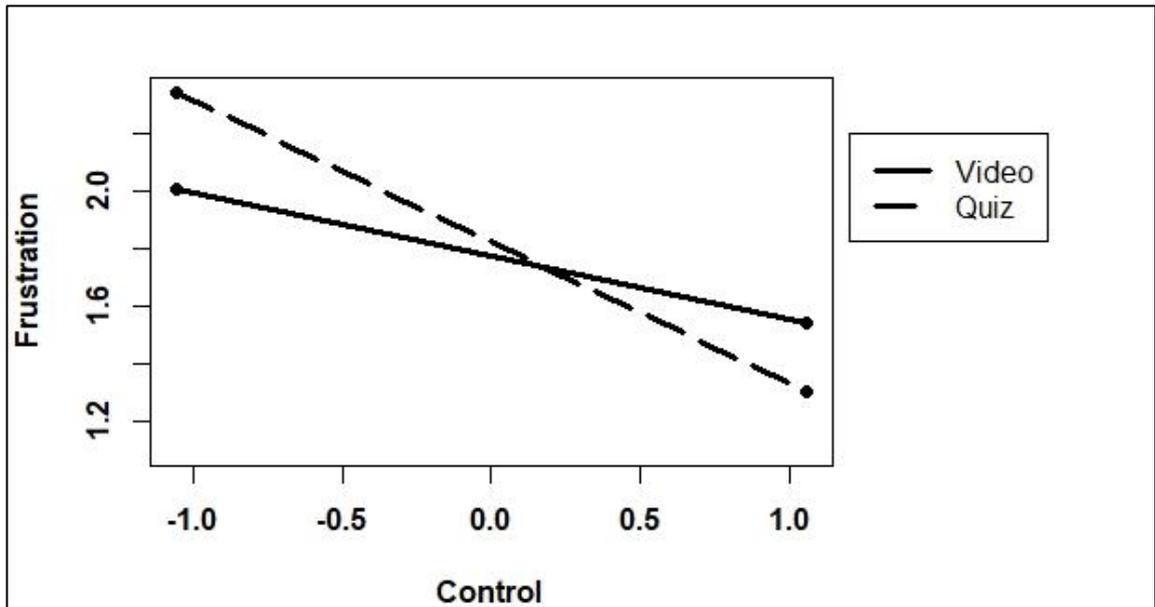
The results of the multilevel regression indicate that the predictors explain 20% of the variance at Level 1 and 59% of the variance at Level 2 for frustration. It was found that control negatively predicts frustration ($\beta = -.321, p < 0.01$). The less control an individual perceives himself or herself to have over their learning in a specific situation, the more frustration they experience in that situation. Neither value nor the various task types were found to significantly predict frustration. However, the Control \times Value interaction was significant for feelings of frustration ($\beta = -.228, p < 0.01$).

Figure 4.6 Significant Control \times Value interaction predicting frustration



This significant interaction can be interpreted such that the negative relation between control and frustration was stronger in situations with lower value appraisals. In Figure 4.6, there is a graphical depiction of this interaction. The Control \times Quiz interaction was also significant for frustration ($\beta = -.212, p < 0.01$). As shown in Figure 4.7, the relation between control and frustration was moderated by the task; the relation between control and frustration was stronger during quizzes than during videos.

Figure 4.7 Significant Control x Quiz interaction predicting frustration



With regard to the Level 2 variables, both average control ($\beta = -.604$, $p < 0.001$) and average value ($\beta = -.266$, $p < 0.05$) negatively predicted frustration at Level 1, the situation level. In other words, when a learner's average control and value appraisals during the course were low, they were more likely to experience frustration during a specific activity in the course (situational frustration).

Surprise

The results of the multilevel regression indicate that the predictors explain 5% of the variance at Level 1 and 14 % of the variance at Level 2 for surprise. The main effects of control and value as well as their interactive effect were non-significant for surprise. However, the Value \times Article ($\beta = .143$, $p < 0.05$), Value \times Discussion ($\beta = .178$, $p < 0.01$) and Control \times Article ($\beta = -.159$, $p < 0.01$) interaction effects were all found to be significant for feelings of surprise. As depicted in Figure 4.8, the relation between value and surprise changed based on whether the task being undertaken was a video or an article. Figure 4.9 also shows that the relation between value and surprise differed depending on whether the task was a video or a discussion. Similarly, the relation between control and surprise differed depending on task type (see Figure 4.10).

Figure 4.8 Significant Value x Article interaction predicting surprise

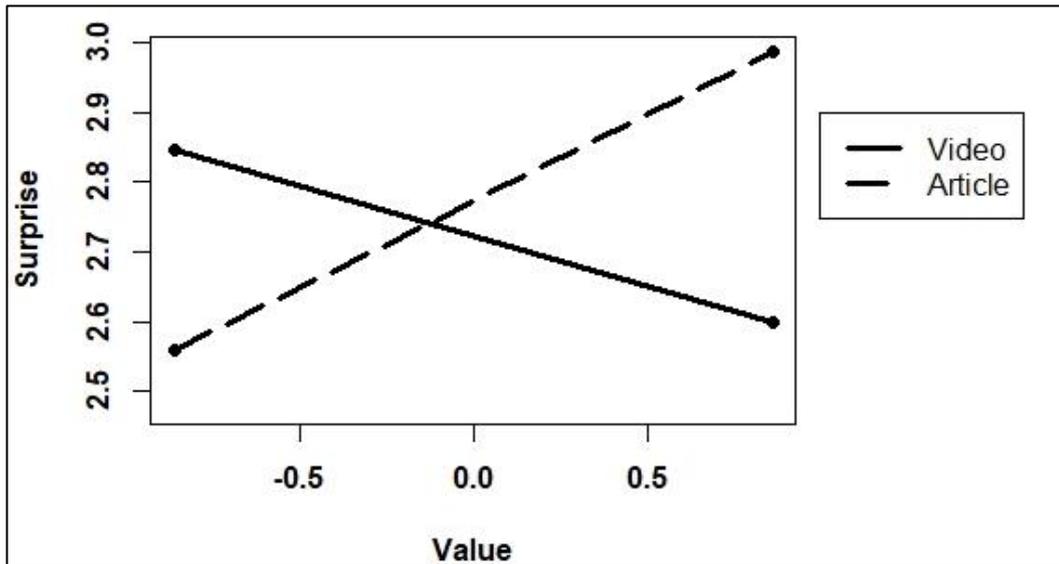


Figure 4.9 Significant Value x Discussion interaction predicting surprise

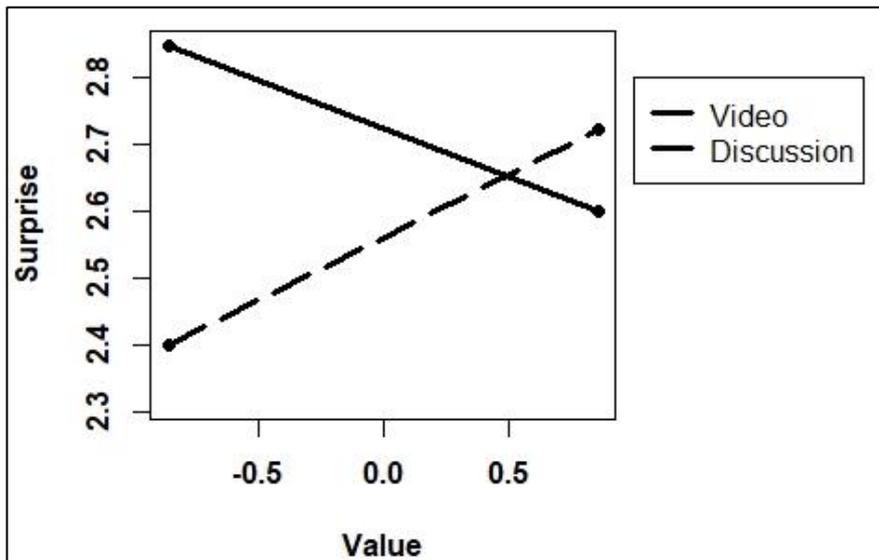
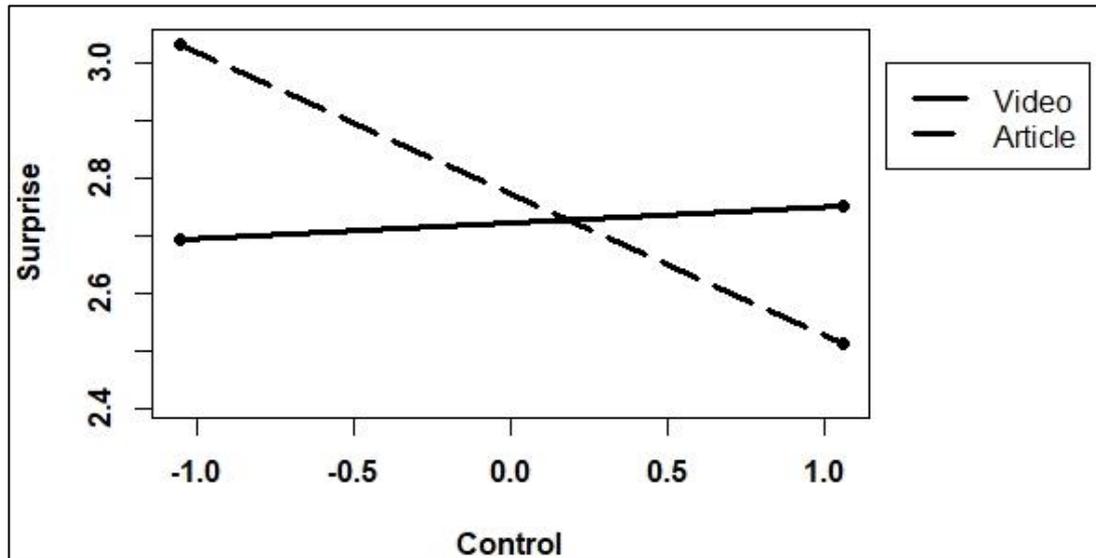


Figure 4.10 Significant Control x Article interaction predicting surprise



With regard to the Level 2 variables, it was found that age negatively predicted surprise ($\beta = -.284, p < .001$); the older the learner the less surprised they were during learning tasks. It was also found that a person's average or 'compounded' value positively predicted surprise at a situational level ($\beta = .410, p < .001$).

Excitement

The multilevel model explains 11.8% of the variance at Level 1 and 28.4% of the variance at Level 2 for excitement. The main effects of control and value as well as their interactive effect were non-significant for excitement. However, quizzes, as compared to videos, were found to positively predict excitement ($\beta = .279, p < .01$). This means that as compared to videos, learners experienced higher levels of excitement during quizzes. At Level 2, average value was found to positively predict excitement ($\beta = .607, p < .001$).

Anxiety

The multilevel model explains 13.3% of the variance at Level 1 and 53.5% of the variance at Level 2 for anxiety. At Level 1, control was found to negatively predict anxiety ($\beta = -.312, p < .01$). With regard to the task types, the quiz dummy was found to positively predict anxiety ($\beta = .217, p < .05$). Learners experienced higher levels of anxiety during quizzes than during videos.

Furthermore, the Value \times Article ($\beta=.138$, $p<0.01$), Value \times Quiz ($\beta=.208$, $p<0.01$) and Value \times Discussion ($\beta=.188$, $p<0.01$) interaction effects were all significant for feelings of anxiety. As shown in Figure 4.11, Figure 4.12 and Figure 4.13 the relation between value and anxiety differed depending on the task.

Figure 4.11 Significant Value \times Article interaction predicting anxiety

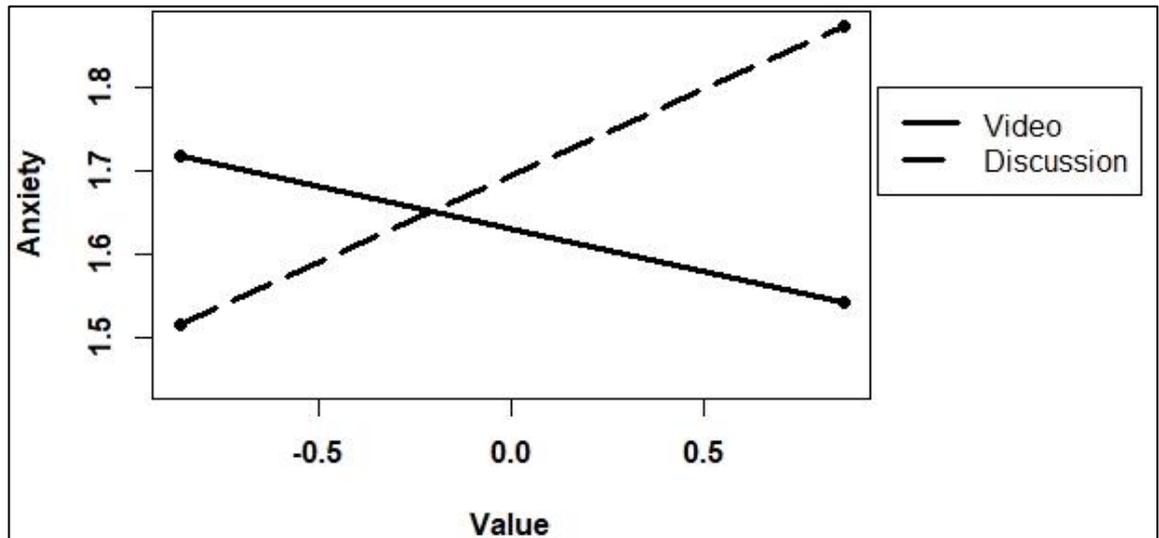


Figure 4.12 Significant Value \times Discussion interaction predicting anxiety

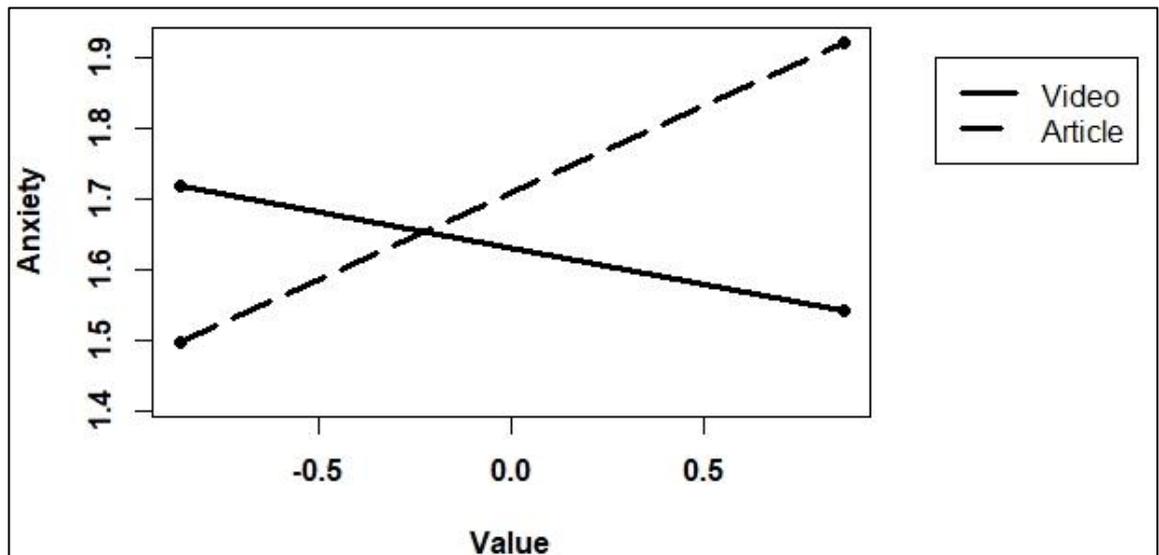
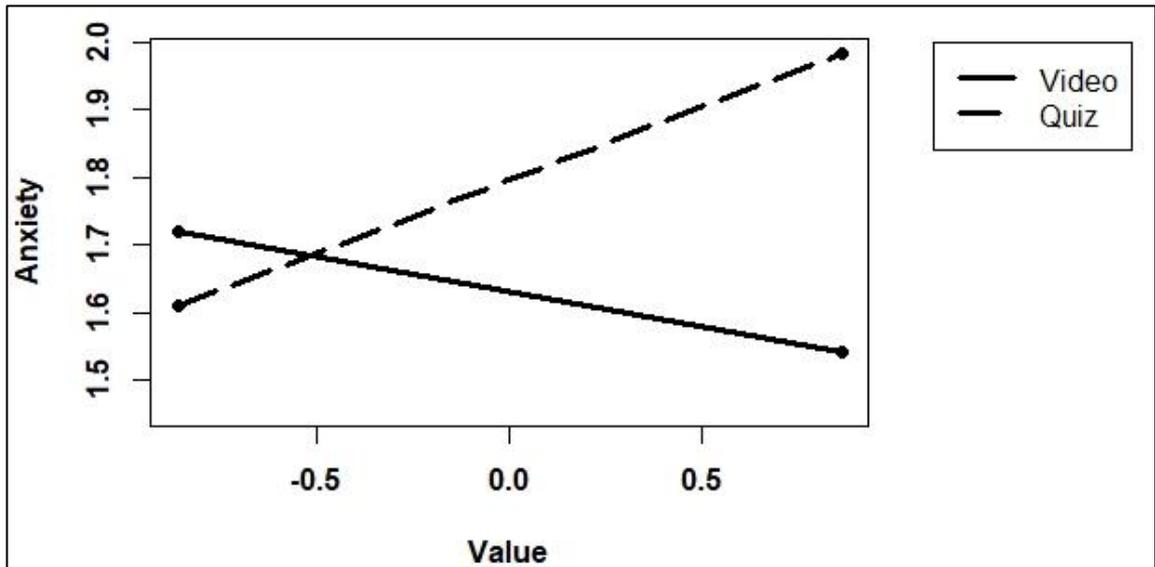


Figure 4.13 Significant Value x Quiz interaction predicting anxiety

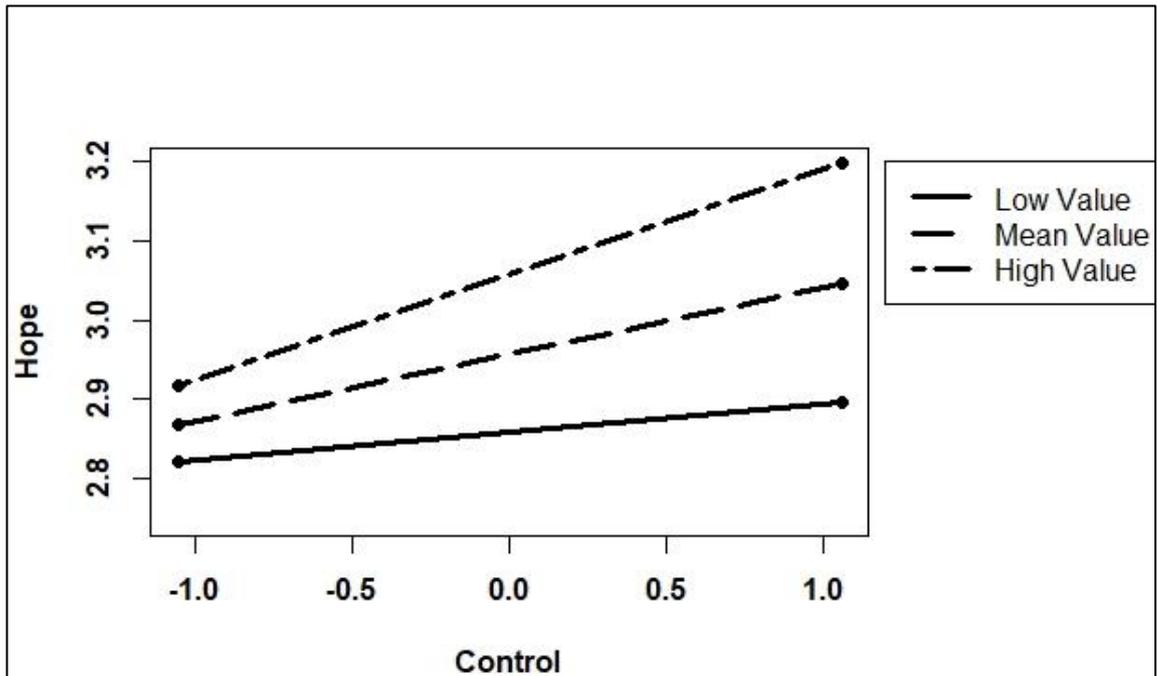


Regarding the Level 2 variables, average control and average value both significantly predicted anxiety. Average control negatively predicted anxiety at the situational level ($\beta = -.739, p < 0.001$) while average value positively predicted anxiety at the situational level ($\beta = .304, p < 0.05$).

Hope

The results of the multilevel regression indicate that the predictors explain 6.9% of the variance at Level 1 and 21.2 % of the variance at Level 2 for Hope. Neither control nor value independently predicted hope, however, the Control \times Value interaction was significant for feelings of hope ($\beta = .163, p < 0.01$). The significant interaction can be interpreted such that the positive relation between control and hope was stronger in situations with higher value appraisals. In Figure 4.14, there is a graphical depiction of this interaction. In addition, quizzes, as compared to videos, were found to positively predict hope ($\beta = .258, p < 0.01$). With regard to Level 2 variables, average value positively predicted hope at the situational level ($\beta = .504, p < 0.001$).

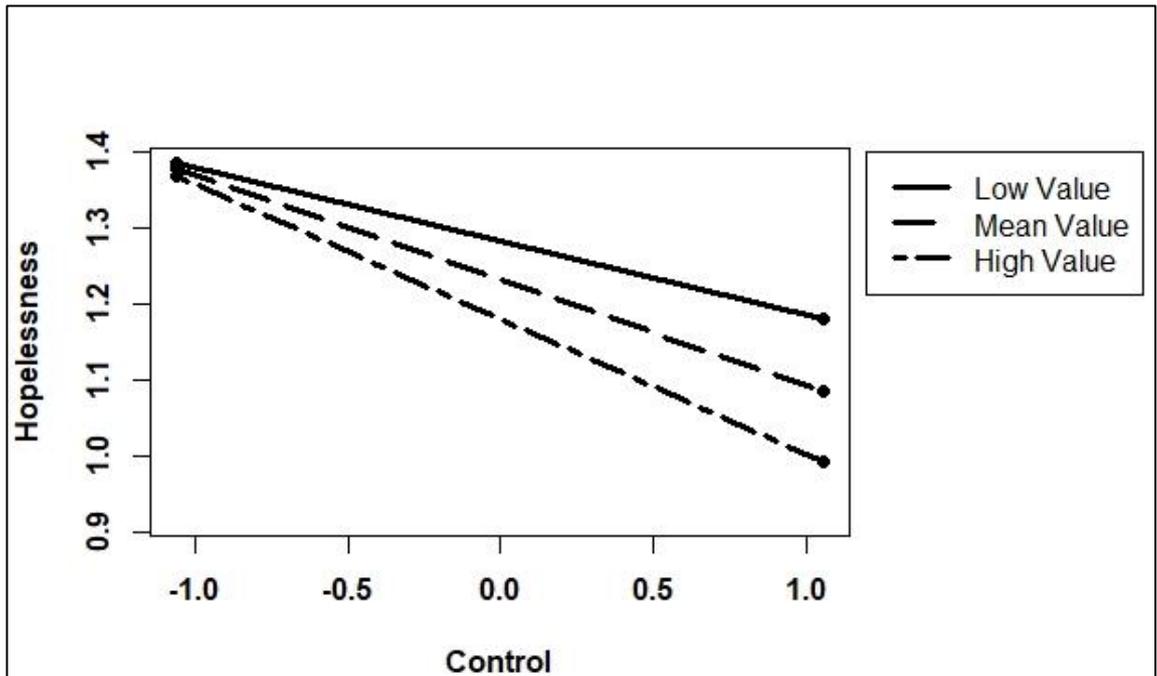
Figure 4.14 Significant Control x Value interaction predicting hope



Hopelessness

The results of the multilevel regression indicate that the predictors explain 11.5% of the variance at Level 1 and 47.9 % of the variance at Level 2 for hopelessness. Control negatively predicted hopelessness ($\beta=-.288$, $p<0.01$). The Control \times Value interaction significantly predicted hopelessness ($\beta=-.207$, $p<0.01$). As shown in Figure 4.15, this significant interaction can be interpreted such that there was a stronger negative association between control and hopelessness in cases of low value. In addition, learners reported more hopelessness during article tasks than during videos tasks ($\beta=.222$, $p<0.05$). With respect to Level 2 variables, an individual's average control appraisals across all learning activities negatively predicted hopelessness during specific activities ($\beta=-.500$, $p<0.01$). Age and gender had no effect on hopelessness.

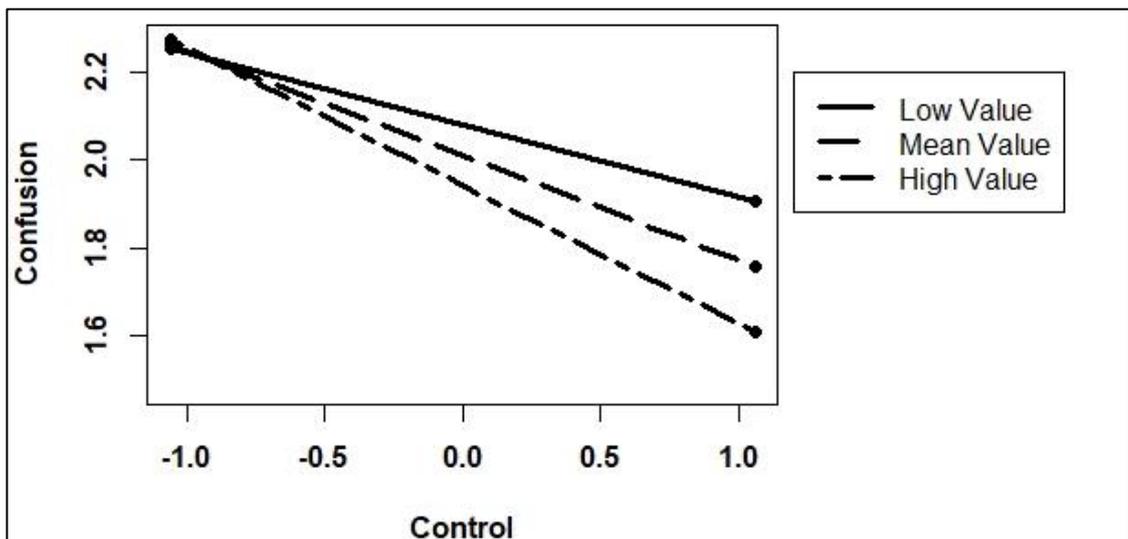
Figure 4.15 Significant Control x Value interaction predicting hopelessness



Confusion

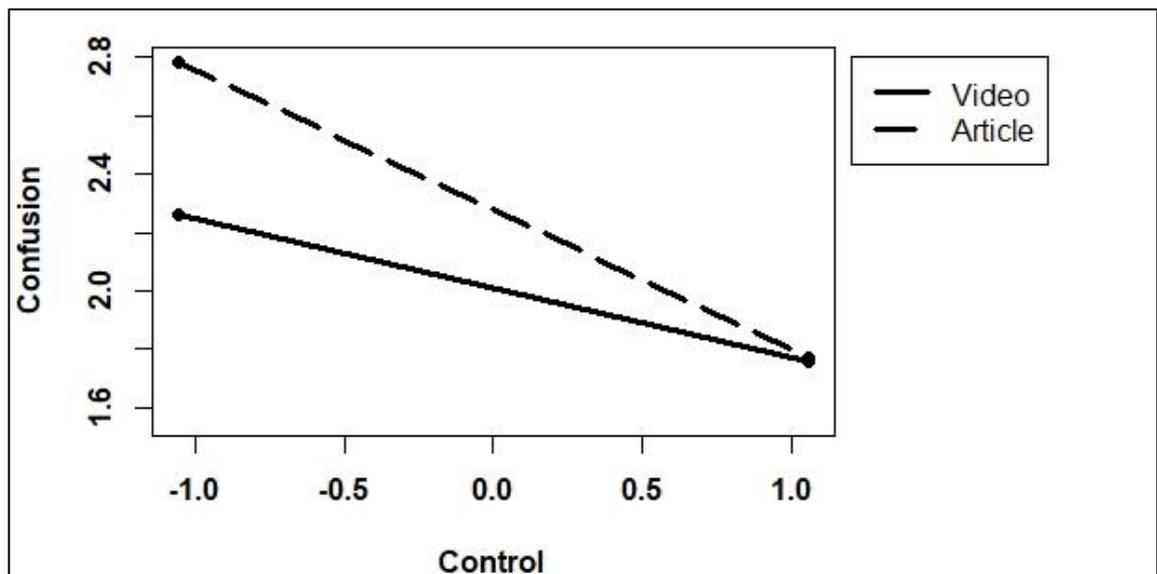
The multilevel model explains 26.1% of the variance at Level 1 and 52.7% of the variance at Level 2 for confusion. Control negatively predicted confusion ($\beta=-.310$, $p<0.01$). The Control x Value interaction also significantly predicted confusion ($\beta=-.232$, $p<0.001$). As shown in Figure 4.16, the negative relation between control and confusion was stronger in situations of lower value.

Figure 4.16 Significant Control x Value interaction predicting confusion



Furthermore, average control, the Level 2 variable, negatively predicted confusion ($\beta=-.617$, $p<0.001$). With regard to task types, learners reported significantly more confusion during article tasks ($\beta=.313$, $p<0.001$) and significantly less confusion during discussions ($\beta=-.264$, $p<0.01$) as compared to videos. The Control \times Article interaction was also significant for feelings of confusion ($\beta=-.140$, $p<0.01$). This interaction can be interpreted such that there was a stronger negative relation between control and confusion during article tasks than during videos (see Figure 4.17).

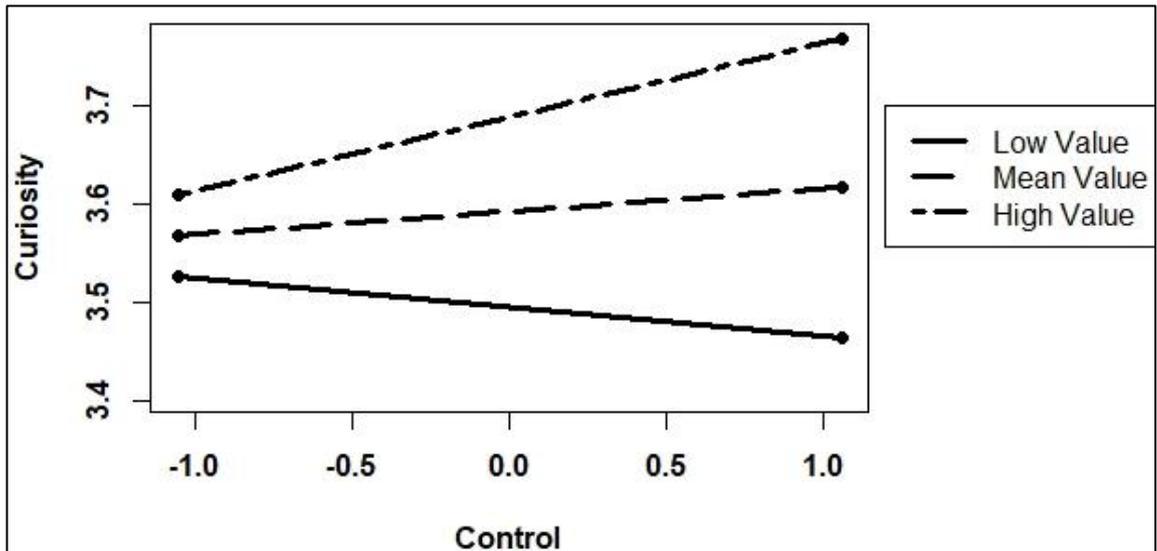
Figure 4.17 Significant Control \times Article interaction predicting confusion



Curiosity

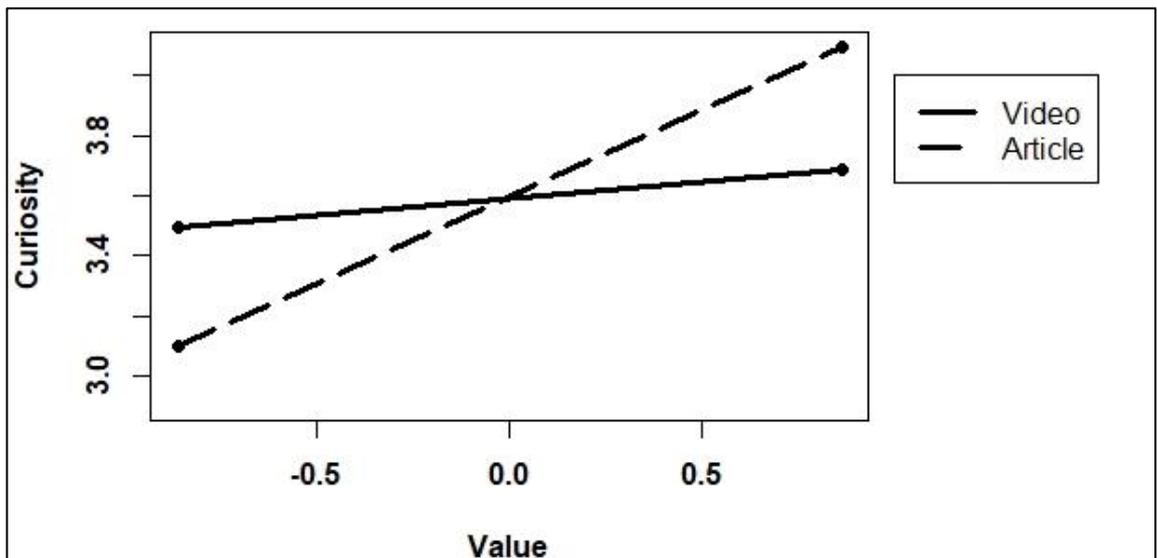
The multilevel model explains 12.9% of the variance at Level 1 and 10.8% of the variance at Level 2 for curiosity. Neither control nor value independently predicted curiosity, however, the Control \times Value interaction was significant for feelings of curiosity ($\beta=.167$, $p<0.05$). As presented in Figure 4.18, this significant interaction shows the relation between control and curiosity to be different depending on the value appraisal.

Figure 4.18 Significant Control x Value interaction predicting curiosity



Average value positively predicted curiosity ($\beta=.364$, $p<0.01$). In other words, when a learner's average value for the course was high, they were more likely to feel curious in specific situations during the course. With respect to task types, learners reported significantly less curiosity during discussion steps than during video steps ($\beta=-.498$, $p<0.001$). In addition, a significant Value \times Article interaction was found to be significant for curiosity ($\beta=.178$, $p<0.01$). As shown in Figure 4.19, the relation between value and curiosity was stronger during article tasks than during videos.

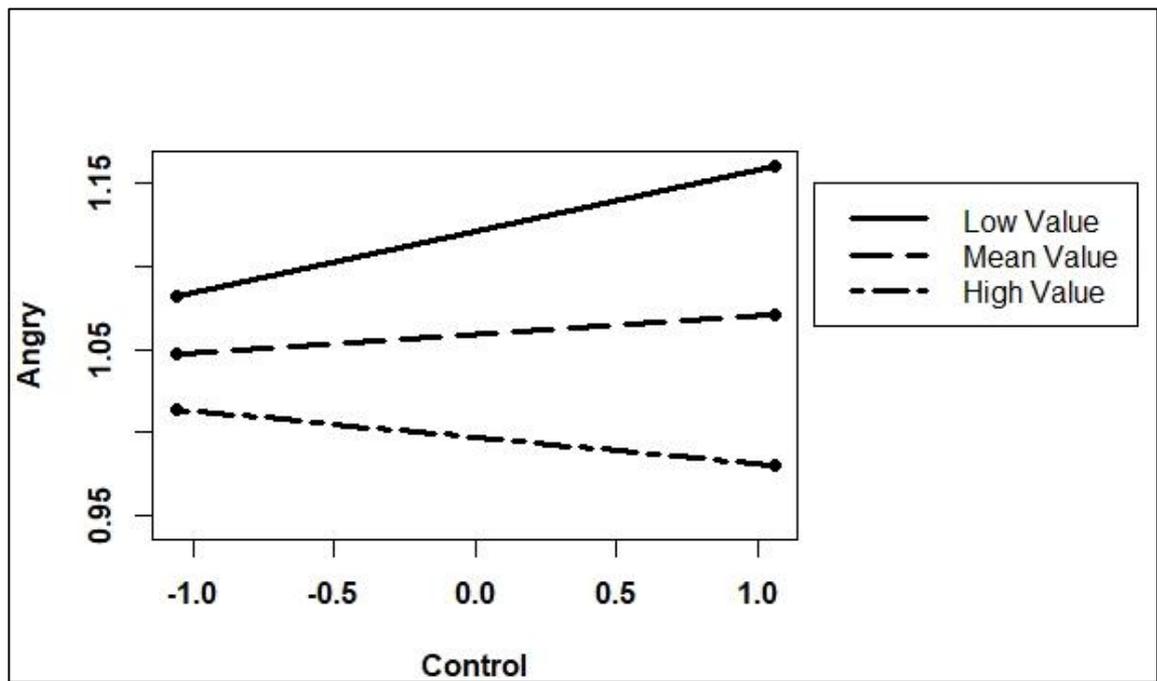
Figure 4.19 Significant Value x Article interaction predicting curiosity



Anger

The multilevel model explains 5.4% of the variance at Level 1 and 53.7% of the variance at Level 2 for anger. None of the variables at Level 1 had an effect on anger apart from the Control \times Value interaction term. Control \times Value was found to significantly predict anger ($\beta = -.188, p < 0.05$). As depicted in Figure 4.20, this significant interaction effect showed the relation between control and anger to be different depending on the value appraisal. In addition, at Level 2, average value negatively predicted situational anger ($\beta = -.566, p < 0.001$).

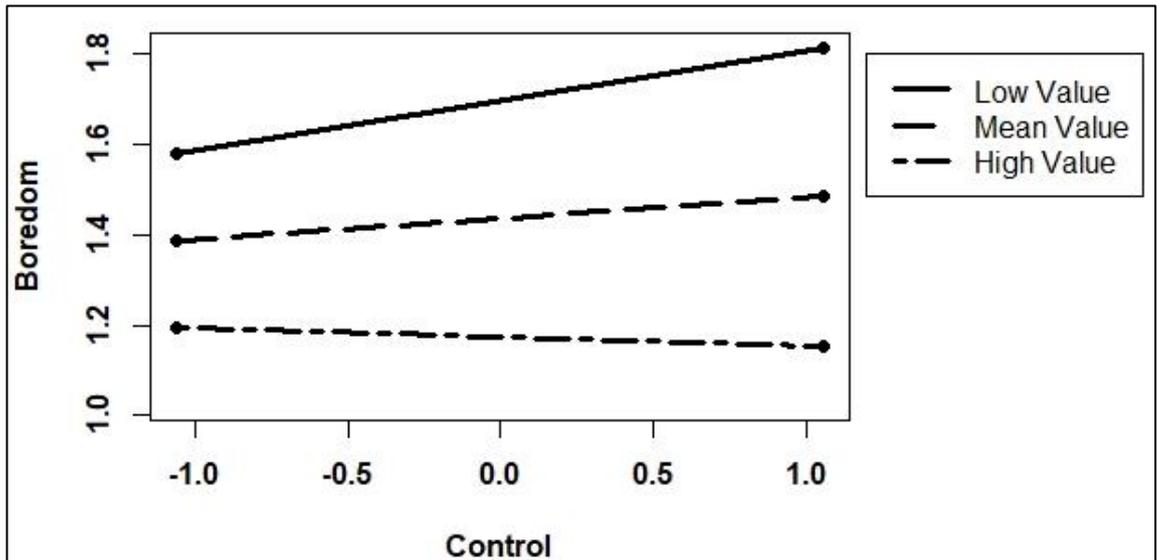
Figure 4.20 Significant Control \times Value interaction predicting anger



Boredom

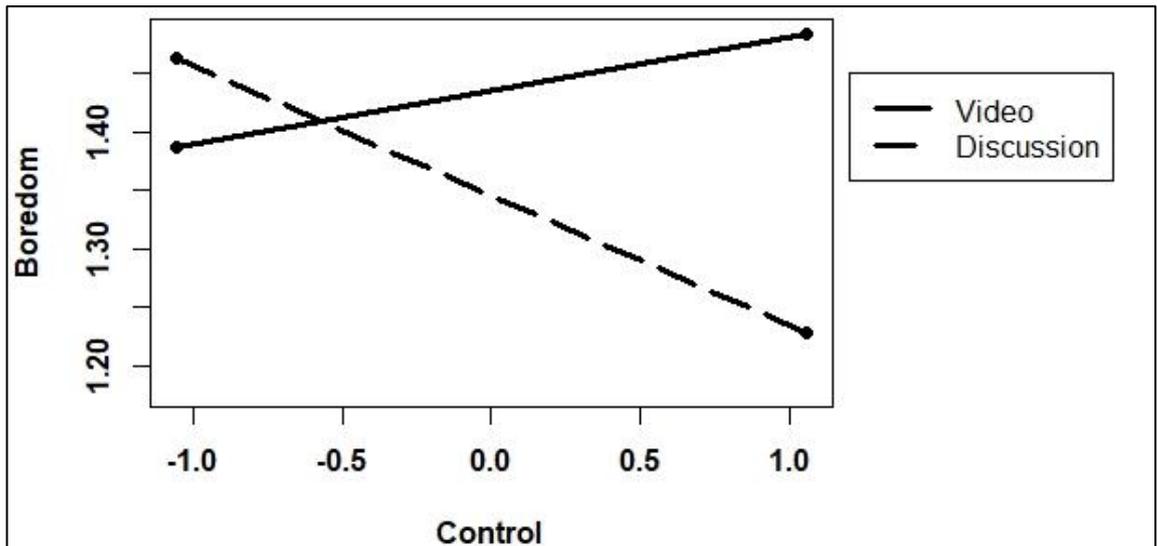
The multilevel model explains 24.9% of the variance at Level 1 and 49.5% of the variance at Level 2 for boredom. Value was found to negatively predict boredom ($\beta = -.468, p < 0.001$). The less learners valued an activity the more bored they felt. The Control \times Value interaction was also significant for boredom ($\beta = -.286, p < 0.001$). As illustrated in Figure 4.21, the significant interaction effect showed the relation between control and boredom to be different depending on the value appraisal. Furthermore, average value negatively predicted situational boredom ($\beta = -.740, p < 0.001$).

Figure 4.21 Significant Control x Value interaction predicting boredom



With respect to the tasks, learners reported less boredom during article tasks compared to video tasks ($\beta=-.218$, $p<0.05$). A significant Control \times Discussion interaction ($\beta=-.143$, $p<0.01$) showed that the relation between control and boredom to be different depending on whether the task was a video or a discussion (see Figure 4.22).

Figure 4.22 Significant Control x Discussion interaction predicting boredom

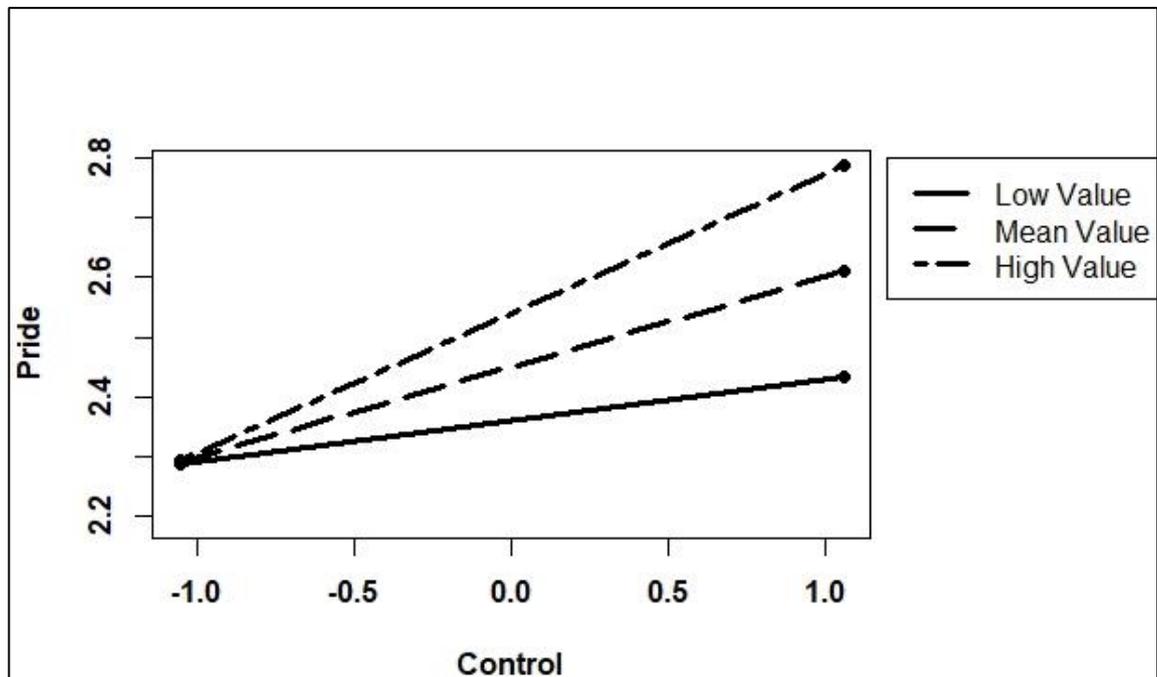


Pride

The results of the multilevel regression indicate that the predictors explain 23.5% of the variance at Level 1 and 28.7 % of the variance at Level 2 for pride. Control

positively predicted pride ($\beta=.175, p<0.05$). The more in control an individual felt over their learning, the more they were likely to report feeling proud. The Control \times Value interaction was also significant for pride ($\beta=.229, p<0.01$). As depicted in Figure 4.23, the significant effect showed that the relation between control and pride was stronger in situations with higher value appraisals.

Figure 4.23 Significant Control \times Value interaction predicting pride



Learners also reported greater pride during discussions ($\beta=.408, P<0.001$) and quizzes ($\beta=.805, p<0.001$) than during videos in the course. While value appraisals in a given situation had no effect on reports of pride in that situation, the Level 2 variable, average value positively predicted situational reporting of pride ($\beta=.508, p<0.001$).

4.6 Qualitative Analysis and Results

As previously mentioned, the function of the open-ended questions in the MEQ was to confirm or validate the responses from the quantitative scales. The researcher was specifically interested in how appraisals pertaining to perceived control and value materialised in the learners own words. Thus, a deductive content analysis of the data obtained from the open-ended questions was conducted. Content analysis is an accepted research method employed to establish the frequency, meaning(s) and/or relationship(s) of particular words, concepts or categories within textual material (Silverman 2013).

4.6.1 Coding procedure

First, learners' perceptions of their emotional experiences were coded for appraisals of 'control' and 'value' or combinations of these appraisals. The code 'other' was used when neither appraisal was deemed to be relevant. Control and value appraisals were then further coded for their object focus. These codes were derived primarily from the data.

For example, "*It is exciting to gain more words which I hope will enable communication when I return to Ireland this fall*" was coded as a value appraisal directed at learning useful vocabulary, while the extract "*When I got all correct answers for the quiz, I thought I have a good chance of being a successful learning of the Irish language*" was coded as a control appraisal directed at success in the quiz.

4.6.2 Results

The researcher identified 244 appraisals of control in the data. Learners tended to describe appraisals of control that referred to the success of their endeavours (e.g. correct answers in quiz), their perceived comprehension of the learning material and acquisition of language skills (e.g. grammatical concepts and pronunciation), the technology, and the amount of information presented to them, as the following illustrate:

I was able to say hello how are you to my husband, and I got a word correct in the quick quiz without looking at the PDF!! (P013)

I watched a short movie recommended on Twitter, called Cáca Milis, and it was as Gaeilge. Although there were subtitles as Béarla, I found I could hear and understand several word and even some whole sentences. Not much, but enough to feel like I am learning something! (P030)

I felt hope that I might be able to learn this language at last, with the repetition of the sounds as many times as I needed! (P042)

I think I'll be able, after this section, to ask for some indications in Irish and to follow them. (P082)

[I] found it difficult to construct my own sentences or remember the information in Irish. (P091)

I'm getting overwhelmed with the amount of information being presented. I need a lot more practice but don't know how or where to get it. It's far too much to try to remember. (P080)

I'm still having trouble with vowel pronunciation, which still seems wildly inconsistent, and I feel like that's preventing me from retaining the vocabulary I'm supposed to be learning. (P069)

Confused with how to get back to my notes...trying to go back to the introduction was tedious hitting the arrow multiple time must be an easier way to retrieve table of contents. (P028)

The researcher identified 265 appraisals of value in the data. Learners tended to describe appraisals of value that referred to engaging with others on the course, aspects of the learning design, their interest in the topic, the educational impact of the task (i.e. whether it taught them something new), and getting the opportunity to test their knowledge, as illustrated in these examples:

I am enjoying the variety of the lessons and how they are presented. It is hard to predict how the next one will be laid out and that is quite enjoyable. (P060)

After studying the letters and the sounds I was excited because it was a way to see if I understood. Getting the correct answers was highly motivating. How could they offer "Skip the Quiz"? I love this section! (P041)

It is wonderful to know how to identify my family members with their Irish titles. I found this lesson to be very relatable and useful to me and my family. I am going to change my son's nickname to Mac from now on! (P067)

I was excited to find out what the lesson would be about and excited to find out if I would learn anything new. (P040)

Numbers are very useful and learning how to count essentially up to 100 is very exciting. The random number generator is great way to encourage people to say numbers! (P060)

I am not very interested in others' comments. (P028)

I felt a bit bored. I do not enjoy grammar at all and was happy when the article was over. (P014)

This video was very boring, and seemed unnecessary given that all it did was list the members of the family which were given below. It might have been better to have it as a conversation video with Eoin and Grainne instead. Honestly, I didn't watch it all the way through as I didn't feel like I was learning anything. (P094)

In engaging with the comment section, I feel curious to see how others are interpreting the course, and curiosity in their answers. (P028)

4.7 Summary

This chapter presented the analytic strategy and results for both the quantitative and qualitative data obtained from the MEQ. The aim of the analysis was to identify and describe the relationships between appraisals, the learning context, and emotions. First, however, results from the pilot study were presented for comparison purposes due to the large sample size and similar instrument used. This was followed by a detailed breakdown of the MEQ sample. The analysis and results for the quantitative and qualitative elements of the MEQ were then presented separately. A step by step guide detailed how the quantitative data was prepared and analysed using multilevel regression modelling. This was followed by an outline of the deductive content analysis procedure applied to the qualitative data. The overall aim of this section was to provide a prescriptive guide for analysing the data obtained from the MEQ and to objectively present the results obtained without any interpretation. The following chapter will present the analysis and results of the second phase of the main research program, the emotion diaries. Chapter 6 will then interpret the results of both phases in relation to the research questions, and the related literature.

5 Analysis and Results: The Emotion Diary

Robson (2011) stresses the need for a systematic, documented approach to the analysis of qualitative data. This chapter details the process of analysing the data obtained from the diary study and presents the findings.

5.1 Data Management

Similar to the survey data, each diary entry or response was assigned a code that would allow for easy organisation and for further quotation in the thesis (see Table 5.1). The data was then transferred to the computer software package, NVIVO, for analysis.

Table 5.1 Diary entry coding description

Diary Entry Identifier: #001/W1/P001	Description of each element
#001	#Diary number
/W1	/Week, i.e. Week 1(W1), Week 2 (W2), Week 3 (W3)
/P001	/Participant ID

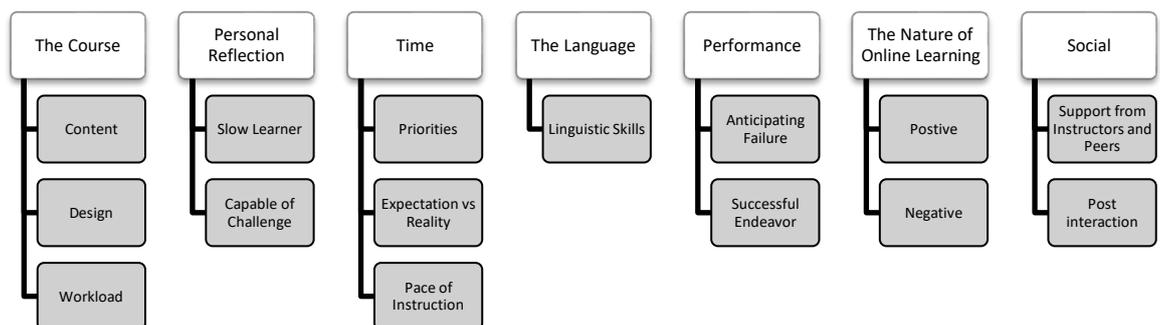
5.2 Analytic Strategy: Thematic Analysis

The analysis of the diaries took two forms. First, a content analysis was conducted to identify the discrete emotions reported and their frequencies. Second, a thematic analysis was conducted to identify the sources of learners' emotions. While content analysis and thematic analysis are similar in that they are both used to identify patterns across qualitative data (Wilkinson 2000), a thematic analysis does not quantify the themes. In addition, the unit of analysis is usually more than a word or phrase in thematic analysis, as is often the case with content analysis. Braun and Clarke (2006, p.79) define "thematic analysis as a method for identifying, analysing and reporting patterns (themes) within the data. It minimally organises and describes your data in (rich) detail". King (2004) states that thematic analysis is a useful method for examining the perspectives of different research participants, highlighting similarities and differences, and generating unanticipated insights. Thematic analysis is also consistent with a pragmatic approach to research, as it is not intrinsically related to any distinct epistemological position (Boyatzis 1998; Braun and Clarke 2006). While this has been a source of criticism for the method, Braun and Clarke (2006) claim, it is a strength, in that it can be applied more flexibly.

was conducted with a specific research question in mind: What are the sources of learner emotions? Codes were primarily determined by the data; the researcher did not have a codebook or list of pre-determined codes. However, it is acknowledged that pre-established theoretical suppositions can inform the coding process whether one is aware of it or not. On the completion of this phase, 61 codes had been generated.

Next, codes were examined in relation to each other and sorted into initial themes and sub-themes (see Figure 5.2). When initially coding the data, a focus was placed on the semantic content of the diaries, rather than latent or interpretive information. A semantic approach reports on the “explicit or surface meanings of the data and the analyst is not looking for anything beyond what a participant has written” (Braun and Clarke 2006, p. 84). However, when generating and interpreting themes, a focus was placed on the latent meanings in the data, i.e. the assumptions and ideas that lie behind what is explicitly stated (Braun and Clarke 2006).

Figure 5.2 Initial themes and subthemes



In phase four, the candidate themes were refined by assessing them for internal homogeneity and external heterogeneity (Braun and Clarke 2006). The coded data extracts for each theme were reviewed to ensure they coherently embodied the theme. Those that did not fit the theme were either recoded or discarded. The outcome of this refinement process can be seen in Figure 5.3. Each theme was also reviewed in relation to the other themes to ensure they were distinct from each other.

Phase 5 began when a satisfactory thematic map of the data was obtained – see Figure 5.4 for the final refinements to the thematic map.

Figure 5.3 Revised themes and subthemes

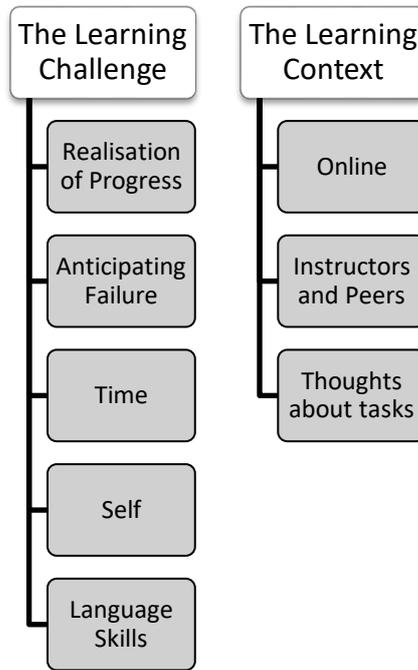
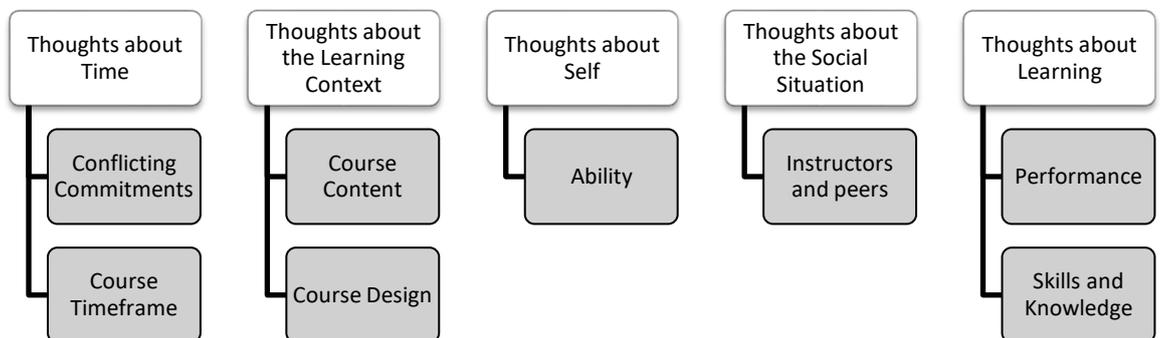


Figure 5.4 Final themes and subthemes



A short description was written for each theme summarising the essence of the theme (Braun and Clarke 2006; see Table 5.3). Finally, a more detailed description of each

theme was compiled forming the qualitative findings for this thesis. These theme descriptions are presented in the following sections.

Table 5.3 Theme names and definitions

Theme	Description
Thoughts about the Learning Context	Appraisals directed at the learning content and design of the course were the sources of emotion encompassed by this theme. Appraisals of relevance (Interest/ Conduciveness to goals), quality and novelty were central to this theme.
Thoughts about Time	This theme refers to learners' perceptions of not having enough time as the source of their emotion. Appraisals were either directed at the workload and pace of the course or their own commitments.
Thoughts about Self	This theme encapsulates the emotions evoked by learners' appraisals of themselves and their ability in the course.
Thoughts about Learning	This theme encompasses appraisals associated with the cognitive aspects of the learning experience. Mastery and progress appraisals were associated with demonstrating learning, while complexity appraisals were linked to acquiring new skills and knowledge.
Thoughts about the Social Situation	Appraisals relating to the social interaction in the MOOC were the sources of emotion encapsulated by this theme. These included appraisals of support and relative standing in the course.

5.3 Sample Demographics

The diary study was conducted with a subsample of the experience sampling study. A total of 35 people from the larger sample of 94, submitted at least one diary entry, comprising the sample for the diary study. Over the three weeks, 55 unique diary entries were submitted (see Table 5.4).

Table 5.4 Diary entries

Week	Diaries Submitted
1	33
2	14
3	8

Table 5.5 Diary study sample

<i>Characteristic</i>	<i>(%) N=35</i>
Gender	
Female	82.9
Male	17.1
Nationality	
European	31.4
North American	60.0
South American	2.9
Australian	2.9
Asian/ Pacific Islander	2.9
First Language	
English	68.6
Other European Languages	28.6
Non-European Languages	2.9
Other Language	
Yes	71.4
No	28.6
Age	
18-25 Years	11.4
25-34 Years	17.1
35-44 Years	22.9
45-54 Years	20.0
55-64 Years	14.3
65+ Years	14.3
Irish language Ability (self-reported)	
No Irish	22.9
A few words	22.9
A few basic sentences	51.4
Parts of conversations	2.9
Most conversations	0.0
Native speaker ability	0.0
Online Learning Experience	
Yes	60.0
No	28.6
Not Sure	11.4

The demographic composition of the diary subsample is very similar to the original sample, with more females ($n=29$) than males ($n=6$) and a relatively equal dispersion of ages (see Table 5.5). In addition, the majority of the sample are North American and nearly 69% speak English as their first language.

5.4 Emotions Reported

Participants reported a wide range of emotions in their diaries. A total of 21 discrete emotions were mentioned in 55 diary entries. These emotions were categorised according to the dimensions of valence and activation (see Table 5.6). Different categories of emotions appeared with differing frequencies. The most commonly reported emotions were positive-activating emotions (66%), of which curiosity was the most frequently mentioned. Negative-activating emotions were the second most frequent category (28%), of which frustration and anxiety were the most commonly reported.

Table 5.6 Frequency count and categorisation of emotions from diaries

Valence	Activation	Emotion	Frequency
Positive	Activating	Excitement	28
		Enjoyment	10
		Curiosity	30
		Happiness	6
		Hope	15
		Pride	17
		Surprise	5
		Total	111
Positive	Deactivating	Relief	1
		Relaxation	1
		Contentment	1
		Total	3
Negative	Activating	Anger	2
		Anxiety	13
		Confusion	10
		Frustration	14
		Fear	1
		Guilt	1
		Stress	2
		Nervous	4
Total	47		
Negative	Deactivating	Regret	1
		Hopelessness	3
		Boredom	3
		Total	7

This table, however, is not as clear-cut as it appears. In the majority of cases, participants reported both positive and negative emotions within the same diary entry, which suggests that over the course of a week learners' emotions can vary. The following diary extracts illustrate this:

It was a mixed week. Some tasks were very difficult, like learning two sets of numbers and I felt very confused by that. I remember getting frustrated and angry with myself at times when I couldn't remember things I thought I had learned. However there were positives too like managing to write several sentences about myself and my family. Overall I ended the week feeling hopeful about making progress in the language. (P045)

I felt a little of anxiety at having to learn everything, but proud and excited in the end when I was able to write sentences (P006).

The emotional diversity identified by this content analysis demonstrates that learners experience a rich and varied emotional life in an LMOOC setting. It also indicates that quantitative approaches to students' emotions that limit the range of emotions considered for practical reasons may be in danger of missing important parts of learners' affective life.

5.5 Themes

A thematic analysis of the emotion diaries led to the identification of five over-arching themes or sources of learner emotion in the LMOOC: 1) Time, 2) Learning Context, 3) Social Situation, 4) Self and, 5) Cognitive Process of Learning. More specifically, it was learners' perceptions or appraisals of these five features of the learning experience that evoked their emotions. In other words, the emotions were directed at these five objects. The following sections will expand on the appraisals associated with each of the five sources identified. In general, each of the sources related to more than one emotion and in many cases both positive and negative emotions, depending on the situation and learner in question.

5.5.1 Thoughts about Time

Time was a pervasive theme. Time-related appraisals were the source of emotion for learners during the LMOOC.

5.5.1.1 Conflicting Commitments

When reflecting on their emotional experience during the LMOOC, it was learners' perceptions of time, or lack thereof, that was identified as the source of a number of negative emotions. Work, other studies, parenting and in one case, moving house, were the aspects of life that severely competed with time spent learning in the MOOC. As a result, learners mentioned feeling frustrated, stressed, hopeless, guilty, and regretful because they determined they were not able to devote as much time as they would like to the course. These emotions were not directed at the course, as many clarified, but primarily at themselves and their competing commitments.

I am frustrated with myself, rather than the course. I have had a lot on at work and a few things happened personally which has impeded my progress and stopped me from doing the course as regularly as I'd hoped. Bad timing really (P020)

Right now I'm very absorbed by work and I don't have much time to work on this course (P010)

Stress - Because I am trying to do the class while juggling other life expectations, like the end of the school year and a big project at work (P027)

5.5.1.2 Timeframe

The timeframe of the course was another time-related aspect of the learning experience that evoked negative emotions among the learners. Learners felt compelled to complete all the activities designated each week, within the weekly timeframe determined by the course. Learners described feeling anxious, hopeless, and even angry when they felt that were unable to keep up with the course or they were falling behind. In comparison to the 'Thoughts about self' theme, learners did not perceive their own lack of ability to be the source of the emotion, rather the excessive demands of the course.

I have always deemed online courses as a little deceitful when it comes to time, because if we really want to read, practice, and interact with others, it takes more than the specified number of hours. This makes me feel anxious. Then I start to work faster in order to complete the week but I pay less attention to learning (P006)

I feel rushed to get through the course (P033)

This had a negative impact on learning in the course. Reporting strong frustration, one of the participants described how they dropped out of the course because the situation became so overwhelming.

I gave up. The course was too fast-paced with not enough time or opportunity to practice and remember what we had already learned before going on to the next thing (P032)

Subsequently, when learners felt as though they had caught up with the course or completed the activities in the allocated amount of time they reported feeling relieved and proud.

Relief that I was back on schedule. I started 101 near a week late (P008)

Completing the course as opposed to learning the material became the goal for many learners.

5.5.2 Thoughts about the Learning Context

In this theme, it was learners' appraisals about the content and the design of the course that were identified as the source of their emotions. Appraisals encompassed by this theme were directed at the topic or instructional format as opposed to the cognitive task of learning.

5.5.2.1 Course Content

This sub-theme consists of appraisals directed at the course material. These were relevance appraisals, which refer to the extent to which the topic was consistent with the individuals' interests, goals or motivations. Learners described feeling curious and excited when they perceived the content in the MOOC to be of interest to them. In most cases, they singled out specific topics or aspects of the content that evoked their curiosity or excitement.

I am really grateful to be able to take this course, and to learn what I can about Irish language, culture, and the ties between the two. Place names are so interesting, as is the different ways of counting and the grammatical formats. (P002)

I enjoy the quizzes and explanations, and try to use everything as much as I can. (P006)

I enjoyed learning about the Irish culture and history (such as Ogham) and would like to know more. I found it exciting to hear Irish spoken in a natural

setting on the video and also other learners using the audio. Previously I have only done exercises e.g. Duolingo which can be rather static. (P032)

Naturally, the Irish language was a source of interest for learners in and of itself.

As a linguist, I feel surprise and excitement with different traits like urú (P006)

It's a very interesting language (P014)

For one participant, it was the links made between the language and real-life situations that contributed to their enjoyment during the course.

The links that are shown between Irish and real-life (through sports, dance, music, film) are so helpful for me as a learner to contextualize the information. (P002)

It is argued that this appraisal is closely related to participants' goals and motivations for enrolling in the MOOC. For example, as discussed in section 4.3.4, many learners stated that they enrolled in the course because of their interest in Irish culture. Thus, when they came across content that aligned with this interest and motivation, they experienced positive emotions.

I read and learned interesting facts about the ancient way of writing Irish and transliteration of the modern spelling of words. Also seen picture of this ancient writings was really interesting (P035)

Curiosity, enjoyment from the cultural tidbits, a bit of fulfilment (P008)

At the same time when learners perceived the course content to be uninteresting or incompatible with their learning goals, negative emotions such as boredom followed. From the examples below, it can be inferred that the individuals in question were primarily interested in learning the linguistic aspects of the course and not so much the cultural aspects.

I'm happy about the language, but there are many articles about Ireland's places. This is interesting, but a little bit long. (P006)

The introduction to the course takes way too long in my opinion. I think that if the course focused more on the language itself, it would help to keep the momentum. (P030)

To give some context to the second example, the beginning of the course explained the cultural origins of the language.

5.5.2.2 Course Design

In addition to appraisals about specific content in the course, quality appraisals directed at the design of the course more generally were sources of emotion for learners. When learners' perceived the course to be well designed, enjoyment ensued.

I think the course is put together in a very enjoyable way, and the extra material, links and stories never failed to raise my interest (P013)

I'm really enjoying the course and find it very informative and well-structured (P020)

Appraisals of novelty pertaining to course design were also prevalent. The unknown evoked curiosity and excitement among learners.

I was curious about the course and what would be included and how it would be set out (P022)

The formats of the lessons were always different and that was an exciting way to learn. I would set aside time to do a lesson or two and it was exciting to see what was going to be taught and how (P031)

5.5.3 Thoughts about the Social Environment

Learners' appraisals of the social environment were the source of both positive and negative emotion. The social environment in the MOOC materialised as interactions with instructors and peers in the discussion forums at the end of each step (liking posts and/or posting comments).

5.5.3.1 Instructors and Peers

Appraisals encompassed by this sub-theme were directed at interactions with instructors and peers. These were predominantly support appraisals referring to the extent to which the individual felt supported by their instructors and peers during the course. When learners' perceived the interaction and the associated atmosphere in the course to be supportive, positive emotions such as hope were reported.

I like it when a post is liked by a students or faculty (P005)

I felt hopeful because of the interactions I had with the educators and my fellow learners (P016)

This positive emotion even helped moderate the effect of negative emotion, boosting morale and confidence.

The group is engaging with one another and offering support - and that is a really positive thing that helps to mitigate the worst of the worry. I think it will be less next week; I feel more support now than judgement and that is helping my confidence (P028)

On the other hand, when an individual perceived there to be a lack of support from instructors and peers, negative emotions such as anxiety were reported.

New program, new language, basically learning how to get around the application without a person to simply ask created additional anxiety that I was wasting time on things that would take seconds to learn if I was in a class. There needs to be an ask instructor link visible at all times to make you feel less alone while learning (P021)

While the source of anxiety described in the above example could also be related to the online design of the course, it was determined that the emotion was primarily evoked by the perceived lack of support from instructors.

Interactions with peers also evoked appraisals of relative standing. These were comparisons an individual drew between themselves and other learners on the course to determine how well they were doing. When this appraisal was unfavourable for the individual in question, frustration was evoked.

I couldn't understand what other course members were writing in the comments or join in myself (P032)

5.5.4 Thoughts about Self

Individuals' appraisals about themselves and their ability evoked emotions among learners.

5.5.4.1 Ability

Individuals' appraisals about whether or not they were capable of undertaking the course evoked emotion during the course. When individuals determined that the activities on the course equated with their level of ability, positive emotions ensued. In these cases, it was not that the course was easy for them, but rather they felt that

they were capable of the challenge. This appraisal resulted in positive emotions such as pride and enjoyment.

Irish grammar - let's face it - is quite confusing sometimes, but altogether I felt I could cope with it so far (P013)

It's been a somewhat challenging but overall fun ride (P008)

On the other hand, when individuals perceived their ability to be inhibiting the learning process, negative emotions such as frustration ensued. Participants described feeling as though they were 'slow learners' (P003) or that the experience was outside their comfort zone.

I remember getting frustrated and angry with myself at times when I couldn't remember things I thought I had learned (P032)

I undertook this knowing it would be outside my box. I just did not really realize it was not even a box in a city I ever heard of it's so far out of my realm (P018)

It can also be argued that a mismatch between the expectations they held regarding their ability and the ensuing reality were the source of emotion in these occasions. In other cases, when their ability exceeded their expectations, positive emotions such as pride were reported.

...pride in having learned SOMETHING at my age! (P024)

I felt proud of myself as I have the guts to study a foreign language and to be able to overcome some of fears in studying the Irish language (P016)

In addition, some appraisals of ability stemmed from former language learning experiences.

I don't do languages, and I learnt that young. As such learning a new one - any new one - will always make me anxious (P028)

5.5.5 Thoughts about Learning

Appraisals directed at the cognitive challenge of learning and demonstrating learning are the sources of emotion identified in this theme.

5.5.5.1 Performance

Appraisals directed at performance situations in the MOOC evoked both positive and negative emotions among the learners. Performance situations were situations where the learner had to demonstrate knowledge such as in the quizzes or when they contributed to the discussion forums. The appraisals associated with such situations were appraisals of mastery and progress, which referred to the extent to which the individual perceived they were mastering or progressing with the language. It was identified that mastery and progress appraisals were made both prospectively and retrospectively of performance situations.

In the cases identified, appraisals of mastery and progress made before performance situations were negative; learners did not anticipate their mastery of the language to be adequate. Such appraisals resulted in reports of anxiety.

I am a perfectionist, so feeling anxiety before tests or quizzes, or any point where I am trying to share my thoughts or feelings is normal (P004)

I was anxious about remembering words/terms, especially for quizzes [...] and discussions (P004).

However, appraisals of mastery and progress following the performance situations were more positive. The performance situation gave them a new benchmark from which to appraise their mastery and progress and when the learners perceived their level of mastery to be increasing, they reported feeling pride, excitement, and in one instance, surprise.

With each quiz I started to feel proud and excited because I got almost all the correct answers at the first attempt. Then I could write sentences of my own that, despite using a dictionary, made me feel that I was achieving something (P006).

I was proud when I understand phrases etc. and do the quizzes (P022)

The progress I have made has really surprised me [...] I am honestly surprised at how much I have picked up though - I've been trying to read the Irish aloud before listening to it, and I'm actually in the ball park more often than not (P028).

This appraisal placed a value on the process of learning as opposed to being successful.

5.5.5.2 Skills and Knowledge

Appraisals directed at the linguistic skills and knowledge associated with learning the Irish language were sources of emotion for learners during the course. These were appraisals pertaining to the complexity of the knowledge or skill being learned. In other words, the extent to which the individual understood the new information they were processing. In each of the occasions identified, the learners judged the information as being very complex and thus, confusion and frustration were reported. Issues with pronunciation and grammar, in particular, were singled out by the learners in their reflections.

I find Irish utterly baffling and I can't find easy ways to remember words [...] why would 'bhfuil' be pronounced 'will'? Why would cases change a persons name? I vaguely remember cases from high school Latin but I haven't encountered them since then (40+ years ago) (P007)

Frustration – the letters and sounds do not make sense (P009)

Frustrated that I wasn't figuring out pronunciation better and all the mutations (P004)

This particular sub-theme highlights the language specific aspects of the course that can evoke emotions in learners.

5.5.6 Summary

This chapter presents the analysis and findings of the diary study. Participants reported a wide range of both positive and negative emotions in their diaries. A number of appraisals were identified as the antecedents of these emotions. Each appraisal had different object-focus, some were directly related to the MOOC (e.g. course content, course design), while others not directly related to the MOOC (e.g. conflicting commitments, self). Table 5.7 summarises the findings from this chapter. In the next chapter, these findings are interpreted in the context of the wider literature and integrated with the findings from the questionnaire to address the research questions posed by the study.

Table 5.7 Appraisal antecedents and their object-focus

Appraisal	Object-focus	
Time	Conflicting Commitments	Non-MOOC Related
Time	Course Timeframe	MOOC Related
Relevance	Course Content (Topic)	MOOC Related
Quality and Novelty	Course Design	MOOC Related
Relative Standing	Peers	Non-MOOC Related
Support	Instructors and Peers	MOOC Related
Ability to cope	Self	Non-MOOC Related
Mastery and Progress	Performance situations	MOOC Related
Complexity	New Skills and Knowledge	MOOC Related

6 Discussion

6.1 Overview

The purpose of this multiple methods study was to identify the sources of learners' emotions during the Irish language MOOC, Irish 101. To accomplish this, a mixed method questionnaire (the Momentary Emotion Questionnaire) and weekly emotion diaries were utilised to acquire data on learners' emotions and antecedent appraisals during the three-week course. Beyond anxiety, the dearth of research on emotions in language learning would lead one to believe that they hold little significance in this context. We know, however, that this is not true. Emotions are present in all of our lives and when we learn they can have an impact on whether or not we succeed (Linnenbrink-Garcia and Pekrun 2011; Pekrun *et al.* 2011). Whilst recent work on emotion in language learning has served the field well by readjusting the spotlight to focus on other emotions (Dewaele and MacIntyre 2014; MacIntyre and Vincze 2017; Boudreau, MacIntyre and Dewaele 2018; Ross and Rivers 2018), a greater focus on emotions in language learning continues to be required. Furthermore, as the online domain occupies an increasingly important space in second-language learning and teaching, addressing the knowledge deficit with respect to emotions and the learner perspective in this area is of particular consequence.

This chapter discusses the major findings from the main phase of this thesis. While noteworthy, findings from the preliminary and pilot studies are not included in this discussion. The results of these phases of the study are detailed in Chapter 3 and Chapter 4. In the sections that follow, the results from both the MEQ and the Emotion Diaries are interpreted in relation to the research questions and the relevant literature. Five research questions were outlined in Chapter 3. Each subsection focuses on a specific research question and considers how the results can illuminate the issues raised. In the context of each research question, the findings are compared and contrasted with existing emotion literature from the field of Second Language Acquisition and Online Learning. Before addressing the research questions, however, the value of combining the two components of the research program (Questionnaire and Diary) is discussed.

The MEQ examined whether the assumptions of the Control-Value Theory of Achievement Emotions (CVT) are supported in an online Irish-language learning context when adopting an intra-individual empirical approach. Both quantitative and qualitative accounts of learners' emotional experiences were obtained following the completion of various tasks during the course in line with an experience sampling

approach. The quantitative data primarily facilitated a multilevel statistical analysis of the relations between positive and negative emotions, and cognitive appraisal antecedents (control and value). The independent as well as interactive effect of control and value appraisals on emotions were investigated as posited by the CVT. The relations between emotions and specific situational characteristics (i.e. whether the learner was engaged in a video, quiz, article or discussion task) were also investigated, as well as the extent to which the appraisal/emotion relations differed as a function of task types. The qualitative data obtained from the MEQ was supplementary in nature. It was used to validate and enhance the quantitative data.

The diary study sought to delve deeper into the learner perspective to identify what the learners themselves perceived to be the sources of their emotions. Emotions are subjective phenomenon, hence the need to account for the individual perspective. Data was obtained at week-level using the diaries, compared to the task-level data obtained from the MEQ. The weekly diaries allowed participants to reflect on the week and identify the various factors that played a role in eliciting their emotions during that week. In addition, they facilitated a more contextualised view of emotional experiences and opened up the study to consider additional antecedents not directly referenced by the CVT.

The two phases of this research project provide a differentiated insight into the learner experience. Combined, they facilitate a more holistic approach to answering the main research question: *What are the sources of learners' emotion during an Irish language MOOC?*

The following section will now discuss how data from the two phases of the study help answer the research questions posed.

6.2 Range of Emotion

The first research question sought to determine the range of emotions learners experienced during the Irish language MOOC. The analyses of both the questionnaire and diary data informs the study's first claim that Irish language MOOC learners experience both positive and negative emotions while learning. Even though previous studies have investigated emotions other than anxiety in online language learning environments (Coleman and Furnborough 2010; Chen and Lee 2011; Santos *et al.* 2016), this is the first study to look at a range of both positive and negative emotions simultaneously in this environment, and it is, therefore, significant in this respect.

The eleven emotions investigated by the MEQ were reported to varying degrees by learners. Further reports of these emotions were present in the diaries. The diaries also revealed additional emotions that were previously unconsidered, such as relief, fear, guilt and contentment; however, these were not reported as frequently. With the exception of guilt (MacIntyre and Vincze 2017; Teimouri 2018), these emotions have not been investigated previously in the context of language learning.

Participants reported feeling positive emotions more intensely than negative emotions. This finding is not surprising given that learners sought out the course of their own accord and were thus very interested in the content. However, even interested learners experienced negative emotions from time to time. Levels of negative emotion varied throughout the course, with increases in negative emotions corresponding with decreases in positive emotions.

All emotions reported in the questionnaire correlated with at least one other emotion, forming both positive and negative groups. This finding supports the literature that asserts that emotional experiences can involve multiple or co-occurring emotions (Izard and Bartlett 1972; Bosch and D'Mello 2014; Dillon *et al.* 2016). Even though emotions were correlated, each of the eleven emotions investigated were found to be distinct phenomenon, with the highest amount of variance shared between two emotions being 44.8% (frustration and confusion). This is a small to moderate effect size according to Plonksy and Oswald (2014 p. 889), which shows that while emotions can be related to other emotions they are essentially independent. This finding supports the investigation of discrete emotion states as opposed to more general positive and negative affect.

Additional findings from the questionnaire that are beyond the scope of the original research question, but that complement it, reveal that the emotions experienced during the course varied from person to person but also within a person. This finding is consistent with Ahmed *et al.* (2010) who found that students' emotions in the mathematics classroom vary both within and between individuals. It is also interesting to note that on average the within-person variability is smaller for the positive emotions than the negative emotions. This finding suggests that positive emotions are relatively more stable than negative emotions. While the between-person approach to studying emotions is important, the current findings provide further empirical support to suggest that the within-person variation also needs to be considered.

6.3 Control and Value as Antecedents

The second research question was based on the assumptions of the CVT (Pekrun 2006) and addressed whether the cognitive appraisals of control and value were related to the emotions experienced during the Irish language MOOC. Taking an intra-individual approach to the analysis, data from the MEQ shows that the cognitive appraisals of control and value predict some of the emotions experienced in an Irish language MOOC. In line with the hypothesis, the relations between perceived control and frustration, confusion, anxiety and hopelessness were all negative in nature. In other words, the more students felt in control of the task, the less likely they were to experience frustration, confusion, anxiety and hopelessness. Control was only found to significantly predict one positive emotion, pride. As hypothesised, this relation was positive; the more learners felt in control of their learning, the more pride they felt.

Perceived value, on the other hand, only predicted one emotion at the intra-individual level, boredom. As expected, the relation between value and boredom was negative. This result suggests that learners tended to be less bored when they were engaging in activities that they valued. Boredom has been the specific focus of a number of emotion studies in education (Pekrun et al. 2010; Nett, Goetz and Hall 2011; Pekrun et al. 2014; Sharp et al. 2015; Kögler and Göllner 2018). Researchers have argued that a lower intrinsic value of a task is very likely to lead to the experience of boredom (Larson and Richards 1991). Overall, these results provide support for Pekrun's (2006) CVT and are consistent with previous research on the antecedents of learners' anxiety, boredom, pride (Bieg, Goetz and Hubbard 2013) and hopelessness (Ahmed *et al.* 2010).

Notably, the findings with regard to frustration and confusion are also consistent with the theory. These two emotions are usually classified as epistemic emotions, along with curiosity and surprise, (Muis *et al.* 2015) and are not as frequently investigated in emotion studies. However, neither curiosity nor surprise were predicted by situational control and value. This finding partially overlaps with Muis *et al.*'s (2015) study, which found that control did not predict either curiosity or surprise and that value only predicted curiosity. It may be the case that other appraisal antecedents are more relevant to the elicitation of these emotions. For instance, recent research has found cognitive incongruence, appraisals of information novelty and complexity, and appraisals of the attainment of epistemic aims to be antecedents to curiosity and surprise, and other epistemic emotions (Chevrier *et al.* 2019; Vogl *et al.* 2019).

Following a review of the literature it is determined that this is the first time epistemic emotions have been investigated at an intra-individual level during online learning, expanding our understanding of epistemic emotions to an online language learning context and an intra-individual level of analysis.

Subjective value measured at the situation level only predicted one emotion at situation level. However, a person's aggregated value across all measurement points was found to predict substantially more of their situation-level emotions. When a learners' average value during the course was high they were more likely to report feeling proud, curious, excited, surprised and anxious during an activity. They were also less likely to report feeling frustrated, angry, or bored during an activity. These results suggest that subjective value is more of a dispositional concept as opposed to a situational concept. Qualitative data from the MEQ supports this conceptualisation of value with many learners voicing their value of the course more generally as opposed to in relation to specific tasks.

Similar to last time just proud I am trying to learn a language that is very important to me. (P013)

I'm loving this course, having the possibility to learn Irish is really awesome. (P075)

With regard to control, it was found that a person's aggregated perceived control across all measurement points also predicted emotions at individual measurement points. When a learners' average control during the course was low, they were more likely to experience frustration, confusion, anxiety and hopelessness during an activity.

In addition to the main effects of control and value on emotion, data obtained from the MEQ supports the assumption that control and value interact when predicting emotions (Pekrun 2006). Evidence was found of value being a moderator for the relation between control and eight emotions: frustration, confusion, anger, boredom, pride, curiosity, hope and hopelessness. However, as noted in the results chapter, the alternative could also be true; control may be moderating the relation between value and the emotions listed.

With respect to the positive emotions of hope and pride, the observed interaction can be interpreted such that the relation between perceived control and these positive

emotions is stronger in situations of high subjective value. In other words, the combined effect of high control and high value resulted in more intense reports of these emotions. This relation is consistent with previous research on the effect of control-value interactions on positive emotions (Goetz *et al.* 2010). The following extract from the qualitative data obtained from the MEQ show how strong reports of pride can be associated with high value and high control appraisals.

The quiz was really quite easy, but I still felt a little frisson every time I got [an answer] right (P047)

For the negative emotions of frustration, confusion and hopelessness, their relations with control were stronger in situations of low value. In other words, the combined effect of low control and low value resulted in more intense reports of each emotion. This relation was also identified by Bieg, Goetz and Hubbard (2013) with respect to anxiety. Low value and low control appraisals can be inferred from the following extract in which the learner describes the source of their strong confusion.

I became confused with the various dialects. I prefer to learn the Connaught dialect. I thought that time was being wasted learning a dialect I would not use. (P003)

For the remaining three emotions, anger, curiosity and boredom, there was an interaction such that the relation between control and these emotions was different in cases of high versus low value. This interaction is consistent with previous findings reported by Bieg, Goetz and Hubbard (2013), and Kögler and Göllner (2018) with respect to boredom. For instance, when control was low but value was high, learners reported less boredom. However, as illustrated in the example below, more boredom was experienced when value was low but control was high.

Unclear how this type of quiz is helpful with language learning – none of the answer options are similar enough to confuse...because I have a little previous Irish, I know what some of the words mean, which makes me feel ahead of the game since the quiz doesn't seem to be testing anything (P091).

To summarise, these results provide empirical support that show appraisals of perceived control and value to be important antecedents to the different emotions experienced at an intra-individual level in an Irish language MOOC. The results

suggest that the link between these cognitive appraisals and emotions can be understood both in terms of the contributions of each appraisal individually as well as the combined interactive effect of the two appraisals. However, it does appear that these appraisals may not be as applicable to certain epistemic emotions.

This is the first study to test the CVT at an intra-individual level among both achievement and epistemic emotions in an LMOOC but also in an online context more generally. Therefore, these results are an important addition to the literature. The findings complement previous inter-individual findings and extend understanding on intra-individual relations.

6.4 Tasks as Antecedents

The third research question inquired as to the relation between the different types of tasks in the LMOOC and the emotions reported by learners. Data from the questionnaire found that even when controlling for the main and interactive effects of cognitive appraisals on emotions, the nature of the learning task in a given situation did have an impact on certain emotional experiences during the Irish language MOOC. More specifically, learners experienced higher levels of hope, excitement, pride and anxiety during quizzes as compared to videos, raising the question, what is it about quizzes that evoked these emotions? The supplemental qualitative data obtained from the MEQ can assist in providing potential answers to this question. One reason may be that quizzes are evaluative in nature, and thus carry the threat of failure or underperformance leading to performance-related anxiety. At the same time, however, they can foster outcome-based feelings of pride, excitement and hope should success be achieved.

Before starting the quiz, I felt quite anxious about the results. As I kept answering, I started feeling more and more confident. I enjoyed the experience therefore. (P043)

After finishing the quiz and getting a perfect score, I became proud of myself. It's proof that I understood the topic, and that made me excited to know more. (P058)

Discussions evoked more pride in learners as compared to videos. Discussion typically asked learners to share information with their peers using words and phrases they had learned in the steps prior. Hence, similar to quizzes, they can be described

as evaluative in nature. It may be proposed that discussions fostered achievement-related pride among learners who were able to contribute successfully to the discussion. Evidence for this interpretation can be found in the qualitative answers of the MEQ.

I remembered a bit more than I thought I would and was able to make my post without looking back as much. (P034)

I felt many things but above all, I felt proud because I could write a few sentences. Although I have to look up the dictionary and check my notes several times, it's great to be able to express things in Irish. (P075)

Discussions evoked less curiosity but also less confusion in learners compared to videos. These findings are not as easy to explain. Participants may have learned from their peers during discussions, reducing their confusion. It is also possible that learners reported lower confusion during discussions than during videos because discussions are primarily review steps and do not introduce learners to any new information. The reduction in new information may have also have reduced learners' curiosity. Alternatively, the topic of the discussion may simply have not been of interest to the participants.

Not really interested in personal opinions about curses. (P028)

I felt bored because we already had ample opportunity to discuss ourselves in the previous lessons about family. (P073)

I don't like sport so I didn't have much to say. (P083)

Finally, during articles, learners experienced more hopelessness and confusion and at the same time less boredom in comparison to videos. Article steps in the course typically introduced learners to new vocabulary and grammatical constructs. Thus, it can be argued that articles challenged the learners leading to confusion, and in more extreme cases hopelessness, as they grappled with new information. The cognitive challenge associated with the article tasks, however, meant that the learner was not bored when engaging with them.

I was mostly confused about the vocative case, especially how to apply it and what it sounds like when its used. (P023)

Never having studied a language, I need to go over it many times. (P015)

Reading dense paragraphs about using words like lenition and genitive are a bit confusing. (P016)

Overall, these results suggest that the characteristics of the learning task may shape learners' emotions at the intra-individual level. Other studies have shown that the achievement-oriented nature of a given situation can have an impact on emotional experiences in everyday life (Goetz *et al.* 2010), and in learning contexts, the subject of instruction can influence the emotions that learners experience (Goetz *et al.* 2016). In the field of language learning, Piniel and Albert (2018) provided initial evidence that emotions can vary according to the particular language skill being taught. Research to date, however, has been conducted in face-to-face classroom settings. This is the first study to examine the role of task characteristics in an online language-learning environment.

To delve deeper into this topic, the fourth research question inquired about the moderating effect of task type on relations between cognitive appraisals and emotions. The literature review revealed that this relation has not yet been empirically tested in a learning context. As hypothesised, this interaction was observed in the present study. In some situations, the strength of the relation between appraisals and emotions increased or decreased depending on the task, while in other cases the direction of the relation changed depending on the task. These results show that a relationship exists between not only tasks and emotions, but also tasks, appraisals and emotions. The findings also align with Pekrun's (2006) assumption that the learning environment functions as a distal appraisal to emotions, influencing emotions by first influencing control and value appraisals. Overall, the relations identified suggest that course designers potentially may be able to influence learners' appraisals, and subsequently their emotions, by altering the task being undertaken.

In the field of SLA, research has looked at the importance of task design (e.g. finding the balance between challenge and the potential for success) in mediating language learning (Gibbons 2002, 2009). The findings of this study indicate the potential role of emotion in this process and further consideration of these relations would be an interesting direction for future research.

6.5 The Role of Age and Gender

In the statistical analysis of the MEQ, the models controlled for the relation between emotion and age and gender. Even though these relations are not directly related to the research questions, it is important to acknowledge the results for future research purposes. Consistent with previous classroom-based language learning studies (Dewaele and MacIntyre 2016; Dewaele *et al.* 2016, 2017), females were found to report more anxiety than their male peers. However, in the multilevel regression analysis gender did not significantly predict any emotion, including anxiety. This finding indicates that the effect of gender on anxiety is not consequential in the bigger context and implies that the emotional experiences of male and female learners does not differ during the MOOC. With respect to age, older age groups were found to report less surprise while learning Irish in the MOOC. It is hypothesised that the older age groups have more experience with the Irish language or language learning more generally, thus the course does not cause them the same level of surprise as the younger cohort.

6.6 Other Antecedents

The fourth and final research question delved deeper into the learner's perspective to ascertain what they determined to be the sources of their emotions. Data obtained from the emotion diaries provided this insight.

One of the key characteristics of MOOCs is that they offer learners a certain degree of autonomy and freedom to complete the course at their own pace, during times and days that suit them (Kennedy 2014). However, this aspect of MOOCs can be a source of negative emotion for learners as they struggle to keep up with the pace or in some cases, even find time to engage with the course due to external commitments. Time, and learners' appraisals regarding time during the course was one theme or source of emotion identified in this study. Competing commitments and the course timeframe, more specifically, were the focus of learners' time-related appraisals during the Irish language MOOC. Negative emotions such as anxiety, frustration and guilt were triggered when appraisals determined that there was not enough time to complete the course either because there was too much content to cover within the timeframe or because other aspects of life were taking priority.

I haven't had as much time to devote to this course as I would ideally like, and so I cannot really practice and study the way I would prefer to. This

leads to some anxiety, because I want to finish everything and do it to the best of my ability, but feel that I cannot do that fully. (P002)

Lack of time due to competing commitments appears to be a prevailing problem across MOOC research. Eriksson, Adawi and Stöhr (2017) found that lack of time was the main reason why learners dropped out the two MOOCs they investigated. Veletsianos, Reich and Pasquini's (2016) study also found that 'The Lifeworld' was a challenge many learners' had to contend with when studying on the four MOOCs they investigated. With regard to this study, even though competing commitments are not necessarily MOOC-related, an awareness among MOOC providers and/or designers of how the wider life-context of the learner can affect learners' emotions and learning during the MOOC is important. Armed with such information, course facilitators may be able to provide advice and support to learners to help curtail the negative emotions resulting from this antecedent.

Appraisals directed at the course timeframe, however, are directly related to the MOOC. Not being able to keep up with the weekly content in the course evoked anxiety and frustration among learners.

The course was too fast-paced with not enough time or opportunity to practice and remember what we had already learned before going on to the next thing. I got discouraged and found I couldn't remember what we had already covered, so I couldn't understand what other course members were writing in the comments or join in myself. (P032)

This is comparable to an issue identified by Knox (2014) in a qualitative study on the effectiveness of learning at scale, where learners reported feeling overwhelmed and anxious because the content of the MOOC was too vast. They described the course as providing *overload, noise, a sense of loss*, and used metaphors of water (i.e. the ocean) to describe its massiveness. One researcher has suggested that MOOCs put a high cognitive load on novice students, giving early learners too much information too quickly, leading to negative emotions such as anxiety (Brennan 2013). However, as there is considerable variation across MOOC designs, purposes, pedagogical approaches and learners, this claim is not always valid.

In this context of this study, it may be the case that the actual time learners need to process the new information exceeds the course-allocated timeframes. If this true, it raises a number of interesting questions about the weekly format of these courses, the fixed periods of access, and the reality of the times allocated to activities, especially in a beginner course. With respect to LMOOCs in particular, course

designers may need to be more cognisant of the fact that learners need time to practice the language given that language learning is a process of skill development and not just knowledge acquisition. To the best of the researchers' knowledge, time, or time-related appraisals, have not been identified as a source of emotion in the research to date.

Other appraisals that were directly related to the MOOC were the appraisals directed at the MOOC content or learning activities. Learners' appraisals of whether or not the Irish language content aligned with their interests and goals appear to be a source of both positive and negative emotion during the course. These were labelled 'relevance appraisals'. Content that was uninteresting or inconsistent with learning goals evoked emotions such as boredom, while content that was deemed of interest to the learner and their goals evoked their curiosity, excitement and enjoyment.

I am really grateful to be able to take this course, and to learn what I can about Irish language, culture, and the ties between the two. Place names are so interesting, as is the different ways of counting and the grammatical formats. (P002)

This appraisal is closely related to the value appraisal in the CVT, which is the perceived importance of an activity and its outcomes (Pekrun 2006). According to Pekrun (ibid), high value appraisals, where the individual perceives the content to be of subjective importance to them, coincide with a greater intensity of positive emotional experiences. Many appraisal theories incorporate perceptions of value to account for the relation between goal conduciveness and emotional experiences (Scherer 1999; Ellsworth and Scherer 2003). The varied nature of the content in the MOOC also evoked appraisals of novelty among learners. Novelty appraisals are commonly included in appraisal theories of emotion (see Ellsworth and Scherer 2003 for overview). It is determined that a novel situation draws attention and mobilises processing resources (ibid). Correspondingly, during the course novelty appraisals evoked curiosity and excitement in learners. Appraisals of quality directed at the course design were also sources of emotion for the learners in the course. Learners were perceptive of design decisions in the MOOC and when they determined the course to be well-designed it contributed to their enjoyment of the course.

It was also identified that appraisals directed at oneself were a source of emotion while participating in the Irish language MOOC. Emotions were reported in relation learners' appraisals of their ability to master the language or course material. Such

appraisals evoked positive emotions, such as pride, or negative emotions, such as frustration, depending on the context.

I am frustrated with myself, rather than the course. I have had a lot on at work and a few things happened personally which has impeded my progress and stopped me from doing the course as regularly as I'd hoped. (P020)

In some cases, the appraisals were derived from former language-learning endeavours supporting the idea that individuals bring their prior learning experiences and assumptions to current learning scenarios (Higgins 1990; Salonen, Lehtinen and Olkinuora 1998).

I don't do languages, and I learnt that young. As such learning a new one - any new one - will always make me anxious. (P028)

Appraisals of ability are comparable to the concept of self-efficacy (Bandura 1997). As mentioned in the literature review, self-efficacy is our belief that a task is achievable by us, and that the environment in which we are working will allow us to achieve that task. Self-efficacy is equivalent to concept of perceived control as posited by the CVT (Pekrun 2006). According to Pekrun (2006), high control appraisals derive from when an individual has a sense of being able to master the material at hand and result in positive emotions being experienced.

Emotions are not solely determined by intrapersonal and environmental factors, other people on the course can have an influence on an individual's emotions. Even though MOOC learners are physically separated from instructors and peers, appraisals of support directed at instructors and peers were identified as a source of emotion for learners during this LMOOC. Learners reported feeling hopeful when they felt supported while learning. On the other hand, they reported feeling anxious when they felt alone in their learning journey.

The group is engaging with one another and offering support - and that is a really positive thing that helps to mitigate the worst of the worry. (P028)

These insights indicate that social isolation is not conducive to fostering positive emotional experiences while learning the Irish language online. Indeed, distance language-learning research also found that isolation and lack of feedback were sources of anxiety (Hurd 2007). Such findings draw comparison to Buhr, Daniels and Goegan's (2019) quantitative study on emotion antecedents in MOOCs, which found

that when learners felt a sense of belonging and connection to their peers they were less likely to feel bored and more likely to enjoy the MOOC. Social emotion (i.e. where it is important that participants find the interaction in the group enjoyable and personally fulfilling), is also acknowledged by the Community of Inquiry framework (Garrison, Anderson, and Archer 2000) as a core element of the online educational experience.

Knowing that social interactions matter is important. MOOCs have shifted from their original focus on connections (cMOOCs) to a focus on information provision, with the majority of the major MOOC platforms promoting transmission-based approaches to learning (xMOOC) (Morris and Lambe 2014). This finding supports the social learning pedagogy adopted by FutureLearn and suggests that instructors and designers can improve learners' emotional experiences in LMOOCs by connecting them to one another.

Social interactions during the course, primarily facilitated through posts on the discussion forums, were also the focus of appraisals of relative standing, which in turn elicited certain emotions among learners. Discussion forum interactions gave participants the opportunity to gauge their personal progress in comparison to their peers. However, in the instances identified in this study such assessments were linked with negative emotions. This finding overlaps with other research in the field of SLA which has found that an awareness of not being as good as peers is a source of anxiety for learners (Dewaele and MacIntyre 2014; Dewaele *et al.* 2018). Comparing oneself to others is part of human nature, however it may be particularly relevant to language-learning contexts due to the close association between language learning and one's identity and sense of self (Norton 2013).

Appraisals were also directed at the cognitive process of learning in the LMOOC. Emotions were reported in relation to learners' perceived mastery of the language or progress in the learning process. Performance situations or instances where participants had to use the language, such as completing quizzes or contributing to discussion forums, were the focus of mastery and progress appraisals. These appear to be both prospective appraisals and retrospective appraisals. Prospectively, learners tended to negatively appraise their mastery resulting in anxiety.

I was anxious about remembering words/terms, especially for quizzes (which then turned out to be easier than I expected) (P004).

Following the performance activity, however, learners reappraised their mastery with the new benchmark obtained from the quiz or discussion, more often than not resulting in feelings of pride and excitement when they saw that they were making progress and improving their mastery of the language.

With each quiz I started to feel proud and excited because I got almost all the correct answers at the first attempt. Then I could write sentences of my own that, despite using a dictionary, made me feel that I was achieving something (P006).

This finding draws comparison to Hilliard *et al.*'s (2020) study, which found that anxiety was greatest prior to completing activities and that it decreased during the activity.

Irish-language learners in the MOOC tended to underestimate or lack confidence in their mastery of the language. These negative mastery appraisals may be due to the fact that in an online context learners do not have the same opportunities to use and practice the language or to receive the regular feedback that they would in face-to-face settings. The activating positive emotions reported by learners when they perceived their learning to be progressing illustrates the value of including quizzes or other progress indicators in courses. The challenge, however, appears to be ensuring that the initial anxiety they may experience prior to these situations does not deter them from engaging.

Another emotion antecedent appraisal directed at the cognitive process of language learning was an appraisal of complexity. Complexity appraisals are appraisals of understanding when presented with new information during the course. In comparison to the previous appraisal, this is a concurrent appraisal that occurs as the situation unfolds.

Some tasks were very difficult, like learning two sets of numbers and I felt very confused by that. (P032)

Since these appraisals are directed at the processing of new information, the resulting emotions can be classified as epistemic emotions (Boekaerts and Pekrun 2016). This antecedent appraisal is the most closely related to the language-learning aspect of the course with linguistic skills such as pronunciation or new grammatical structures being the object of complexity appraisals for many of the learners. In this course, learners often appraised the incoming information to be too complex to be resolved resulting in epistemic confusion or, in cases of continued confusion, frustration. This finding is consistent with recent classroom-based research conducted by Chevrier *et*

al. (2019), which found that appraisals of complexity were the leading antecedent of the five epistemic emotions investigated.

In summary, an analysis of the diary data identified five overarching themes relating to the sources of learners' emotions during the Irish-language MOOC i) Thoughts about Time, ii) Thoughts about the Learning Context, iii) Thoughts about Self, iv) Thoughts about the Social Environment and, v) Thoughts about Learning. These were derived from the learners own explanation of their emotional experiences

In line with appraisal theories of emotion (see Moors *et al.* 2013 for review) it was determined that it was learners' evaluations of situations during the Irish language MOOC that determined their emotions. Aspects of the MOOC were the objects of some appraisals, while for other appraisals the object-focus was non-MOOC related. In addition, among the MOOC-related appraisals some were directed at language learning while others transcended the language aspect of the course. While no qualitative research has been conducted on emotions in MOOCs to date, some of the antecedents identified overlap with previous research in the wider field of computer-assisted learning (Wosnita and Volet 2005; Järvenoja and Järvelä 2005), as well as the limited research on emotions antecedents from the field of SLA (Dewaele and MacIntyre 2014).

6.7 Summary

This section has discussed the main study's findings in relation to the research questions and associated literature. The following is a summary of the findings that have been identified:

- Learners experience a range of both positive and negative emotions during the Irish language MOOC. While the learners reported negative emotions to varying intensities during the course, it appears that positive emotions were consistently the emotions experienced most intensely.
- Emotions vary both within and between persons during the course. Negative emotions appear to vary more within persons than positive emotions.
- Appraisals of perceived control and value function as important antecedents to the emotions experienced within-persons during the Irish language MOOC
- Different tasks in the Irish language MOOC appear to predict learners' emotions. Tasks also appear to influence the relationship between control and

value appraisals and emotions. This is an important finding as it indicates potential avenues through which to help improve the learning experience from the instructor or designer side.

- Beyond control and value, other appraisals appear to evoke learners' emotions in the MOOC. These appraisals are predominantly directed at different aspects of the learning environment, namely interactive activities, social interactions, the timeframe of the course, learning topics and the cognitive process of acquiring new skills and knowledge.
- Some sources of emotion are not directly related to the Irish language MOOC but rather the wider context of the learners' lives.

The main question this thesis set out to answer was: What are the antecedents of learners' emotions in an Irish language MOOC? Taken together the findings discussed in this chapter provide a comprehensive answer this question. The following chapter will reflect on the overall study by acknowledging its limitations and outlining potential implications for practice, methodology and theory.

7 Conclusion

7.1 Summary of Thesis

MOOCs are online learning environments that reach hundreds and thousands of learners. Thus, understanding the learning experience and supporting learners in this context is crucial. Emotions are an important topic of investigation in this regard. Research has shown that emotions play a vital role in learner motivation, engagement and achievement (Boekaerts and Pekrun 2016; Tyng *et al.* 2017). This link between emotions and learning can potentially be leveraged to improve learning (Goetz *et al.* 2010). Investigating the antecedents of emotions is an important avenue of research in this regard. Historically, emotions have been overlooked by educational researchers. The tide is changing, however, as more and more researchers are focusing on the role of these subjective phenomena in learning, in particular in online learning domains (see Henritius, Löfström and Hannula 2018; Loderer, Pekrun and Lester 2018).

The goal of the current study was to extend this growing interest in emotions and their antecedents into the area of language learning MOOCs. The study had four objectives. The first was to identify the emotions experienced by learners participating in the Irish language MOOC, Irish 101. Emotion research in the field of SLA has traditionally focused solely on anxiety (see Horwitz 2010). While more recent studies have begun to look at a wider range of emotions (Dewaele and Macintyre 2014; MacIntyre and Vincze 2017; Boudreau, MacIntyre and Dewaele 2018; Ross and Rivers 2018), relatively little is known about emotions other than anxiety in online language learning contexts.

Following from appraisal theories of emotion, the second objective was to explore whether the two cognitive appraisals of perceived control and value, functioned as antecedents at an intra-individual level to learners' emotions during the Irish language MOOC. This relation is central to Pekrun's (2006) Control-Value Theory of Achievement Emotions. Despite the fact that the theory refers to within-person processes, intra-individual approaches to the investigation of these relations are limited and have not yet been investigated in online learning contexts. In addition, this would be the first time the theory was tested in a language learning MOOC.

The third objective was to determine the influence of the learning environment on learners' emotions. The direct effect of the various task types on emotions was of interest as well as how the tasks influenced appraisal/emotion relations. This area of

inquiry also stems from the Control-Value Theory of Achievement Emotions (ibid), which determines that the learning environment is a distal antecedent to emotions. This relation holds important implications for learning design as it suggests that educators may be able to influence learners' emotional experiences through the learning environment.

Finally, due to the subjective nature of emotions, the fourth objective was focused on the learner perspective and sought to ascertain what they determined to be the sources of their emotions.

A multistage, multimethod research design was adopted to address these objectives. Preliminary and pilot studies informed the methods, instruments and procedure adopted by the main study, which consisted of two separate phases, a mixed method questionnaire and an emotion diary. Both types of data were collected concurrently during the Irish language MOOC. In order to obtain data pertaining to within-person processes, an experience-sampling methodology was adopted. The questionnaire collected self-reports of learners' emotions, and control and value appraisals, at multiple points during the course. The diaries were submitted on a weekly basis by a sub-sample of the questionnaire study. The diaries elicited detailed reports from the learners by asking them to recall specific situations during that week that evoked particular emotions, focusing specifically on the causes of those emotions. A multi-level approach was adopted to analyse the quantitative data, while a thematic analysis was adopted for the qualitative data.

The results of this study revealed that both positive and negative emotions are experienced to varying degrees by learners during the Irish 101 MOOC and that these emotions stem from learners' appraisals or perceptions of different aspects of the learning experience. Specifically, perceptions of control and value were found to be important antecedents to the different emotions an individual may experience at different points during the course. Appraisals of time, mastery, support, relative-standing and complexity also appear to be associated with the emotions experienced during the MOOC. Other appraisals were not directed specifically at the course but rather the wider context of the person's life beyond the course. The nature of the task in and of itself was also found to influence emotions as well as appraisal-emotion relations. These findings contribute to an increased understanding of the sources of emotions in this type of learning environment.

7.2 Contributions

This study makes contextual contributions, methodological contributions, theoretical contributions, and holds important implications for educational practice. Each of these will be considered further in the following sections.

7.2.1 Contextual

Social scientists of the most varying standpoints agree that human action can be rendered meaningful only by relating it to the contexts in which it takes place. The meaning and consequences of a behavior pattern will vary with the contexts in which it occurs. This is commonly recognized in the saying that there is a “time and a place for everything”. (Gouldner 1955, p.12)

Psychological processes such as emotions are shaped by context. They cannot be interpreted independent of the context in which they occur because it is the context that infuses them with meaning (Greenway, Kalokerinos and William 2018). An important finding from the field of educational psychology is that academic emotions, in particular, are malleable, emerging from person-environment transactions (Schutz *et al.* 2006; Pekrun *et al.* 2011). Further research has shown that academic emotions are domain-specific (Goetz *et al.* 2006), indicating that emotional experiences in one subject are not the same as emotional experiences in another. Therefore, extending emotion research to a new context is an important contribution to knowledge.

The context for this study is an Irish language MOOC. Firstly, this study is one of the first to consider emotion in an LMOOC. B ark anki’s (2018) study is the only other published research identified by the systematic review to do so. However, B ark anki (*ibid*) only investigates anxiety and the study is unattached to a theoretical framework. This research, in comparison, is underpinned by the CVT and addresses a wider range of both positive and negative emotions.

An LMOOC is a relatively new online language-learning environment. The very nature of language learning raises unique difficulties for teaching and learning in an online environment. These challenges are accentuated in a MOOC where there are potentially thousands of heterogeneous learners. Thus, extending emotion research to this context, as this study has done is an important contribution to knowledge.

Secondly, the Irish language-learning context is in itself notable as a review of the literature reveals that no published literature has considered emotions in this context to date. This is the first study to investigate emotions during the Irish language

learning process in both face-to-face and online learning environments. In 2019, Walsh (2019) published a sociolinguistic study, which examined emotion among 'new speakers' of the Irish language, i.e. fluent, regular speakers who were not raised with the language. The study looked at the role of emotion in their use of the language and in their transition to new speakerhood. Nevertheless, Walsh's study is not comparable to the present study, which focuses on beginner learners in a situated learning context.

This contribution is enhanced by the fact that Irish is a minority language. Learning a minority language is not the same as learning a major language or indeed 'global English' (Graddol 2006; Crystal 2007). While language learning is already understood to be an emotional process due to the strong connections between language learning and identity (Mercer 2011), it could be argued that this is intensified in a minority context where the motivations for learning the language are likely to be more personal. For instance, many of the learners in this study indicated that their motivation for learning the language was to connect with their Irish ancestors and heritage. This is a deeply personal motivation and indicates that the significance attached to learning the Irish language may not be the same as other languages. It has also been identified in the motivation literature that many motivation models fall short in explaining the nuances of minority language learning (Flynn and Harris 2016). It is, therefore, of utmost importance that minority languages are not simply painted with the same brush as widely spoken languages in the study of emotions.

This study affirms the presence of emotions in the Irish language learning process and identifies the specific positive and negative emotions that are relevant to learning the language in both face-to-face and online learning environments. The study also identifies the appraisal antecedents of emotions in this context. Aspects of MOOC and the Irish language itself were often the focus of such appraisals demonstrating that this context does play a role.

Understanding emotions and their sources is important for informing the design of effective learning environments as is discussed in more detail in section 7.2.4. In the specific case of Irish, improving the experience and success rates of those learning the language online has crucial implications for the preservation and growth of this minority language and its associated culture.

7.2.2 Methodological

The research design for this study consisted of multiple stages. First, a preliminary study engaged with the target population (Irish language learners) in a range of authentic Irish learning environments to determine the emotions relevant to Irish language learning given the lack of prior research in this context. At this stage, the Irish language MOOC was only in the process of development. When the MOOC had been developed, a two-phase pilot study then re-engaged with the target population, first, to approve the refined instruments, and second, to assess the feasibility of the data collection procedure at scale on the course. Learnings from the pilot study raise important practical considerations for future emotion research in MOOCs and in online courses more generally. The methodology and instruments utilised in the final research stage, the main study, were the products of this multistage process. Overall, this iterative redesign process demonstrates research rigour. Accounts of iterative, contextualised approaches to research, such as the one undertaken in this thesis, are lacking in the literature. The reporting of this research process is also a move away from what Kaplan (1964) terms ‘reconstructed logic’, which is the researcher’s after the fact, idealisation of the logic and procedures behind a study. As Kaplan (ibid p.10-11) notes:

...reconstructed logic is not meant to be merely a description of what is actually being done by scientists...but rather an idealization of scientific practice... The idealisation may be carried so far that it is useful only for the further development of logic itself, and not for the understanding and evaluation of scientific practice.

As such, this study demonstrates a move towards a ‘logic in use’ account of research, which is the more or less logical procedures used by the researcher (what was actually done) (ibid). Reporting on this process is an important contribution to knowledge as setbacks experienced in this study hold learnings for the research design of future studies in the field.

The current study also demonstrates the utility of a mixed method approach in investigating learners’ emotions in a MOOC. In their literature overview of empirical MOOC research, Veletsianos and Shepherdson (2016) highlighted the absence of the learner voice in MOOC literature and called for an expansion of the methodological approaches used in MOOC research. Adopting a mixed method approach that combines self-report questionnaires and emotion diaries, as this study has, is one response to this call.

The questionnaires, which were administered using an experience sampling approach, ensured that data reflecting the natural ebbs and flows in an individual's emotion throughout the course could be recorded with an extensive sample. The diaries provided a deeper insight into the learner perspective. Taken together, the two methods meant that a more comprehensive portrait of learners' emotional experiences could be generated than would be possible using one data source alone. Obtaining reports of emotional experience direct from the learners themselves, as opposed to inferring emotions from text contributions or click-stream data was important for incorporating the learner voice and accessing the subjectivity of the experience under investigation.

Measuring emotions using an experience-sampling method (ESM) in MOOCs is rare. The researcher is only aware of one other study that has adopted this approach (Dillon *et al.* 2016). Furthermore, the over-reliance on post-hoc data at the expense of research that focused on the fluctuations of emotions was one of the main findings from Henritius, Löfström and Hunnula's (2018) systematic review of the literature on emotions in virtual learning more generally. ESM addresses many of the limitations of a retrospective questionnaire (Scollon, Kim-Prieto and Diener 2003). It also aligns with a dynamic perspective of emotions, which views emotions to be under constant change, varying situationally and over time (Dörnyei 2009b) and emerging from person-environment interactions (Pekrun *et al.* 2011).

The methodology employed in this study, therefore, has much to offer emotion research in MOOCs. However, the current study faced a number of practical challenges concerning embedding the survey in the course at multiple points. Many of these limitations were imposed by the platform provider. If emotion research, and indeed other research investigating the learning experience in this context is to advance, platforms need to become more facilitative of longitudinal research and allow research instruments to be embedded in the course. Not only would this likely increase response rates but it would also improve the quality of the data (van de Oudeweetering and Agirdag 2018).

To date, a large proportion of emotion research has been conducted under the limitations of retrospective recall. Emotions reported retrospectively can be clouded by social desirability, misinterpretations and memory limitations (Kivikangas *et al.* 2018). Technological advances, particularly in the area of artificial intelligence have the potential to transform the study of emotions. Notably, facial recognition and other

bodily response technologies are already being used to monitor emotions in computer-enabled classrooms (D'Mello 2017). These real-time data collection measures can eliminate the limitations of retrospective bias. As the field progresses, however, it is important that these methods do not replace self-report. Post hoc reporting gives the learner the chance to reflect on and make sense of their learning experience; an important insight as a learner's personal interpretation of an experience could influence their future learning behaviours. Instead, retrospective self-report should be triangulated with more real-time measures to improve the overall quality of emotion research in education.

Ultimately, the large numbers of participants and the wide geographical distribution of the sample as well as the varying levels of engagement among those participating in an informal course such as a MOOC, means that measuring emotions in this context is not a straightforward task. Nevertheless, the instruments and procedures presented in this study provide a blueprint that can be adopted, adapted, and developed further by future researchers investigating emotion in MOOCs or indeed other online learning contexts, regardless of the subject domain.

7.2.3 Theoretical

This study provided empirical support for the Control-Value Theory of Achievement Emotions (Pekrun 2006) at an intra-individual level among individuals learning Irish in a MOOC. An LMOOC, is a novel learning environment for examining the propositions of this theory. Findings from the experience-sampling questionnaire (MEQ) showed that the appraisals of control and value, and their interaction, generally predicted the emotions in the expected directions while using an intra-individual approach to analysing the data. Relations consistent with the theoretical model were also identified in learners' qualitative accounts of the learning experience.

At present, there are only a few studies that utilise an intra-individual approach to investigate the CVT and they are limited to a classroom setting (Ahmed *et al.* 2010; Bieg, Goetz and Hubbard 2013; Goetz *et al.* 2016; Kögler and Göllner 2018). The theory specifically refers to within-person processes of emotion, thus conclusions on intra-individual functioning of appraisals and emotions are only justified when the intra-individual variation of emotion is considered (Bieg, Goetz and Hubbard 2013). This is the first study to investigate the within-person functioning of the theory in a MOOC but also in an online learning environment more generally.

Most notably, this study also provides empirical support for the assumption that characteristics of the learning environment are antecedents to emotions. The different task types learners engaged with during the course were found to influence appraisal-emotion relations. There have been no studies to date that have empirically investigated the relationship between task characteristics and cognitive appraisals as the mechanism through which emotions are generated, making this study an important contribution to knowledge in this regard. This finding has important implications for learning design interventions.

Finally, the qualitative analysis of learners' emotion diaries identified further appraisals relevant to the elicitation of emotion not posited by the theory. Many of these appraisals were directed at the learning environment. Within the theoretical model proposed by Pekrun (2006), it may be the case that such appraisals function as proximal antecedents to emotions alongside control and value or they may be more distal appraisals mediating the relationship between the learning environment and control and value appraisals. In this case, the new appraisals would shape learners' emotions by first impacting perceptions of control and value; however, further research would be required to determine this.

Recently, researchers have begun to critique the Control Value Theory. Eliot and Hirumi (2019) argue that the multi-dimensional perspective of emotions adopted by the theory creates methodological and conceptual challenges for researchers. In particular, they highlight that the fine-grained nature of the theory's academic emotion taxonomy limit researchers to self-report, and that some of the emotions included are not well categorised as *emotions* but rather other mental states (e.g. boredom). Alternatively, they advocate for the use of basic emotion theory in educational contexts and physiological measures of emotions (e.g. EEG). While a move toward more real-time data collection measures would be a welcome development, such approaches are not yet feasible in a MOOC context. We must also be mindful of adopting an overly positivist approach to emotion research. The lived experience and the learner voice cannot be lost. Should whether or not we conceptualise boredom as an emotion hold significance if that is what the learner perceives themselves to be feeling? Nevertheless, many of the points raised in the paper warrant consideration in future research.

To date emotion research has remained siloed from other theories and frameworks for online education. However, there is great potential for emotion theory to influence

education theory. Emotion is notably missing from frameworks of support for online learning. The widely adopted and validated Community of Inquiry (CoI) framework (Garrison, Anderson, and Archer 2000) does not account for emotion beyond the influence found in social presence, and to date only one study has considered this addition (Cleveland-Innes and Campbell 2012). This absence is noteworthy as research has identified emotion as a vital element of the online learning process (Artino 2012, Mayer 2019, Stephens, Markus and Glaser-Zikeuda 2019). Given the prominence of the CoI framework in the field of online learning, the addition of a fourth element, “emotional presence” has the potential to make a very significant contribution to the literature and should be considered as an area for future research.

7.2.4 Educational Practice

In addition to advancing the understanding and awareness of emotions in an Irish language MOOC, the findings of this study can be used as a guide in the development of more effective courses of this nature. Due to the correlational nature of this investigation, it is not possible to provide actionable and prescriptive strategies for improving the learning experience in LMOOCs in general. Nevertheless, the results reported provide course designers with some insights into learners’ emotions and their antecedents in this context. Understanding these relations is the first in a series of steps needed to identify instructional strategies that enhance the learning experience.

Firstly, this study found that emotions experienced during the Irish 101 MOOC and appraisals of control and value are dynamic; they change from situation to situation as well as from individual to individual. An implication of this finding is that educators should be able to influence situational appraisals and subsequent emotions. Findings with regard to specific appraisals suggest that course designers should strive to create learning environments that support positive appraisals of control and value. In addition, in line with the observed interaction effects of control and value, intervention programs that promote both appraisal constructs are recommended. The findings of previous research and the qualitative data obtained from this study indicate that this may be done by ensuring that a) the course explicitly addresses the importance, personal value and use of activities (Artino and Jones 2012); b) technology is reliable, accessible and usable (Artino and Jones 2012); c) cognitive and metacognitive scaffolding is provided to support the learning process (Loderer, Pekrun and Lester 2018); and d) positive reinforcement and achievement feedback is provided (Goetz *et al.* 2006). The situational nature of value appraisals identified in this study suggest

that positive value appraisals need to be maintained throughout the course as an individual's average value was associated with more emotions than their task-level value.

The majority of the other appraisal antecedents identified by this study were directed at aspects of the learning environment (the LMOOC). Thus, it seems that educators and course designers should address the areas of course design and delivery where these appraisals are directed. Recommendations deriving from this study include ensuring that a) learners are given the chance to connect with one another, which should positively influence their appraisals of support; b) the course provides learners with opportunities to assess their learning progress, which can foster positive appraisals of mastery; c) adequate time for practice is allocated to activities in the course in order to reduce negative appraisals of time and the associated negative emotions that ensue; and d) instructors are aware of the potential cognitive difficulties associated with processing new skills and information and are on hand to provide support and scaffolding during such steps to reduce negative complexity appraisals.

It was also found that task types influence emotions, and appraisal-emotion relations. This finding shows that the very nature of the task, i.e. whether it is a discussion, video, article or quiz, can have an influence on the learners' emotions. It is important that course designers keep this in mind as they structure and scaffold the course.

Other antecedent appraisals, such as appraisals of ability, relative standing and time (directed at external commitments) were not directly related to the MOOC. Nevertheless, it is important that course designers and educators are aware of the influence of external factors so that they can provide advice and support to the learners.

The very process of reflecting and reporting on your emotions, as required of participants in this study, has the potential to contribute to the language learning process by developing a more 'holistic learner' who is cognisant of their emotions, the sources of those emotions and the impact they can have on learning. Self-reflection and self-awareness is an important step in the learning process (Talbot 2016) and it is also central in the development of emotional intelligence and the ability to regulate and manage your emotions (Salovey et al. 2011).

Ultimately, though, the most important contribution towards improving the learning experience in LMOOCs, and MOOCs more generally, may be for instructors, course

designers and most importantly, the students themselves, to become aware of the close links between emotions and learning as highlighted by this research.

7.3 Limitations

As with any research involving human subjects, the present study is not without limitations. As such, some caution needs to be exercised when interpreting the findings.

Firstly, the sample in this study is self-selected. It is likely that it does not represent the general population of Irish-language learners, if such a sample could actually be defined in a meaningful way. A positive bias towards learning the Irish language is thus likely to be present among the respondents. Nevertheless, the diversity of the respondents in terms of age, gender, nationality etc. offers some protection for the sampling procedures.

Secondly, the very act of measuring learners' emotional experiences may influence the appraisals and emotions being reported (Wheeler and Reis 1991). While this limitation also applies to the diaries, it is particularly problematic in the case of the questionnaires. Although the experience-sampling design of this study ensures ecological validity and reduces memory bias, the repeated measures means that learners may begin to respond similarly over time (Biggs and Das 1973) or react to the survey as opposed to the learning material (Scollon, Kim-Prieto and Diener 2003). While evidence of such reactivity did not appear in the qualitative accounts, the effects caused by higher attentiveness to emotions cannot be controlled for. Single-item measures helped reduce reactivity. They were also necessary to assess a wider range of emotions without creating participant fatigue. Single-item measures, however, can reduce reliability. Even though a pilot study was conducted to determine how participants interpreted the items, it is possible that participants responded to the control and value items, and even the emotions, in any number of ways.

Another limitation pertains to compliance. While a link to the questionnaire was inserted at the end of selected steps during the course, it is impossible to know whether the respondents engaged with the step prior to completing the questionnaire. Additionally, with respect to the diaries, the possibility that learners did not fill out the diary at the end of a week cannot be ruled out. Attempts to address this were restricted by technical limitations of the platform.

From a theoretical standpoint, in the model developed by Pekrun (2006) cognitive appraisals are posited to influence learners' emotions. However, it may also be the case that emotions influence cognitive appraisals or that the two variables reciprocally influence each other over time. The design of this study, however, was non-experimental and correlational in nature, thus precluding causal conclusions. Further research regarding the direction of these relations is warranted. Furthermore, although confounding variables were controlled for (e.g. age, gender, task type), it cannot be ruled out that other variables had an impact on the observed relations between cognitive appraisals and emotions. Thus, future studies might control for additional variables such as achievement or mastery goals, which may influence both cognitive appraisals and emotions.

Finally, it is acknowledged that the findings may be biased by the high rate of attrition in the MOOC. Once a student drops out, it is no longer possible to collect their self-reported emotion. It is likely that only those who are experiencing more positive affect overall will remain in the course. While the attrition rate in this MOOC was low in comparison to other courses of this nature, only 12% of the participants completed all steps. Low attrition is a problem across MOOC research more generally and future research is needed that controls for dropout bias in self-reporting affect surveys.

These limitations notwithstanding the findings of the study are promising and contribute to an emerging area of practice where research is limited. They offer a foundation from which to carry on the dialogue around emotions in LMOOCs.

7.4 Directions for Future Research

This section proffers some recommendations for the direction of future research on this topic. Firstly, to build on the relations identified among the appraisals of control and value, tasks and emotions, further research is necessary. A structured equation model would shed some light on the direction of the relationships while future experimental or quasi-experimental research would allow causal conclusions to be drawn.

This study identified the emotions relevant to learning during an Irish language MOOC and the antecedents of such emotions. However, it did not investigate the effect of the emotions on learning, which is an equally important area of inquiry and a logical next step in this process. Future research should explore the consequences of emotions in this context, i.e. their relation to learning strategies and outcomes.

To complement this study and the methodological approach adopted, it would be beneficial to analyse the temporal dynamics of the appraisals and subsequent emotions. The descriptive statistics presented in this study indicated lower levels of emotionality at the end of the course compared to the beginning. Understanding more about how appraisals and emotions fluctuate across days and weeks could hold important insights for learning design.

Control and value are well-researched appraisal antecedents of emotions in educational settings. However, recommendations for educational practice are in need of empirical support. Research needs to start testing the effectiveness of intervention programs aimed at influencing learners' appraisals and their subsequent emotional experiences.

Another important avenue for research would be to replicate this study with other LMOOCs, and other subjects in MOOCs. Replicating this study with other learners, languages and subjects will determine whether the findings can be applied to other participants and circumstances.

Naturally, these topics are only a starting point. Undoubtedly many more questions merit investigation in this flourishing area of inquiry. More research, which draws on the potential of new technologies, will help academics and educators better understand the phenomenon of emotion, and learn how to leverage the link between emotions and learning to improve course design and instruction.

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Yang, D., Wen, M., Howley, I., Kraut, R. and Rose, C. (2015) 'Exploring the effect of confusion in discussion forums of Massive Open Online Courses', in *Proceedings of the Second (2015) ACM Conference on Learning @ Scale*. Vancouver, BC, Canada: ACM Press. pp. 121-130.

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Appendices

Appendix A: Systematic Review

Appendix A.1 Search Strategy

Web of Science Search

Initial Term	AND	AND	# of Results
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment'	25
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment' of 'affect*'	317
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment' or 'affect*' or 'anxiety' or 'enjoyment'	384

ERIC Search

Initial Term	AND	AND	# of Results
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment'	2
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment' of 'affect*'	69

'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment' or 'affect*' or 'anxiety' or 'enjoyment'	82
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PsycINFO Search

Initial Term	AND	AND	# of Results
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment'	11
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment' of 'affect*'	117
'language learning' OR 'language acquisition' OR 'language learner'	'online' or 'distance' or 'computer-assisted' or 'digital' or 'web' or 'technology'	'emotion' or 'sentiment' or 'affect*' or 'anxiety' or 'enjoyment'	149

Appendix A.2 Excluded Studies with Reason

AbuSeileek, A. (2012). The effect of computer assisted cooperative learning method and group size on EFL learners' achievement in communication skills. <i>Computers & Education</i> , 58(1), 231–239.	Inapplicable Context
Affective learning and computational systems. New perspectives on second language learning	Unable to locate
Al-Hoorie, A. H. (2017). Sixty Years of Language Motivation Research: Looking Back and Looking Forward. <i>SAGE Open</i> .	Not an empirical paper

Alemi, M., Meghdari, A., & Ghazisaedy, M. (2015). The impact of social robotics on L2 learners' anxiety and attitude in English vocabulary acquisition. <i>International Journal of Social Robotics</i> , 7(4), 523-535.	Inapplicable Context
Alrabai, F. (2016). Factors underlying low achievement of Saudi EFL learners. <i>International Journal of English Linguistics</i> , 6(3), 21-37.	Not an empirical paper
Amerstorfer, C. (2018). Past its expiry date? The SILL in modern mixed-methods strategy research. <i>Studies in Second Language Learning and Teaching</i> , 8(2), 497-523.	Not an empirical paper
Arnold, N. (2007). Reducing foreign language communication apprehension with computer-mediated communication: A preliminary study. <i>System</i> , 35(4), 469-486.	Inapplicable Context
Aydınlı, J., & Ortaçtepe, D. (2018). Selected research in applied linguistics and English language teaching in Turkey: 2010–2016. <i>Language Teaching</i> , 51(2), 210-245.	Not an empirical paper
Bouchefra, M., & Baghoussi, M. (2017). Algerian EFL University Teachers' Attitudes towards Computer Assisted Language Learning: The Case of Djilali Liabes University. <i>International Journal of Education and Literacy Studies</i> , 5(2), 132-139.	Teacher emotions
Bown, J. (2006). Locus of learning and affective strategy use: Two factors affecting success in self-instructed language learning. <i>Foreign Language Annals</i> , 39(4), 640-659.	Inapplicable Context
Bytheway, J. (2013). Affecting language learners' use of vocabulary learning strategies in massively multiplayer online role-playing games. <i>Proceedings of INTED 2013</i> . 5032-5040.	Emotion not investigated
Chang, H. C., Fang, W. C., Yang, B. H., Luo, B. R., Chew, S. W., & Chen, N. S. (2017). Examining the relationships between foreign language anxiety and attention during conversation tasks. In <i>Innovations in Smart Learning</i> (pp. 1-11). Springer, Singapore.	Inapplicable Context
Chang, M. M., Lin, M. C., & Tsai, M. J. (2013). A study of enhanced structured web-based discussion in a foreign language learning class. <i>Computers & Education</i> , 61, 232-241.	Emotion not investigated
Chen Hsieh, J. S., Huang, Y.-M., & Wu, W.-C. V. (2017). Technological acceptance of LINE in flipped EFL oral training. <i>Computers in Human Behavior</i> , 70, 178-190.	Emotion not investigated
Chen, M. H., Chen, W. F., & Ku, L. W. (2018). Application of Sentiment Analysis to Language Learning. <i>IEEE Access</i> , 6, 24433-24442.	Emotion not investigated
Chen, Y. L. (2016). The effects of virtual reality learning environment on student cognitive and linguistic development. <i>The Asia-Pacific Education Researcher</i> , 25(4), 637-646.	Emotion not investigated
Cismas, S. C. (2009, September). Test anxiety and motivational incentives in web-based learning. In <i>WSEAS International</i>	Not an empirical paper

Conference. Proceedings. Mathematics and Computers in Science and Engineering (No. 9). WSEAS.	
Cong-Lem, N. (2018). Web-Based Language Learning (WBLL) for Enhancing L2 Speaking Performance: A Review. <i>Advances in Language and Literary Studies</i> , 9(4), pp.143-152.	Not an empirical paper
D. W. K. Chu, K. K. Ng, I. K. W. Lai and P. W. M. Lam, "Analysis of Student Behaviors in Using WeChat / WhatsApp for Language Learning at Diploma Level in Hong Kong: A Pilot Test," 2015 International Symposium on Educational Technology (ISET), Wuhan, 2015, pp. 104-108.	Inapplicable Context
Dewaele, J. M. (2010). Multilingualism and affordances: Variation in self-perceived communicative competence and communicative anxiety in French L1, L2, L3 and L4. <i>IRAL-International Review of Applied Linguistics in Language Teaching</i> , 48(2-3), 105-129.	Inapplicable Context
Dewaele, J., & Ip, T. (2013). The link between Foreign Language Classroom Anxiety, Second Language Tolerance of Ambiguity and Self-rated English proficiency among Chinese learners. <i>Studies in Second Language Learning and Teaching</i> , 3(1), 47-66.	Inapplicable Context
Dracopoulos, E., & Pichette, F. (2011). Second language writing anxiety, computer anxiety, and performance in a classroom versus a web-based environment. <i>Studies in Second Language Learning and Teaching</i> , 1(1), 101-117.	Inapplicable Context
Ebrahimzadeh, M., & Alavi, S. (2016). Motivating EFL students: E-learning enjoyment as a predictor of vocabulary learning through digital video games. <i>Cogent Education</i> , 3(1), 1255400.	Inapplicable Context
Exploring the relationship between language learning strategy usage and anxiety among Chinese university students	Unable to locate
Fan, L. (2011, August). Research on Methods of Improving L2 Language Learning Based on Principles of Language Teaching with Web Resources. In <i>International Conference on Computer Science, Environment, Ecoinformatics, and Education</i> (pp. 509-513). Berlin, Heidelberg: Springer	Not an empirical paper
Felix, U. (2001). Students as Informants for Web-based Learning Design. In G. Kennedy, M. Keppell, C. McNaught, & T. Petrovic (Eds.), <i>ASCILITE 2001 Meeting at the Crossroads</i> (pp. 53 - 56). Melbourne Vic Australia: University of Melbourne.	Emotion not investigated
Gadanecz, P. (2018) "The nature of positive emotions via online language learning," IN 9th IEEE International Conference on Cognitive Infocommunications (CogInfoCom), Budapest, Hungary, 2018, pp. 197-204.	Inapplicable Context
García Laborda, J. & Alcalde Peñalver, E. (2018). Constraining issues in face-to-face and Internet-based language testing. <i>Journal for Educators, Teachers and Trainers</i> , Vol. 9(2), pp. 47 – 56	Inapplicable Context

Gierlinger, E. 2015. "You Can Speak German, Sir': On the Complexity of Teachers' L1 Use in CLIL." <i>Language and Education</i>	Emotion investigated	not
Green, H., Harper, F., and Fernández-Toro, M. (2018). Using screencasts in the teaching of modern languages: investigating the use of Jing® in feedback on written assignments. <i>The Language Learning Journal</i> , 46(3) pp. 277–292.	Emotion investigated	not
Habók, A. and Magyar, A., 2018. Validation of a self-regulated foreign language learning strategy questionnaire through multidimensional modelling. <i>Frontiers in psychology</i> , 9.	Emotion investigated	not
Hamzaoglu, H., & Koçoğlu, Z. (2016). The application of podcasting as an instructional tool to improve Turkish EFL learners' speaking anxiety. <i>Educational Media International</i> , 53, 313-326	Inapplicable Context	
Harb, J., Bakar, N. A., & Krish, P. (2014). Gender differences in attitudes towards learning oral skills using technology. <i>Education and Information Technologies</i> , 19(4), 805-816.	Inapplicable Context	
Horwitz, E. K., Nassif, L., Uslu-Ok, D., & Meadows-Parrish, C. (2017). Supporting more successful language learning: Approaches for helping post-secondary learners in three contexts. <i>Eurasian Journal of Applied Linguistics</i> , 3(2), 99-120.	Inapplicable Context	
Hsu, T.C. Learning English with Augmented Reality: Do learning styles matter? <i>Comput. Educ.</i> 2017, 106, 137–149.	Inapplicable Context	
Hung, H.T., Yang, J.C., Hwang, G.J., Chu, H.C. and Wang, C.C., 2018. A scoping review of research on digital game-based language learning. <i>Computers & Education</i> , 126, pp.89-104.	Not an empirical paper	
Hwang, G. J., Hsu, T. C., Lai, C. L., & Hsueh, C. J. (2017). Interaction of problem-based gaming and learning anxiety in EFL students' English listening performance and progressive behavioral patterns. <i>Computers & Education</i> , 106, 26–42.	Inapplicable Context	
Hwang, Y. L., Huang, P. W., & Hsu, L. P. (2013). Impacts of Language Learning Based on Computer-Assisted Language Learning Instruction. <i>Applied Mechanics and Materials</i> , 479, 928.	Inapplicable Context	
Jabbari, N. and Eslami, Z.R. (2019) Second language learning in the context of massively multiplayer online games: A scoping review. <i>ReCALL</i> , 31(1), pp.92-113.	Not an empirical paper	
Jee, M.J. (2018). Four skill-based foreign language anxieties: learners of Korean in Australia. <i>Linguistic Research</i> 35 (Specialissue) 23-45.	Inapplicable Context	
Jeong-Ryeol, K. & Young Joo, J (2017) Language input revisited in the S.M.A.R.T. world, <i>Journal of Computational and Theoretical Nanoscience</i> 23(10) pp. 9773-9777	Inapplicable Context	
Kerz, E., & Wiechmann, D. (2017, November). Individual differences in l2 processing of multi-word phrases: Effects of	Emotion investigated	not

working memory and personality. In International Conference on Computational and Corpus-Based Phraseology (pp. 306-321). Switzerland: Springer International Publishing		
Kessler, G. (2010) 'Fluency and anxiety in self-access speaking tasks: The influence of environment', Computer Assisted Language Learning, 23(4), pp. 361–375.	Inapplicable Context	
Kongrith, K. and Maddux, C.D., 2005. Online learning as a demonstration of type II technology. Computers in the Schools, 22(1-2), pp.97-110.	Not an empirical paper	
Kourieos, S. and Evripidou, D., 2013. Students' Perceptions of Effective EFL Teachers in University Settings in Cyprus. English Language Teaching, 6(11), pp.1-16.	Inapplicable Context	
Lacazette, M. & Rojas, M. (2015) Affective Filter and Comprehensible input in second language acquisition on the web, ICERI2015 Proceedings, pp. 3435-3437	Emotion investigated	not
Lai, C. (2015). Modeling teachers' influence on learners' self-directed use of technology for language learning outside the classroom. Computers & Education, 82, 74-83.	Emotion investigated	not
Lai, C., Li, X., & Wang, Q. (2017). Students' perceptions of teacher impact on their self-directed language learning with technology beyond the classroom: cases of Hong Kong and US. Educational Technology Research and Development, 65(4), 1105-1133.	Emotion investigated	not
Lai, C., Zhu, W.M., & Gong, G. (2014). Understanding the quality of out-of-class English learning. TESOL Quarterly. Advance Online Publication.	Inapplicable Context	
Lee, C., Yeung, A. S., & Ip, T. (2017). University English language learners' readiness to use computer technology for self-directed learning. System, 67, 99-110	Inapplicable Context	
Lee, J.S. (2019) Quantity and diversity of informal digital learning of English, Language Learning & Technology, 23(1), pp. 114-126	Inapplicable Context	
Li, R. et al. (2019) 'Examining efl learners' individual antecedents on the adoption of automated writing evaluation in china', Computer Assisted Language Learning.	Inapplicable Context	
Liao, P. (2014). Flipped Learning: Integrating Community Language Learning with Facebook via Computer and Mobile Technologies to Enhance Learner Language Performances in Taiwan. In International Conference, MISNC (pp. 92-101). Berlin Heidelberg: Springer	Inapplicable Context	
Lin, T. J., & Lan, Y. J. (2015). Language learning in virtual reality environments: Past, present, and future. Journal of Educational Technology & Society, 18(4), 486-497.	Not an empirical paper	
Liu, J. J., Li, F. Y., & Ren, L. L. (2012). Study on Cross-Cultural Communication and Cooperative Learning in Web Environment.	Emotion investigated	not

In Advanced Materials Research (Vol. 468, pp. 2812-2815). Trans Tech Publications.	
Liu, M. C., Huang, Y. M., & Xu, Y. H. (2018). Effects of individual versus group work on learner autonomy and emotion in digital storytelling. Educational Technology Research and Development, 66(4), 1009-1028.	Inapplicable Context
Lnor, T. et al. (2012) 'Minding the gap between first and continued usage of a corporate e-learning English-language program', International Journal of Technology and Human Interaction (IJTHI), 8(1), pp. 55–74.	No SLA focus
Lu, Z., Zheng, C., & Li, Z. (2018). Effects of embedded summary writing on EFL learners' anxiety and oral production in a computer-based testing environment. Journal of Computers in Education, 5, 221-241.	Inapplicable Context
Luo, B.R., Lin, Y.L., Chen, N.S., Fang, W.C. (2015). Using smartphone to facilitate English communication and willingness to communicate in a communicate language teaching classroom. Proceedings of the 15th International conference on Advanced Learning Technologies (pp. 320–322). IEEE.	Inapplicable Context
Maldonado, H., Lee, J.-E. R., Brave, S., Nass, C., Nakajima, H., Yamada, R., Iwamura, K., and Morishima, Y. 2005. We learn better together: enhancing elearning with emotional characters. In CSCL '05: Proceedings of the 2005 conference on Computer support for collaborative learning, International Society of the Learning Sciences, pp. 408–417	Emotion not investigated
Marek, M. W., & Wu, W. C. V. (2014). Environmental factors affecting computer assisted language learning success: a Complex Dynamic Systems conceptual model. Computer Assisted Language Learning, 27(6), 560-578.	Emotion not investigated
Melchor-Couto, S. (2018). Virtual world anonymity and foreign language oral interaction. ReCALL, 30(2), 232-249.	Inapplicable Context
Mitigating learners' FLA and improving their RC through NBLT	Unable to locate
Murphy, E. and Zeng, Z. (2007) Tensions in the Language Learning Experiences and Beliefs of Chinese Teachers of English as a Foreign Language. TESL-EJ, 10 (4). pp. 1-19	Teacher emotions
Na, N. (2014, September). Anxiety about English Language Learning among University Students. In 2014 Conference on Informatisation in Education, Management and Business (IEMB-14). Atlantis Press.	Inapplicable Context
Perifanou, M. A. (2009). Language micro-gaming: fun and informal microblogging activities for language learning. Communications in Computer and Information Science, 49, 1–14. DOI: 10.1007/978-3-642- 04757-2_1.	Emotion not investigated

Petroni, S. (2014) 'Cognitive and affective implications of mobile technology for second language learning', <i>Rivista Di Psicolinguistica Applicata</i> , 14(1), pp. 97–111.	Emotion not investigated
Porto, M., Montemayor-Borsinger, A., & Lopez-Barrios, M. (2016). Research on English language teaching and learning in Argentina (2007–2013). <i>Language teaching</i> , 49(3), 356-389.	Not an empirical paper
Qian, K., Owen, N., & Bax, S. (2018). Researching mobile-assisted Chinese-character learning strategies among adult distance learners. <i>Innovation in Language Learning and Teaching</i> , 12(1), 56-71.	Emotion not investigated
Reinders, H. and Wattana, S. (2014) Can I say something? The effects of digital game play on willingness to communicate. <i>Language Learning & Technology</i> .	Inapplicable Context
Reinders, H., & Wattana, S. (2015). Affect and willingness to communicate in digital game-based learning. <i>ReCALL</i> , 27(1), 38-57.	Inapplicable Context
Rivers, D.J and Ross, A.S (2018) Communicative interactions in foreign language education: Contact anxiety, appraisal and distance, <i>Learning, Culture and Social Interaction</i> , 16, pp. 20-30	Inapplicable Context
Ross, P. et al. (2011) Research writing in the sciences: Liminal territory and high emotion. <i>Journal of Learning Design</i> , 4(3) pp. 14-27	No SLA focus
S. Bodnar, C. Cucchiarini, B. Penning de Vries, H. Strik, and R. van Hout, "Learner affect in computerised L2 oral grammar practice with corrective feedback," <i>Computer Assisted Language Learning</i> , pp. 1–24, 2017	Inapplicable Context
Saaty, A. A. (2016). Utilizing facebook in language classrooms: Social constructivist and affective filter approaches. <i>Arab World English Journal (AWEJ)</i> Vol, 6.	Not an empirical paper
Sanchez, J. A. G., Shibata, A., Ohnishi, K., Dong, F., & Hirota, K. (2014, November). Visualization method of emotion information for long distance interaction. In 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM) (pp. 1-6). IEEE.	No SLA focus
Sandford, R., Ulicsak, M., Facer, K., & Rudd, T. (2006). Teaching with games—Using commercial off-the-shelf computer games in formal education. Bristol: Futurelab. Retrieved from https://www.nfer.ac.uk/publications/FUTL49/FUTL49.pdf	Inapplicable Context
Sargeant, H., Carminke, A., & Molinari, A. (2014). ICT-BASED LANGUAGE LEARNING THROUGH EUROPEAN PROJECTS. <i>eLearning & Software for Education</i> , (4).	Not an empirical paper
Saude, S. et al. (2012) Learning through the lounge: Using social presence to assess the learning environment in a MyLinE online	Emotion not investigated

forum, <i>Procedia - Social and Behavioral Sciences</i> , 66 (2012), pp. 448-459	
Shahi, M. J. (2016). The impact of e-learning on improving Iranian EFL learners' language skills: Decreasing learning anxiety. <i>Journal of Fundamental and Applied Sciences</i> , 8(3), 261-275.	Inapplicable Context
Shepherd et al. (2011) Lost in the middle of the kingdom: A second language acquisition video game, <i>Proceedings of the 49th Annual Southeast Regional Conference</i> , 2011, Kennesaw, GA, USA, March 24-26, 2011	Not an empirical paper
Smith, M. S. (2017). Language and affective processing implemented within a crossdisciplinary conceptual framework. <i>Poznan Studies in Contemporary Linguistics</i> , 53(1), 43-62.	Emotion not investigated
Steinhauer, K., White, E.J. and Drury, J.E., 2009. Temporal dynamics of late second language acquisition: Evidence from event-related brain potentials. <i>Second Language Research</i> , 25(1), pp.13-41.	Emotion not investigated
Sun, Y. (2014). Microteaching Writing on YouTube for Pre-service Teacher Training: Lessons Learned. <i>CALICO Journal</i> , 31(2), 179-200.	Teacher emotions
Tankó G., Csizér K. (2018) Individual Differences and Micro-Argumentative Writing Skills in EFL: An Exploratory Study at a Hungarian University. In: Chitez M., Doroholschi C., Kruse O., Salski Ł., Tucan D. (eds) <i>University Writing in Central and Eastern Europe: Tradition, Transition, and Innovation</i> . Multilingual Education, vol 29. Switzerland: Springer International Publishing	Inapplicable Context
The use of learning strategies for English as a second language	Unable to locate
Thompson, A. S., & Lee, J. (2014). The impact of experience abroad and language proficiency on language learning anxiety. <i>Tesol Quarterly</i> , 48(2), 252-274.	Inapplicable Context
Training of college English learning strategies based on Communicative platform	Unable to locate
Troussas, C., Virvou, M., Espinosa, K. J., Llaguno, K., & Caro, J. (2013, July). Sentiment analysis of Facebook statuses using Naive Bayes classifier for language learning. In <i>IISA 2013</i> (pp. 1-6). IEEE.	No SLA focus
Turrin, R. (2017, August). Personalization challenges in e-learning. In <i>Proceedings of the Eleventh ACM Conference on Recommender Systems</i> (pp. 345-345). ACM.	Not an empirical paper
Ushida, E. (2005). The role of students' attitudes and motivation in second language learning in online language courses. <i>CALICO journal</i> , 49-78.	Inapplicable Context
Wang, Y. and Qi, G.Y., 2018. Mastery-based language learning outside class: Learning support in flipped classrooms. <i>Language Learning & Technology</i> , 22(2), pp.50-74.	Inapplicable Context

Warner, J. A., Koufteros, X., & Verghese, A. (2014). Learning computerese: The role of second language learning aptitude in technology acceptance. <i>Educational and Psychological Measurement</i> , 74(6), 991-1017	Emotion not investigated
Webb, M. and Doman, E. (2019) 'Impacts of flipped classrooms on learner attitudes towards technology-enhanced language learning', <i>Computer Assisted Language Learning</i> .	Inapplicable Context
Wehner, A.K., Gump, A.W., & Downey, S. The effects of second life on the motivation of undergraduate students learning a foreign language, <i>Computer Assisted Language Learning</i> , 24 (3) (2011), pp. 277-289	Inapplicable Context
White, C. (2014). The distance learning of foreign languages: A research agenda. <i>Language Teaching</i> , 47, 538–553.	Not an empirical paper
White, J. (2014). The use of CALL as a means of reducing anxiety of students studying abroad. <i>Procedia Technology</i> . Vol. 18, 113-119.	Inapplicable Context
Yang, J., & Quadir, B. (2018). Effects of Prior Knowledge on Learning Performance and Anxiety in an English Learning Online Role-Playing Game. <i>Journal of Educational Technology & Society</i> , 21(3), 174-185	Inapplicable Context
Yang, J.C., Lin, M.Y., & Chen, S.Y. (2018). Effects of anxiety levels on learning performance and gaming performance in digital game-based learning. <i>J. Comp. Assisted Learning</i> , 34, 324-334.	Inapplicable Context
Yang, S. C. (2001b). Language learning on the world wide web: an investigation of EFL learners' attitudes and perceptions. <i>Journal of Educational Computing Research</i> , 24(2), 155–181.	Inapplicable Context
Zhao, L. Z. (2016). On English listening anxiety of foreign language learners and countermeasures. IN <i>Proceedings of the 2nd International Conference on Sustainable Energy and Environmental Engineering (SEEE 2016)</i>	Inapplicable Context
Zhao, Q & Chen D. (2014) Design of interactive spoken English teaching platform in MCALL model, In Liu, Sung & Yao (Eds.) <i>Information Technology and Computer Application Engineering</i> , London: Taylor and Francis Group	Not an empirical paper
Zhu, Y. et al. (2016) The study of correlation between online English learning anxiety and achievement for Chinese college students, <i>Proceedings of the 5th International Conference on Social Science, Education and Humanities Research</i> , 69, pp 908-912	Unable to locate

Appendix B: Preliminary Study

Appendix B.1 Ethics Approval

Gaeltacht and Evening Classes

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University



Ms Elaine Beirne
Fiontar

4th July 2016

REC Reference: DCUREC/2016/096

Proposal Title: An investigation of the affective states experienced by Irish language learners in a traditional classroom environment

Applicant(s): Ms Elaine Beirne & Dr Mairéad Nic Giolla Mhichíl

Dear Elaine,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this project.

Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in black ink, reading 'Dónal O'Mathúna', written in a cursive style.

Dr Dónal O'Mathúna
Chairperson
DCU Research Ethics Committee



Taighde & Nuálaíocht Tacaíocht
Ollscoil Chathair Bhaile Átha Cliath,
Baile Átha Cliath, Éire

Research & Innovation Support
Dublin City University,
Dublin 9, Ireland

T +353 1 700 8000
F +353 1 700 8002
E research@dcu.ie
www.dcu.ie

Third Level Courses

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University



Ms. Elaine Beirne
Fiontar agus Scoil na Gaeilge

7 February 2017

REC Reference: DCUREC/2017/013

Proposal Title: A further investigation of the affective states experienced by Irish language learners in a traditional classroom setting

Applicant(s): Ms. Elaine Beirne & Dr. Mairéad Nic Giolla Mhichíl

Dear Elaine,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this project.

Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in blue ink that reads 'Dónal O'Gorman'.

Dr Dónal O'Gorman
Chairperson
DCU Research Ethics Committee



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Ollscoil Chathair Bhaile Átha Cliath,
Baile Átha Cliath, Éire

Research & Innovation Support
Dublin City University,
Dublin 9, Ireland

T +353 1 700 8000
F +353 1 700 8002
E research@dcu.ie
www.dcu.ie

Duolingo (Online) Course

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University



Ms Elaine Beirne
Fiontar agus Scoil na Gaeilge

29 March 2017

REC Reference: DCUREC/2017/024
Proposal Title: An investigation of the affective states experienced by Irish language learners in an online learning context
Applicant(s): Ms Elaine Beirne, Dr. Mairéad Nic Giolla Mhichíl

Dear Elaine,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this project.

Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in blue ink that reads 'Dónal O'Gorman'.

Dr Dónal O'Gorman
Chairperson
DCU Research Ethics Committee



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Research & Innovation Support
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T +353 1 700 8000
F +353 1 700 8002
E research@dcu.ie
www.dcu.ie

Appendix B.2 Description of Course Providers

Gael Linn

Gael Linn (www.gael-linn.ie) was founded in 1953 and the organisation's main aim is to foster and promote the Irish language and its heritage throughout Ireland as a living language and as an expression of identity. In addition to a number of other services, the organisation runs courses for both second level and adult learners. For adult learners, Gael Linn offers both Dublin based evening classes as well as weeklong immersion courses which are held in the Donegal Gaeltacht during the summer months. All adult courses are offered at three levels, Beginners, Intermediate and Advanced.

Oideas Gael

Oideas Gael (www.oideas-gael.com) was founded in 1984 and is based in the Donegal Gaeltacht (Irish speaking region of Ireland). They offer weeklong immersion courses for adult learners of Irish, as well as hillwalking, music and cultural activity programmes. The language courses run during the months of June, July and August with weekend courses also being offered a few times a year. They cater for learners at beginner, intermediate and advanced levels. Learners are placed in a class relative to their previous language learning experiences. Class allocations are determined by a consultation with staff on arrival. These courses draw learners from all over Ireland and across the world.

Gaelchultúr

Gaelchultúr (www.gaelchultur.com) was established in 2004 with the aim of promoting the Irish language and various aspects of Irish culture, including music, song and dance, in Dublin and other parts of Ireland. Gaelchultúr is a private enterprise and provides Irish language courses for adult learners at eight levels which align with levels within the Common European Framework of Reference (CEFR). These courses focus on developing spoken skills in the language. Two further levels are offered which they have labelled 'Accuracy in Irish 1' and 'Accuracy in Irish 2' that a focus on basic grammatical concepts and on developing participants' reading and writing skills. Courses are offered to the general public. However, they also offer professional certificates in Irish, which are aimed at public sector employees who deal with the public on a regular basis and are required on occasion to provide a service

through Irish. The majority of Gaelchultúr's courses are run in Dublin, but a smaller number of courses take place in other areas of the country. There are also a branch of courses available online (www.ranganna.com)

Conradh na Gaeilge

Conradh na Gaeilge (www.cnag.ie), historically also known as the Gaelic League, was founded in 1893. It is an active lobbying group for the Irish language and culture. They offer Irish language courses for adult learners at nine levels which align with the CEFR. The course syllabuses are structured around the Teastas Eorpach na Gaeilge (TEG; The European Certificate in Irish) framework. The Classes cover a wide range of topics including conversational Irish, Irish grammatical structures, listening exercises and reading. Courses are located in Dublin and Galway. All course based in Dublin consist of two content hours per week.

Duolingo

Duolingo (www.duolingo.com) is a free online language platform that provides introductory language courses to people all over the world. Courses can be accessed via the website or a mobile app. Each course consists of small 'bite-size' lessons (5 minutes per day) that involve interactive activities. All courses also incorporate elements of gamification. As of April 2019, the platform offered 100 different language courses in 23 languages to over 300 million users worldwide. According to the website, the Irish language course has over 960,000 active learners.

Appendix B.3 Email Sent to Course Providers

A [ainm], a chara,

Is mac léinn iarchéime mé in Fiontar, Ollscoil Chathair Bhaile Átha Cliath. Táim i mbun staidéir ar na mothúcháin a bhaineann leis an bpróiseas foghlamtha teanga, go háirithe foghlaim na Gaeilge.

Is é aidhm an staidéir raon na móthúchán a mbraitheann foghlaimeoirí Gaeilge agus an Ghaeilge á foghlaim acu [cuir comhthéacs anseo]. Is beag taighde atá déanta ar an ábhar seo i réimse na dteangacha go fóill. Cuirfidh torthaí an staidéir go mór leis an eolas faoi fhoghlaim teangacha agus go háirithe faoi fhoghlaim na Gaeilge.

Tuigim go ritheann sibh cúrsaí Gaeilge do dhaoine fásta [cuir comhthéacs anseo], an mbeadh cead agam cuairt a thabhairt ar na ranganna agus suirbhé a scaipeadh? Nó muna bhfuil sé sin indéanta, an suirbhé a scaipeadh i measc na bhfoghlaimeoirí trí ríomhphoist?

Suirbhé gearr (5 nóiméad ar a mhéad) anaithnid atá ann. Míneoidh mé do na foghlaimeoirí cén fáth go bhfuil an taighde á dhéanamh agus na socruithe maidir le cosaint sonraí. Beidh ar na rannpháirtithe foirm i ndáil le toiliú feasach a shíniú má tá siad sásta páirt a ghlacadh sa staidéar. Ar ndóigh, beidh rannpháirtíocht sa staidéar go hiomlán deonach.

Tá an suirbhé agus an fhoirm cheada faoi iamh. Tá faomhadh eitice faighte ag an staidéar seo ón gCoiste um Eitic Thaighde, Ollscoil Chathair Bhaile Átha Cliath.

Bheinn an-bhuíoch díot as do chabhair a fháil leis an taighde seo.

Le dea-ghuí,

Elaine Beirne

Dear [name]

I am a PhD student in Fiontar, Dublin City University. I am investigating the emotions associated with the language learning process, in particular, Irish language learning.

The aim of my study is to identify the range of emotions learners experience when they are learning the language in [add context as appropriate]. There is limited research on this topic in the area of language learning. The results will contribute to understanding on how languages are learned, in particular the Irish language.

I understand that you run Irish language courses for adults [insert context]. Would it be possible for me to visit the classes to distribute my survey? Or alternatively, distribute the survey among your students by email?

The survey is short (5 minutes' maximum) and anonymous. I will explain the purpose of the research and the data protection arrangements to the learners. Participants will have to sign an informed consent form if they are willing to participate in the study. Of course, participation is completely voluntary.

The survey and the consent form are attached. Ethics approval for this study has been granted by the Research Ethics Committee in Dublin City University.

I would really appreciate your help with this research.

Best Wishes,

Elaine Beirne

Appendix B.4 Instrument

Survey

1. Please identify, from the following list of emotions, which emotions you experienced during the learning session you have just completed. (*Tick all that apply*)

Anger	
Anxiety	
Boredom	
Confusion	
Confidence	
Contempt	
Contentment	
Curiosity	
Delight	
Disappointment	
Disgust	
Embarrassment	
Enjoyment	
Enthusiasm	
Engagement	
Eureka	
Excitement	
Fear	
Frustration	
Happiness	
Hope	
Hopelessness	
Interest	
Isolation	
Neutral	
Pride	
Relief	

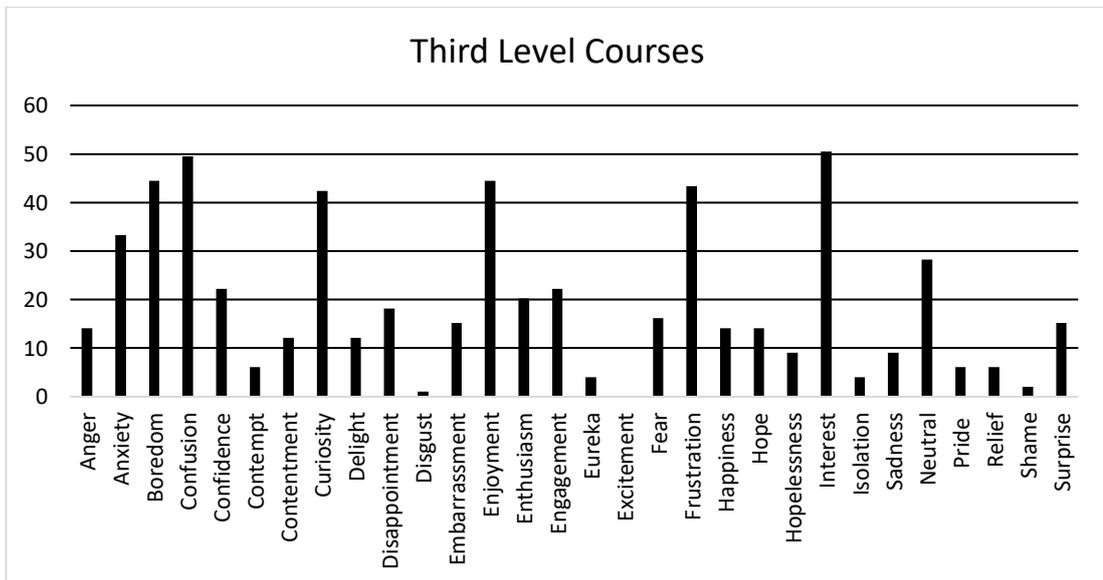
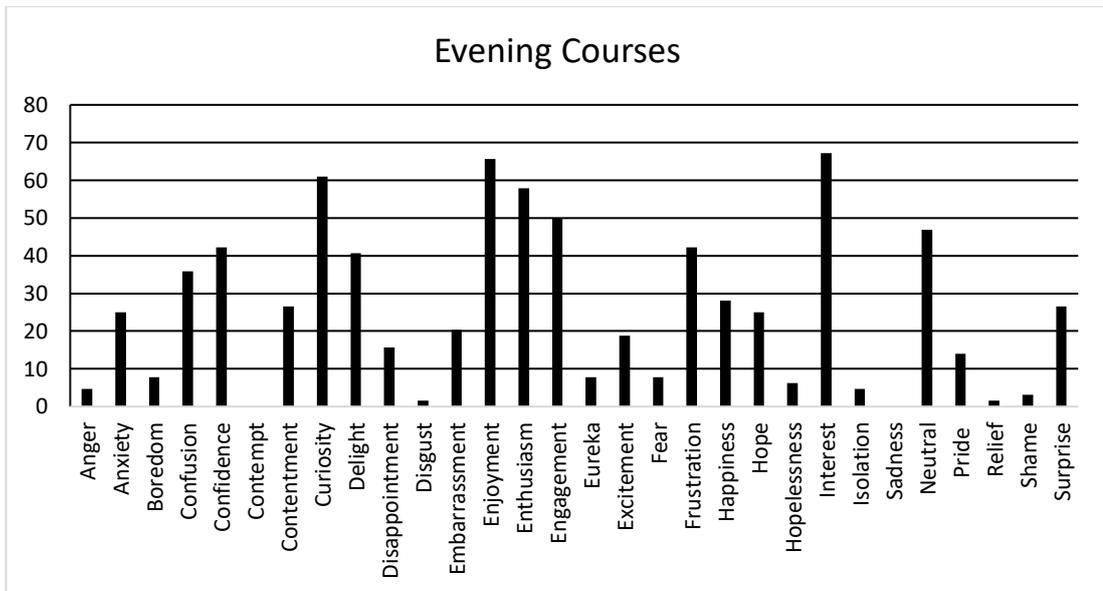
Sadness	
Shame	
Surprise	

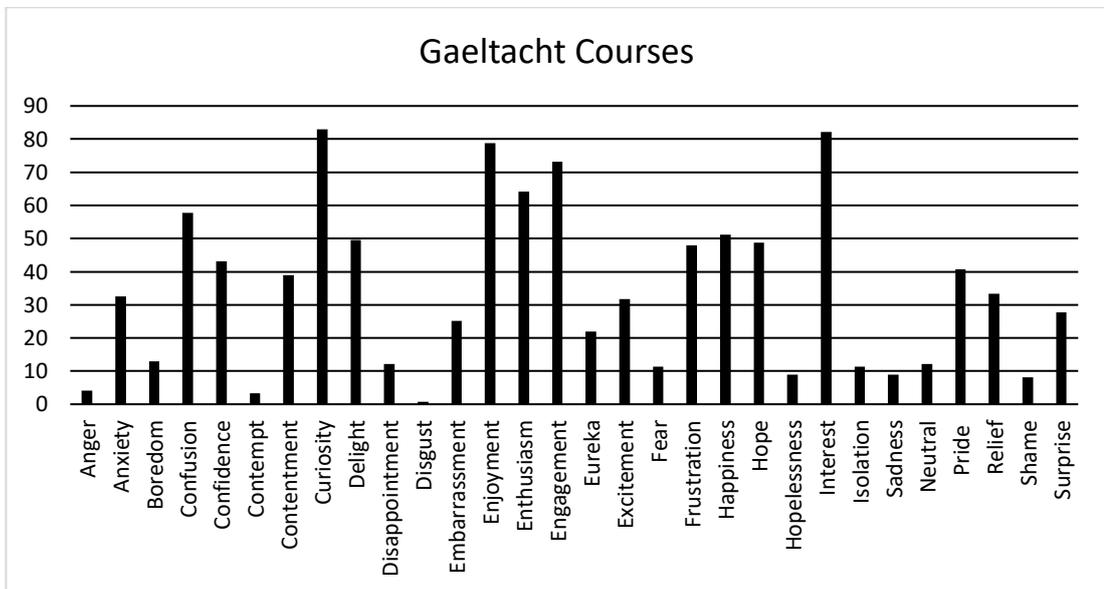
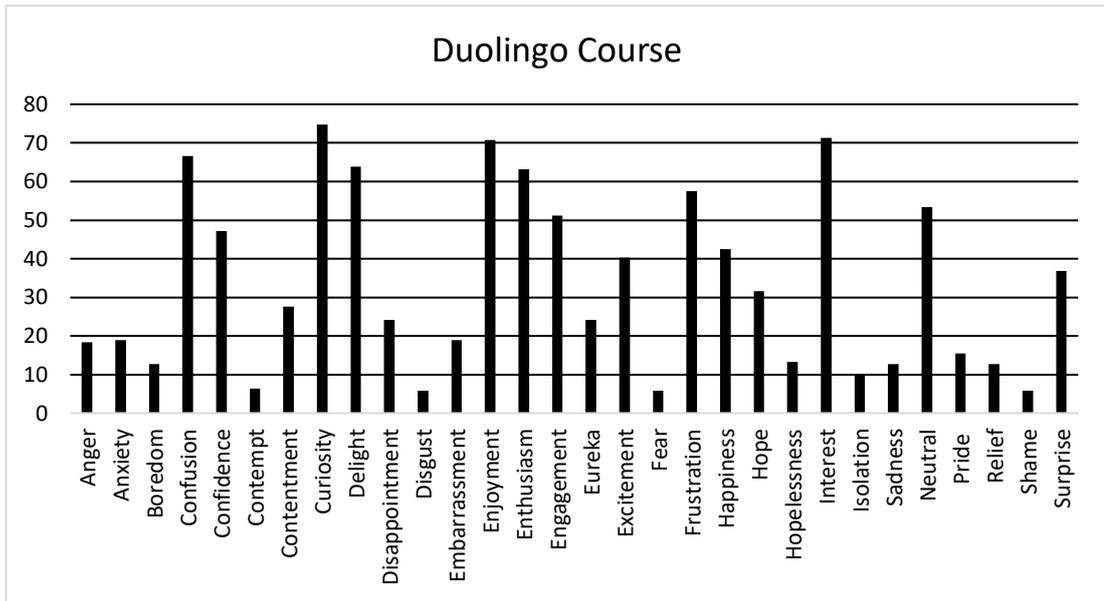
2. Did you experience any emotions not listed above during the learning session?
Yes/No

If yes, please list them below:

--

Appendix B.5 Results Breakdown





Appendix C: Pilot Study

Appendix C.1

Ethics Approval

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University



Ms Elaine Beirne

Fiontar & Scoil na Gaeilge

3 January 2018

REC Reference: DCUREC/2017/205

Proposal Title: Sentiment Analysis in an LMOOC Context

Applicant(s): Ms Elaine Beirne, Dr Mairéad Nic Giolla Mhichíl

Dear Elaine,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this project.

Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in blue ink that reads 'Dónal O'Gorman'.

Dr Dónal O'Gorman
Chairperson
DCU Research Ethics Committee



Taighde & Nuálaíocht Tacaíocht
Ollscoil Chathair Bhaile Átha Cliath,
Baile Átha Cliath, Éire

Research & Innovation Support
Dublin City University,
Dublin 9, Ireland

T +353 1 700 8000
F +353 1 700 8002
E research@dcu.ie
www.dcu.ie

Appendix C.2 Background Questionnaire (Phase 1 Pilot)

Background Questionnaire

This questionnaire is designed to gain insight into your previous language learning experiences and your experience of using Information and Communication Technologies for learning a language. Your answers will help generate a profile of users within this research study. The information provided will remain confidential i.e. personal data will not be used to identify any individual as part of the research outcomes.

Thank you for taking the time to answer this questionnaire.

What is your age?

- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 +

What is your gender?

- Female
- Male
- Prefer not to say

What is your country of origin?

Your answer _____

If yes, please specify the course or courses and indicate if you completed the course(s)

Your answer

If no, why not?

Your answer

Back

Submit

Appendix C.3 BQ Feedback Form (Pilot Phase 1)

Background Questionnaire Feedback

Thank you for taking the time to participate in this pilot study. Your feedback to this questionnaire will assist me in making improvements prior to the main study.

Did you have any difficulties completing the questionnaire?

Yes

No

If 'yes' please provide details

Your answer

In your opinion, how clear were the questions?

	1	2	3	4	5	
Not clear at all	<input type="radio"/>	Very clear				

What is your opinion of the structure and format of the questionnaire?

	1	2	3	4	5	
Poor	<input type="radio"/>	Excellent				

Any other comments?

Your answer

Submit

Appendix C.4 Pilot Questionnaire (Phase 1)

How did you feel during this task?

This study is being undertaken independently by Dublin City University to enhance the learner experience. Your participation in the research will have no effect on your course progress, marks or FutureLearn profile, and won't be linked to your FutureLearn identity. We will request your user ID so that we can collate your responses to the course surveys you choose to complete. FutureLearn does not take responsibility for the contents or the consequences of your participation in the study.

Please note that by responding to this survey you are agreeing to take part in the study.

*Required

Please insert your participation ID *

Your answer

How were you feeling while reading this article?

For each emotion please indicate the strength of that emotion by clicking the box that best describes the intensity of your emotional experience during the task.

	Not at all	Very little	Moderate	Strong	Very Strong
Surprised	<input type="radio"/>				
Curious	<input type="radio"/>				
Excited	<input type="radio"/>				
Confused	<input type="radio"/>				
Anxious	<input type="radio"/>				
Frustrated	<input type="radio"/>				
Bored	<input type="radio"/>				

I valued this task *

Please indicate on the scale below your level of agreement with this statement

	1	2	3	4	5	
Strongly agree	<input type="radio"/>	Strongly disagree				

I felt in control during this task *

Please indicate on the scale below your level of agreement with this statement

	1	2	3	4	5	
Strongly Agree	<input type="radio"/>	Strongly Disagree				

Submit

Appendix C.5 Pilot Feedback Form (Phase 1)

Research Survey Feedback

*Required

Please insert you participant ID *

Ask the facilitator if unsure

Your answer _____

In your own words, what do you think is being asked in Question 1? *

Your answer _____

Please explain your interpretation of the statement in Question 2 *

Your answer _____

Please explain your interpretation of the statement in Question 3 *

Your answer

Do you have any comments on the wording or layout of the survey?

Your answer

Are the instructions for completing the survey clear? *

Yes

No

If no, why not?

Your answer

Submit

Appendix C.6 Pilot Questionnaire (Phase 2)

Dublin City University (DCU) is investigating the emotional experiences of learners whilst learning the Irish language online. This research will inform the design of our future Irish language courses. This is an optional study that you can take part in. Findings will be published as part of academic and doctoral research by the course educators. The use of survey data adheres to Dublin City University's stringent ethical research practices and the privacy of respondents will be respected and protected according to DCU's Data Protection Policy. Institutional ethical approval was received: 03/01/2018.

This study is being undertaken independently by Dublin City University to enhance the learner experience. Your participation in the research will have no effect on your course progress, marks or FutureLearn profile and FutureLearn does not take responsibility for the contents or the consequences of your participation in the study. If you do not want to participate, please [click here](#) to return to the course.

How were you feeling while completing this quiz?

For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity.

	Not at all	Very Little	Moderate	Strong	Very Strong
Anxious	<input type="radio"/>				
Hope	<input type="radio"/>				
Bored	<input type="radio"/>				
Angry	<input type="radio"/>				
Surprised	<input type="radio"/>				
Proud	<input type="radio"/>				
Confused	<input type="radio"/>				
Curious	<input type="radio"/>				
Frustrated	<input type="radio"/>				
Hopelessness	<input type="radio"/>				
Excited	<input type="radio"/>				

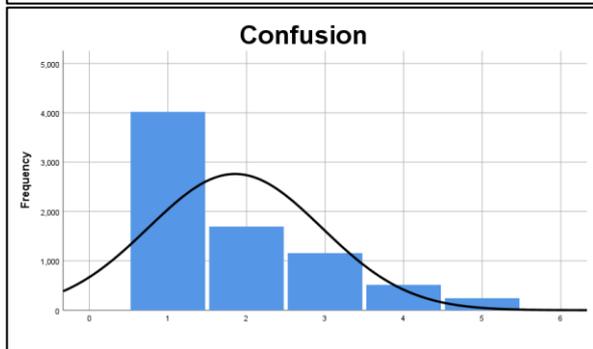
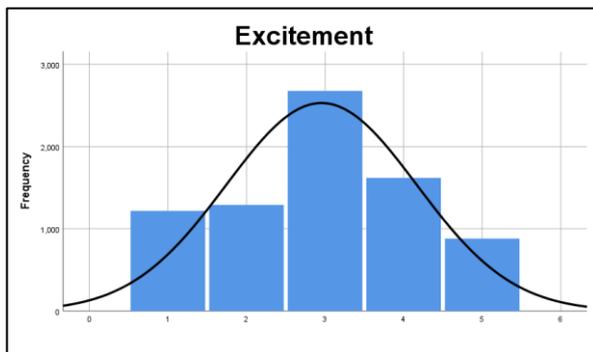
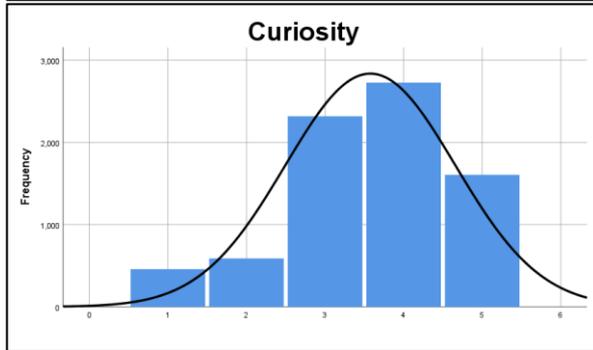
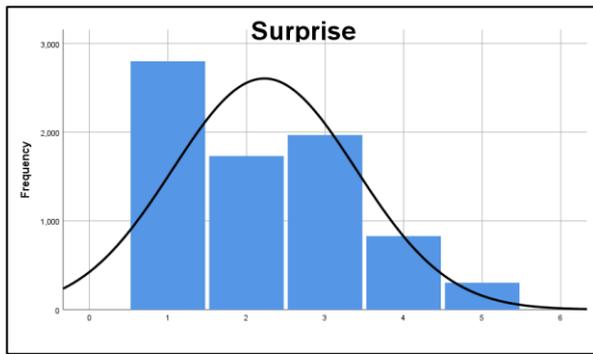
Each of the following statements refer to the quiz you have just completed. Please indicate your level of agreement with each statement.

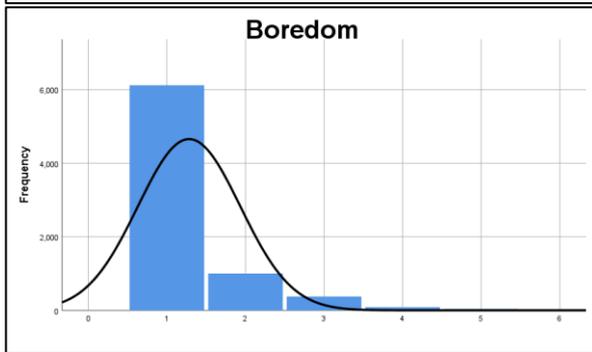
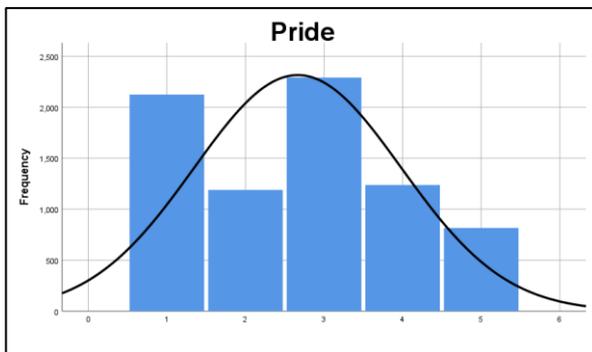
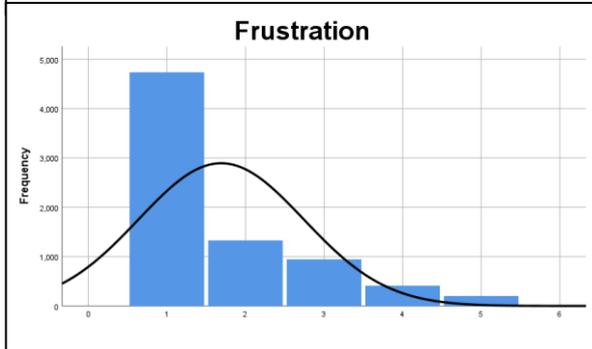
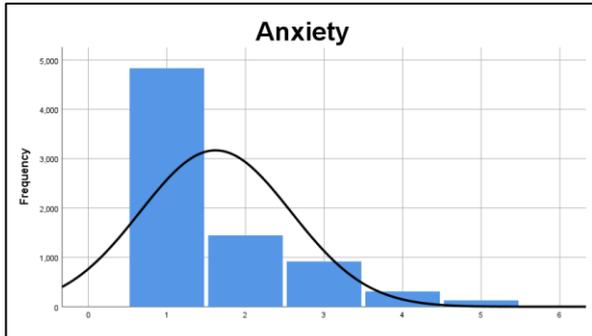
	Strongly Agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I valued this task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt in control during this task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

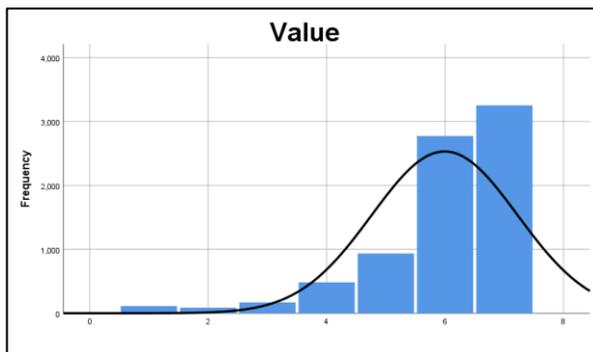
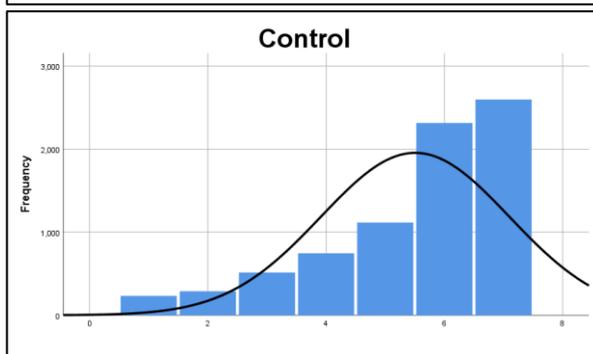
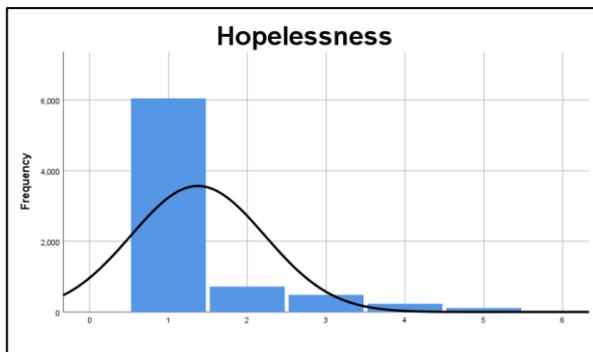
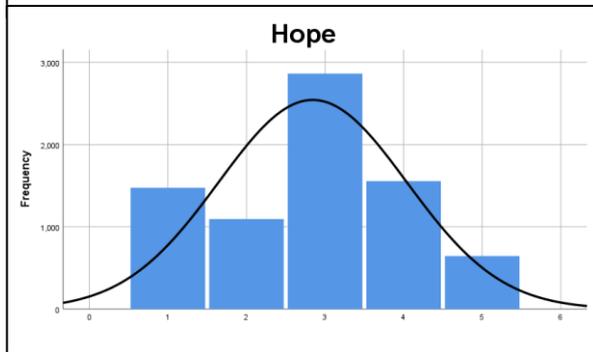
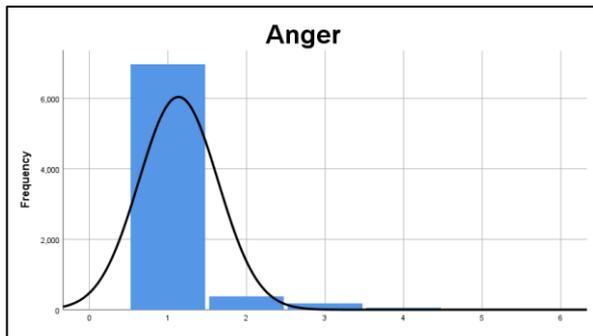
Appendix C.7 Survey Location Matrix for Pilot Study

Week	Survey	Step	Task Type	Content	Skill
1	1	1.4	Discussion	Discussion Contribution	Writing
1	2	1.8	Video	Video on Vowels	Listening
1	3	1.13	Quiz	First Quiz	Writing
1	4	1.21	Article	Grammatical Article	Reading
1	5	1.23	Article	Culture	Reading
1	6	1.28	Discussion	Oral Contribution	Speaking
2	7	2.5	Audio	Audio Quiz	Listening
2	8	2.11	Quiz	Grammar Quiz	Writing
2	9	2.14	Article	Culture	Reading
2	10	2.17	Video	Vocabulary	Listening
2	11	2.26	Article	Grammar -Numbers	Reading
2	12	2.29	Discussion	Oral Contribution	Speaking
3	13	3.3	Animation	Vocabulary	Listening
3	14	3.6	Audio	Vocabulary	Listening
3	15	3.17	Article	Grammar	Reading
3	16	3.19	Discussion	Written Contribution	Writing
3	17	3.21	Article/Video	Culture	Listening/ Reading
3	18	3.26	Animation	Feedback	Listening

Appendix C.8 Histograms







Appendix C.9 Kolmogorov-Smirnov Result

	Statistic	df	Sig.
Surprise	.220	7289	.000
Curiosity	.214	7289	.000
Excitement	.189	7289	.000
Confusion	.309	7289	.000
Anxiety	.374	7289	.000
Frustration	.367	7289	.000
Boredom	.472	7289	.000
Pride	.174	7289	.000
Anger	.522	7289	.000
Hope	.216	7289	.000
Hopelessness	.467	7289	.000
Value	.273	7289	.000
Control	.250	7289	.000

a. Lilliefors Significance Correction

Appendix C.10 Factor Analysis

Rotated Component Matrix^a

	Component		
	1	2	3
Surprised	.612		
Curious	.734		
Excited	.865		
Confused		.856	
Anxious		.745	
Frustrated		.837	
Bored			.867
Proud	.782		
Angry		.435	.621
Hopeful	.815		
Hopeless		.772	
Eigenvalue			
Variance			
Cronbach Alpha			

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.
 a. Rotation converged in 4 iterations.
 Note: Coefficients smaller than .4 were suppressed

Appendix C.11 Mean Comparison Tables

	Total		Video		Discussion		Quiz		Article	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Surprise	2.23	1.17	2.31	1.16	2.08	1.16	2.10	1.15	2.29	1.18
Curiosity	3.58	1.08	3.79	0.99	3.14	1.21	3.40	1.12	3.56	1.05
Excitement	2.95	1.21	3.08	1.19	2.76	1.27	2.94	1.21	2.84	1.21
Confusion	1.86	1.10	1.78	1.07	1.87	1.14	1.70	1.00	2.13	1.19
Anxiety	1.62	0.96	1.55	0.92	1.70	1.03	1.62	0.94	1.70	1.01
Frustration	1.69	1.05	1.64	1.03	1.79	1.12	1.55	0.96	1.87	1.13
Boredom	1.28	0.65	1.28	0.63	1.25	0.66	1.31	0.70	1.26	0.63
Pride	2.66	1.32	2.64	1.33	2.61	1.30	2.89	1.29	2.50	1.31
Anger	1.13	0.50	1.13	0.50	1.14	0.50	1.11	0.46	1.16	0.55
Hope	2.84	1.20	2.86	1.19	2.78	1.22	2.91	1.20	2.77	1.19
Hopelessness	1.37	0.85	1.35	0.82	1.48	0.99	1.26	0.71	1.49	0.95
Value	5.99	1.23	5.91	1.28	5.91	1.35	6.11	1.16	6.02	1.17
Control	5.50	1.59	5.37	1.65	5.44	1.63	5.92	1.37	5.31	1.62

	Week 1		Week 2		Week 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Surprise	2.28	1.17	2.17	1.15	2.09	1.16
Curiosity	3.71	1.04	3.40	1.10	3.31	1.14
Excitement	3.06	1.19	2.77	1.22	2.78	1.25
Confusion	1.80	1.09	1.98	1.14	1.88	1.06
Anxiety	1.60	0.95	1.68	0.99	1.61	0.96
Frustration	1.64	1.03	1.83	1.11	1.70	1.03
Boredom	1.32	0.69	1.24	0.61	1.18	0.53
Pride	2.73	1.32	2.56	1.29	2.57	1.34

Anger	1.12	0.48	1.17	0.57	1.12	0.47
Hope	2.87	1.19	2.77	1.19	2.85	1.24
Hopelessness	1.32	0.79	1.46	0.94	1.44	0.93
Value	5.90	1.30	6.11	1.11	6.18	1.10
Control	5.50	1.60	5.47	1.61	5.59	1.53

Appendix D: Primary Research Program

Appendix D.1 Ethics Approval

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University



Ms Elaine Beirne
Fiontar

20th March 2018

REC Reference: DCUREC/2018/044
Proposal Title: An Exploration of Learner Sentiment in an LMOOC Context
Applicant(s): Ms Elaine Beirne, Dr Mairéad Nic Giolla Mhichil

Dear Elaine,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this project.

Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in blue ink that reads 'Dónal O'Gorman'.

Dr Dónal O'Gorman
Chairperson
DCU Research Ethics Committee



Taighde & Nuálaíocht Tacaíocht
Ollscoil Chathair Bhaile Átha Cliath,
Baile Átha Cliath, Éire

Research & Innovation Support
Dublin City University,
Dublin 9, Ireland

T +353 1 700 8000
F +353 1 700 8002
E research@dcu.ie
www.dcu.ie

Appendix D.2 Recruitment Email

{{First Name}}, a chara,

I am a PhD student from Dublin City University, Ireland. I am currently recruiting participants for a small scale, short-term research study. The study explores the emotional experience of learners as they learn the Irish language online. This is a great opportunity, for those interested, to learn the Irish language and engage with its rich culture while also contributing to research about how people learn online. The course in question is part of the [Fáilte ar Líne project](#) and may be of interest to those who are undertaking your Celtic Studies modules.

The deadline for registering for the study is Friday 4th May 2018. I would really appreciate if you could distribute the following message (below) among any students or staff who you think may be interested.

If you have any questions, please do not hesitate to contact me.

Thank you in advance for your help.

Le dea-ghuí,

Elaine Beirne

Appendix D.3 Social Media Recruitment

Three social media platforms were used to recruit participants: Facebook, LinkedIn and Twitter. Posts were posted from the researcher's personal account, the project account (Fáilte ar líne) and the researcher's supervisor's account. Once posted on a platform, other individuals were also able to share. The following are examples of such posts.

Facebook Posts



Fáilte ar Líne

Published by Elaine Beirne [?] · 18 April at 18:51 · 🌐



Opportunity to take part in a research study and learn the Irish language at the same time. Take a look and see what would be involved...

Register your interest here: <https://bit.ly/2J73Li6>

<https://youtu.be/n8r0N5QMLrM>



Fáilte ar Líne Emotion Research Irish 101

Elaine Beirne, PhD Candidate in Dublin City University describes the research study she will run in May 2018, in the Irish 101 Massive Open Online Course, ru...

YOUTUBE.COM

👤 1,335 people reached

Boost Post



Like



Comment



Share



Patrick John Breheny, Aida Mustapha and 23 others

Oldest ▾

17 shares



Elaine Beirne

20 April at 16:55 · Dublin ·



Hi All,

As part of my PhD research, I am recruiting adult beginner Irish language learner participants to take part in a short study in May 2018. I am investigating the emotions experienced during language learning in the Irish101: Introduction to Irish Language and Culture online three-week course.

This is an opportunity to participate in a research study and learn the Irish language at the same time. ... See more



Fáilte ar Líne Emotion Research Irish 101

Elaine Beirne, PhD Candidate in Dublin City University describes the research study she will run in May 2018, in the Irish 101 Massive Open Online Course, ru...

[YOUTUBE.COM](#)



Like



Comment



Share

Mark Kelleher, Ellen Howley and 17 others

9 shares



Write a comment...



LinkedIn Posts

 **Mairéad Nic Giolla Mhichíl** ⋮
Professor Information Technology & Senior Research Fellow at Dublin City Univer...
5d • Edited

My PhD student **Elaine Beirne NIDL at DCU** is recruiting adult beginner Irish language learner participants to take part in a short study in May 2018. She is examining emotions in language learning in the Irish101: Introduction to Irish Language and Culture online three-week course. You can register your interest here <https://bit.ly/2J73Li6> Elaine explains more about what is involved in this short video!

<https://lnkd.in/dg5vb3n> #irish #languagelearning #Gaeilge



Fáilte ar Líne Emotion Research Irish 101
[youtube.com](https://www.youtube.com)

8 Likes

 Like  Comment  Share

Likes





Elaine Beirne

PhD Candidate at Dublin City University
4d



As part of my PhD research, I am recruiting adult beginner Irish language learner participants to take part in a short study in May 2018. I am examining emotions in language learning in the Irish101: Introduction to Irish Language and Culture online three-week course. You can register your interest here <https://bit.ly/2J73Li6> Have a listen to this short video to find what is involved!

<https://lnkd.in/dzquYsF> #PhDResearch #recruiting #irish #languagelearning #Gaeilge



Fáilte ar Líne Emotion Research Irish 101

youtube.com

17 Likes

Like Comment Share

Likes



505 views of your post in the feed

Twitter Posts

Pinned Tweet



Fáilte Online @FailteOnline · Apr 19

We want to learn more about how people learn Irish online and are looking for beginner learners of the Irish language to take part in a short study.

#PhDResearch #recruiting #Gaeilge

Find out more:

youtu.be/n8r0N5QMLrM

Register: bit.ly/2J73Li6



Fiontar & Scoil na Gaeilge (DCU), Fulbright Ireland, FutureLearn and 5 others

1 42 56



Mairéad NGM @1MNGM · Apr 19

My PhD student @elaine_beirne @DublinCityUni is looking for participants for her doctoral study to take part in the Irish101: Introduction to Irish Language and Culture online course on @FutureLearn running this May for beginners. @boconch1 @mbrownz @wakiwakiEnglish @cslcND



Fáilte Online @FailteOnline

We want to learn more about how people learn Irish online and are looking for beginner learners of the Irish language to take part in a short study. #PhDResearch #recruiting #Gaeilge...



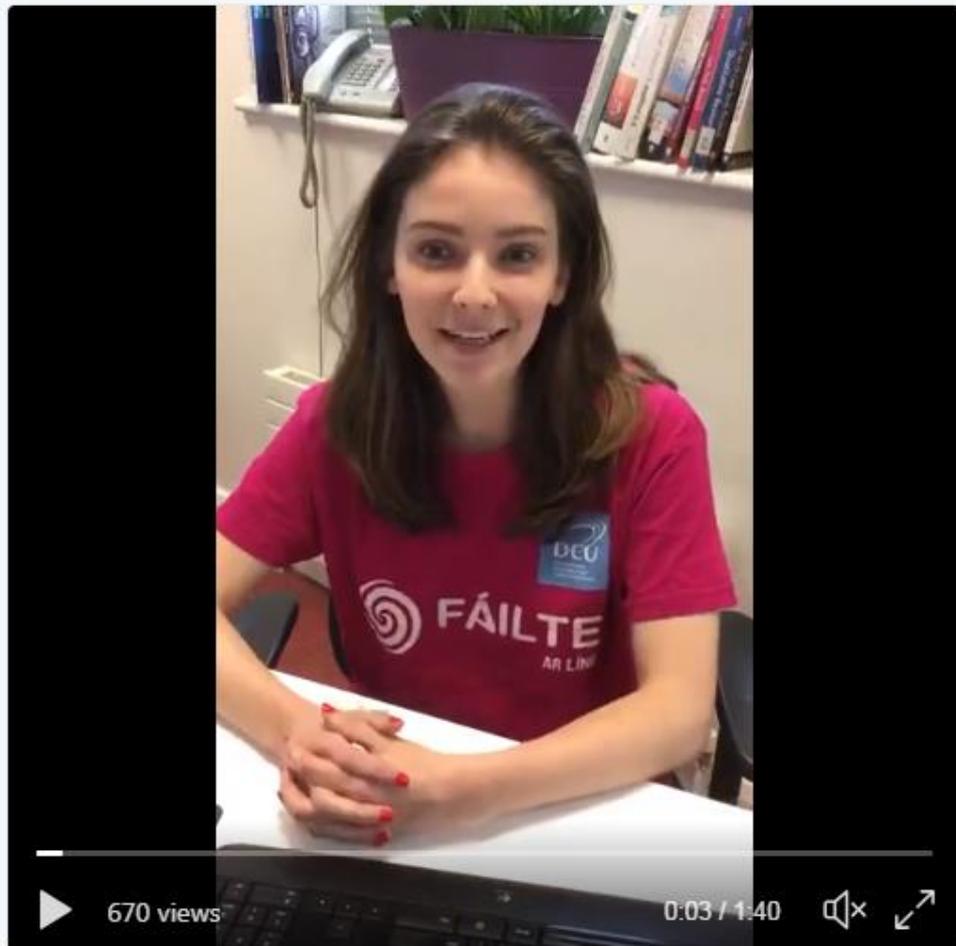
13

14



Elaine Beirne @elaine_beirne · Apr 18

Opportunity to take part in a research study and learn the Irish language at the same time. Take a look and see what would be involved... Register your interest here: bit.ly/2J73Li6



1

22

21



Appendix D.4 Request to Participate

The following text appeared in the course on the FutureLearn platform at the end of selected steps.

Can you help us?

Dublin City University (DCU) is investigating the emotional experiences of learners whilst learning the Irish language online. This research will inform the design of our future Irish language courses. This is an optional study that you can take part in. Findings will be published as part of academic and doctoral research by the course educators. The use of survey data adheres to Dublin City University's [stringent ethical research practices](#), and the privacy of respondents will be respected and protected according to DCU's [Data Protection Policy](#). Institutional ethical approval was received: 03/01/2018.

| [Click here to complete survey 1](#)

This study is being undertaken independently by Dublin City University to enhance the learner experience. Your participation in the research will have no effect on your course progress, marks or FutureLearn profile, and FutureLearn does not take responsibility for the contents or the consequences of your participation in the study.

Appendix D.5 Consent Form

Title: An Exploration of Learner Sentiment in an LMOOC Context
Principal Investigator: Dr. Mairéad Nic Giolla Mhichíl (mairead.nicgiollamhichil@dcu.ie)
Co-Investigator: Elaine Beirne (elaine.beirne4@mail.dcu.ie)
Department: Fiontar & Scoil na Gaeilge

I agree to participate in this study which is investigating the emotional experience of learners while learning the Irish language during the three-week online course, Irish 101. By participating in this study, I am contributing to knowledge about online language learning behaviour and thus informing the design of future courses.

As part of this study, I will complete a background questionnaire as well as a number of online surveys located at multiple points throughout the course. I will also have the opportunity to submit a weekly reflective diary should I wish. Both the surveys and reflective diaries will ask me to report on the emotions I experienced while learning Irish online.

I understand that my participation in this study is voluntary and that I may withdraw at any point.

I am aware that the findings of this study will be used for publication purposes and will be included in the doctoral thesis of the co-investigator. All information I provide will remain confidential. Soft copies of data will be coded and securely stored on an encrypted Dublin City University PC. Any hard copies will be stored in a secure locked filing cabinet in the Fáilte ar Líne project offices on the Glasnevin campus of Dublin City University.

I understand that any records that identify research participants will be destroyed after 3 years. The anonymised data will be retained and used for future research purposes.

Electronic Signature

Having read and understood the information on this form, do you consent to take part in this study?

I consent

I do not consent

Full Name

Appendix D.6 Background Questionnaire



Background Questionnaire

The purpose of this questionnaire is to generate a profile of the different participants in this study. It should only take 2-3 minutes to complete. Be assured that all information provided will remain strictly confidential.

Go raibh maith agat/ Thank you!

Elaine

Language Learning Experience

What is your first language?

Do you speak any other languages?

Yes

No

If yes, please list them below:

How would you describe your level of Irish at present? (Please tick one box below)

No Irish

A few words

A few basic sentences

Parts of conversations

Most conversations

Native speaker ability

If you have learnt Irish before, in what context(s) did that take place? (eg. school, adult evening classes etc.)

Goals and Motivations

In your own words, please explain your motivation(s) for learning Irish

When signing up for a course most people have a goal they want to achieve. What do you hope to achieve by taking this course?

Have you ever taken a course delivered partially or fully online before?

Yes

No

Not sure

Personal Details

Finally, a few questions about yourself:

What is your nationality?

Gender

Female

Male

Other

Prefer not to say

Age

Under 18

18 - 24

25 - 34

35 - 44

45 - 54

55 - 64

65 - 74

75 - 84

85 or older

Appendix D.7

Momentary Emotion Questionnaire

Dublin City University (DCU) is investigating the emotional experiences of learners whilst learning the Irish language online. This research will inform the design of our future Irish language courses. Findings will be published as part of academic and doctoral research by the course educators. The use of survey data adheres to Dublin City University's stringent ethical research practices, and the privacy of respondents will be respected and protected according to DCU's Data Protection Policy. Institutional ethical approval was received: 20/03/2018.

This study is being undertaken independently by Dublin City University to enhance the learner experience. Your participation in the research will have no effect on your course progress, marks or FutureLearn profile and FutureLearn does not take responsibility for the contents or the consequences of your participation in the study.

How were you feeling while completing this quiz?

For each emotion, please indicate the strength of that emotion by clicking the point that best describes the intensity of your emotional experience during the learning activity.

	Not at all	Very Little	Moderate	Strong	Very Strong
Bored	<input type="radio"/>				
Proud	<input type="radio"/>				
Confused	<input type="radio"/>				
Anxious	<input type="radio"/>				
Surprised	<input type="radio"/>				
Angry	<input type="radio"/>				
Excited	<input type="radio"/>				
Curious	<input type="radio"/>				
Hope	<input type="radio"/>				
Hopelessness	<input type="radio"/>				
Frustrated	<input type="radio"/>				

Which emotion(s) did you feel the most strongly?

Can you explain what happened and how you came to feel this way?

Each of the following statements refer to the quiz you have just completed. Please indicate your level of agreement with each statement.

	Strongly Agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I valued this task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt in control during this task	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Email:

Please provide your email address below so that we can track how your responses change over the course.

Appendix D.8 Emotion Diary

Emotion Diary

Take a moment to remember the different emotions you experienced this week while learning Irish and reflect on the situations that made you feel that way.

What emotions have you felt this week while learning Irish during the course?

Which of the emotions that you noted above did you feel the most strongly?

Can you explain what happened and how you came to feel that way?

Email

Please provide your email address below so that we can track how your responses change each week.

Appendix D.9 Email Correspondence with Participants

Email 1: Getting Started

Dear {{First Name}}

Go raibh maith agat/Thank you for expressing an interest in participating in this research study. I hope you are looking forward to beginning your Irish language-learning journey.

The course is three weeks long. It is self-paced so you do not have to be worried about being logged on at any specific times, you can work through the material in your own time.

So, what do you need to do now?

I would appreciate if you could take a few minutes to fill out the consent form and background questionnaire which you can [{{Link}}](#).

The study

As you progress through the course you will see that there are surveys located at the end of certain steps. These surveys are very short and will ask you to report on the emotions you experienced when completing that task. Please answer these surveys, as they are central to the research aspect of the course.

What will happen next?

Later today, you will receive an email from the course coordinator, Caitríona Nic Giolla Mhichíl, inviting you to enrol in the course.

To accept this invitation click the 'find out more' button. This will bring you to the FutureLearn website where you will be asked to register with FutureLearn. When you register, you will be brought to the course welcome page. On the welcome page, click 'Join course' to enrol.

Please note, participation in this study is on a voluntary basis, you can decide to exit the study at any point. If you no longer want to take part in this study you can [opt out here](#).

Please do not hesitate to contact me if you have any questions.

Slán go fóill/ Goodbye for now!

Elaine

Email 2: Joining the Course

A chairde,

Only a few days to go to the start of Irish 101!

Do not forget to click here [{{Link}}](#) and fill in the consent form and background questionnaire, if you have not already, it will only take a minute or two!

Please note, if you do not sign the consent form, I will not be able to use your answers, so it is important that you do.

The study

As you progress through the course, you will see that there are surveys located at the end of certain steps. These surveys are very short and will ask you to report on the emotions you experienced when completing that task. Please answer these surveys as they are central to the research aspect of the course.

Instructions for enrolling

Later today, you will receive an email from the course coordinator, Caitríona Nic Giolla Mhichíl, inviting you to enrol in the course.

To accept this invitation click the 'find out more' button. This will bring you to the FutureLearn website where you will be asked to register with FutureLearn. When you register, you will be brought to the course welcome page. On the welcome page, click 'Join course' to enrol. The course will start on Monday 7th May, please make sure you have joined by then.

Le dea-ghuí/ Best wishes,

Elaine

Email 3: Irish 101 has begun

{{First Name}}, a chara,

Irish 101 has begun!

If you have not started yet do not worry, it is not too late. Sign in and have a go, even if it is only for a few minutes each day, you will be surprised at how much you will pick up.

In order to get the most out of the course make sure you engage with the discussion forums at the end of each step. There, you can get to know the other learners, ask questions, or try out some of the Irish you have just learned. This is also where the DCU instructors will be interacting with you.

Please make sure you also answer the surveys as they come up. By learning more about the emotions (both positive and negative) you experience while learning the Irish language we will be able to design better courses moving forward. You may also find the surveys to be a useful reflection step.

I really appreciate all your help and interest and I hope you are enjoying the course.

Bain taitneamh as/Enjoy!

Le dea-ghuí,

Elaine

Email 4: Week 1 Reflection

A chairde,

I hope you have been enjoying week 1 of Irish 101.

Thank you to all of you who have been filling in the surveys. I really appreciate your help. Many of you have been feeling curious and hopeful this week. Some of you have also felt a little anxious during some tasks. This is very normal when starting something new.

Do you have a few minutes to reflect on the first week?

Please fill out this diary reflecting on your emotional experiences this week:

Emotion Diary

You can fill in the form or submit a voice recording responding to the same prompt questions, whichever suits you.

It is not too late...

If you have not started yet, do not worry you still have plenty of time, why not start now?

The course will remain open for a number of weeks after it has finished so you can keep learning. You do not have to complete everything during the 3 weeks.

Le dea-ghuí,

Elaine

Email 5: Week 2

A chairde,

Tá seachtain a dó faoi lán seoil anois/ Week two is in full swing!

I am looking forward to discovering which emotions you experience during your second week on the course. Do not forget to fill in the surveys and let me know!

If you are still working your way through week one do not worry, you still have plenty of time. The course will remain open for two weeks after it has finished so you can keep learning. If you have not started yet, you still can, [click here](#) to start learning.

Learning a language can be challenging and it does not happen overnight, so keep going. We have a nice proverb in Irish that sums this up nicely:

De réir a chéile a thógtar na caisleán/ It takes time to build castles

(I have attached an audio file below so you can hear how it is said)

Finally, for those of you who may be interested in learning more about the role of emotions in the learning process take a look at this video in which Dr. Mary Helen Immordino-Yang explains how our feelings impact our learning:

<https://www.youtube.com/watch?v=85BZRVE6M0o&t=338s>

Le dea-ghuí,

Elaine

Email 6: Week 2 Reflection

A chairde,

We are coming to the end of week 2.

Some of you may be over halfway there now while others are just getting started, either way; I hope you are enjoying the experience so far. If you have taken a break, why not log in and start learning again?

Take a moment to reflect on your experience this week...

If this is your [first week](#) learning on the course, [fill out this emotion diary](#).

If this is your [second week](#) learning on the course, [fill out this emotion diary](#)

Why not see how much you have learned...

Have a listen and see if you can understand as the DCU team practice some Irish phrases for greeting people. There are also a few proverbs thrown into the mix:

<https://www.youtube.com/watch?v=471NNiw2QI4>

Slán go fóill,

Elaine

Email 7: Week 3

A chairde,

We are now in the third week of Irish 101.

My message this week is one of encouragement. Around this point, many people can find that other commitments and life in general can start to get in the way of their time on the course. My best advice would be to break it down; do one or two steps of the course each day or make it your goal to learn a new word or phrase each day.

For those looking for some motivation have a look at this YouTube channel: <https://www.youtube.com/channel/UCcfSiyJgWUOxfhISWry-SmQ>

This channel contains Irish language versions of many modern songs that have been in the charts over the last few years. These are translated and performed by Irish secondary school students (12-18 year olds) who attend Gaeltacht courses in the summer months. These videos are a prime example of how the Irish language is alive and well in Ireland today.

Finally, keep filling out the surveys. I am interested in finding out how your emotions change over the course and the reasons why. Make sure to let me know through the surveys.

Slán go fóill,

Elaine

Email 8: Week 3 Reflection

A chairde,

We are now at the end of our third week. Congratulations to those of you who have finished the course.

To everyone else, keep going, it will be worth it!

Take a moment to reflect on your experience this week...

If this is your **third week** learning on the course, [fill out this emotion diary](#)

If this is your **second week** learning on the course, [fill out this emotion diary](#).

If this is your **first week** learning on the course, [fill out this emotion diary](#).

Once again, thank you for your constant engagement with the surveys. I really appreciate your support with this research project.

Do not forget the course will remain open for another two weeks. If you have finished, why not use that time to go back over some of the material you found more challenging.

Slán go fóill,

Elaine

Email 9: Final Thank you

A chairde,

Now that Irish 101 is over, I would like to take the opportunity to thank you for your participation in the course and, in particular, your contribution to my research study. Your enthusiasm and passion have been infectious. Whether you just tried out a couple of activities or you finished the entire course, I hope the experience was worthwhile and I hope that you have learned something new about the Irish language and its culture.

If you would like to continue learning, make sure to keep an eye on the Fáilte ar Líne Twitter or Facebook page to find out when Irish 102 will be starting.

I have collected some very interesting and valuable data from this study. Thank you for the role you played in this. I am sure the results will go a long way in informing course design, not only with our courses here in Fáilte ar Líne but also further afield as well. If you would like me to send you a copy of the results when they are published, please fill in your details [here](#). The results will also be disseminated through our social media platforms.

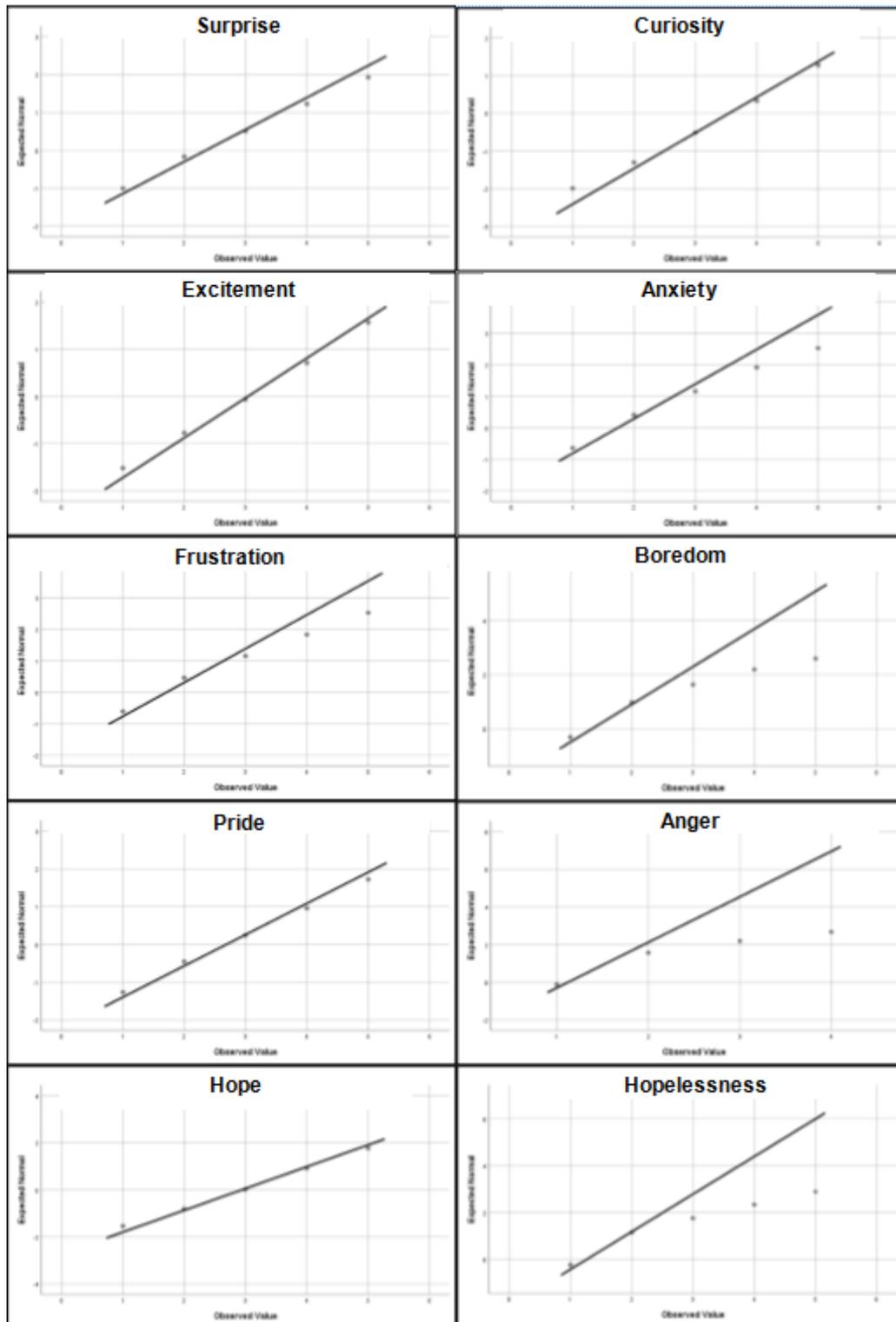
Go raibh míle maith agaibh!

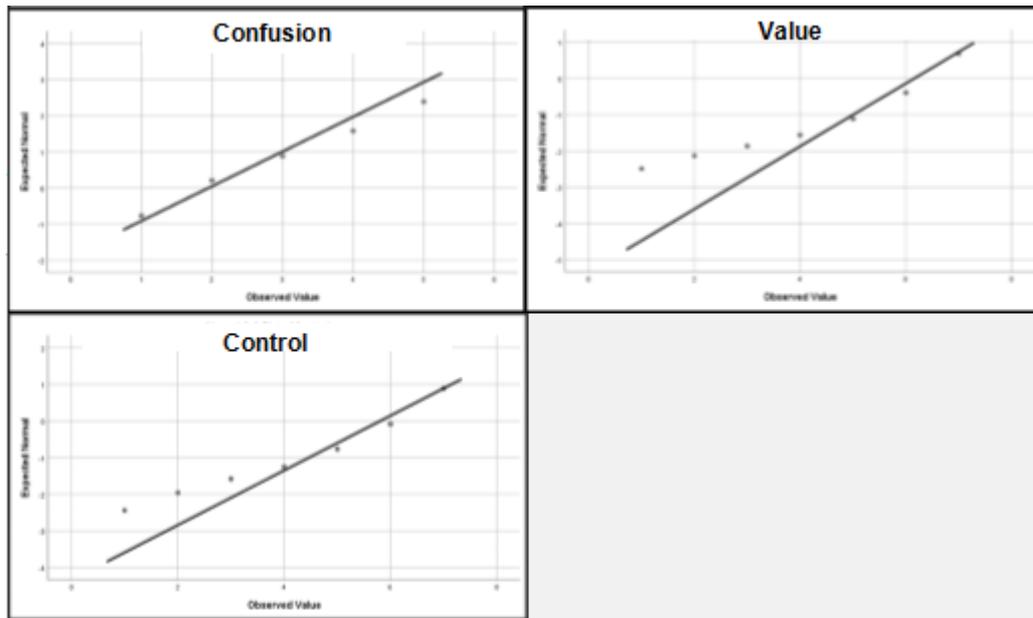
Elaine

Appendix E: MEQ Results

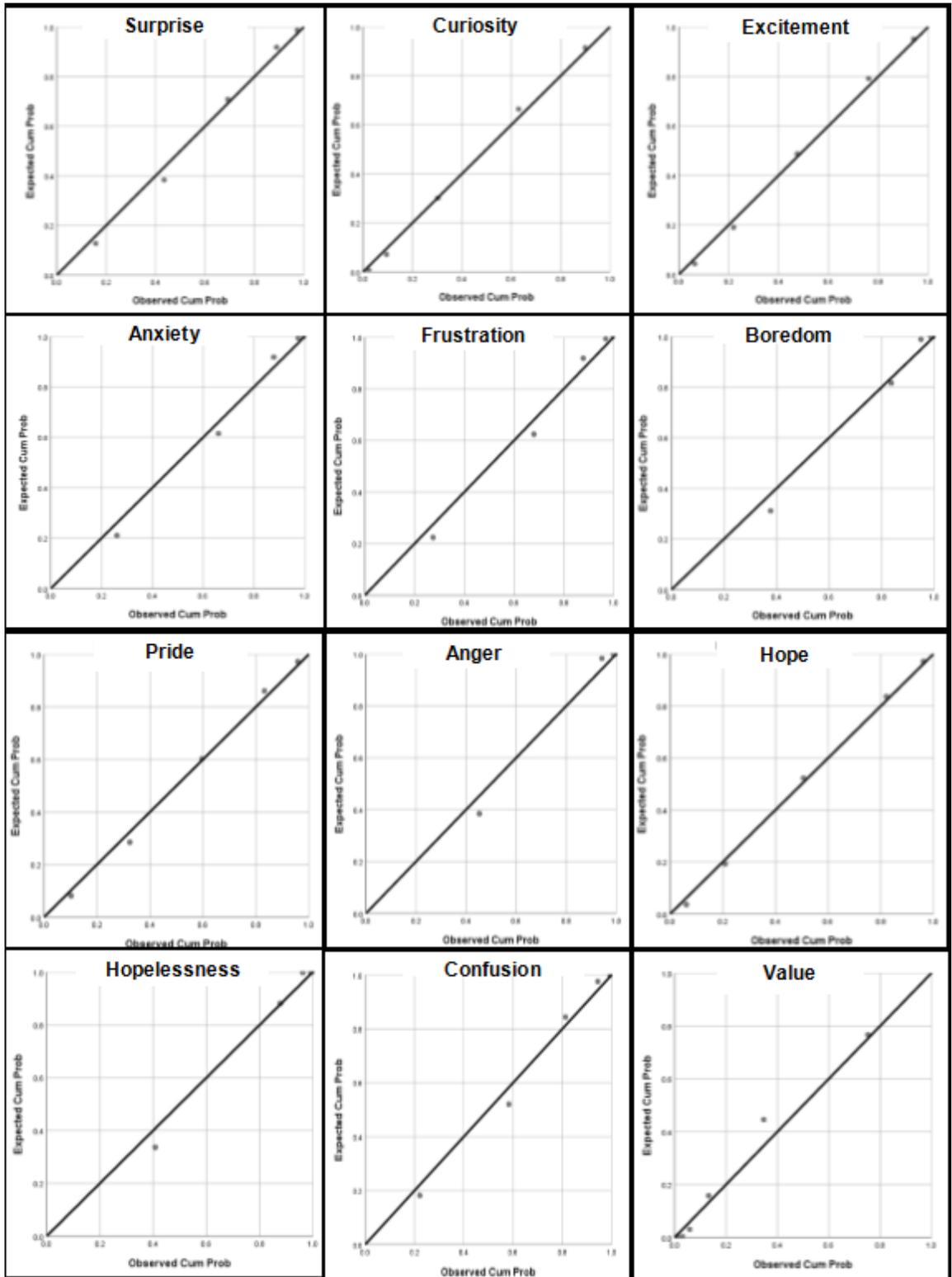
Appendix E.1 Probability Plots

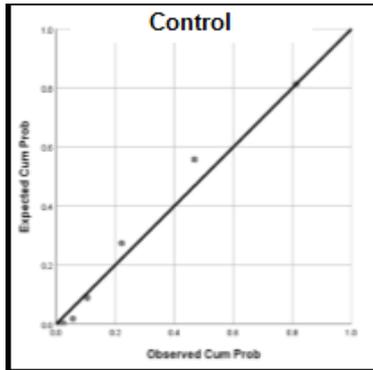
P-P plots graph the cumulative probability of a variable (actual z-scores) against the cumulative probability of normal distribution (expected z-scores). A straight line indicates the assumption of univariate normality is tenable.





In comparison, Q-Q plots graph the quantiles (values that split the data into equal proportions) of the data set instead of every single score. Again, a straight line indicates that the assumption of univariate normality is tenable.





Appendix E.2 Response Rate

Survey Number	Number of Responses
1	19
2	8
3	17
4	9
5	1
6	3
7	2
8	5
9	1
10	9
11	9
12	12

Appendix E.3 MPLUS Syntax for Confusion Model

Mplus VERSION 8
MUTHEN & MUTHEN
09/18/2019 7:57 PM

INPUT INSTRUCTIONS

TITLE: Elaine Phd data version 2
Multilevel (explore within and between level variation)

(Predictor group mean centering)

DATA:
FILE IS "quant_MS_Mplus2.csv";

VARIABLE:

NAMES ARE

Person Measure Task
Surprise Curious Excited Confused Anxious
Frustrat Bored Proud Angry Hopeful Hopeless
Value Control
Gender Age
OtherLan Levellri PrevOnl
VidDum DisDum QuizDum ArtDum
SurpAvg CurAvg ExcitAvg confAvg AnxAvg
FrustAvg BorAvg ProudAvg AngAvg HopAvg HopelAvg
ValAvg ContrAvg
StepComp Female;

USEVARIABLES ARE:

Confused Value Control
DisDum QuizDum ArtDum
ValAvg ContrAvg !FrustAvg
Female Age interact
VintDis VintQuiz VintArt CintDis CintQuiz CintArt;

MISSING ARE ALL (-99);

WITHIN = Value Control DisDum QuizDum ArtDum interact
VintDis VintQuiz VintArt CintDis CintQuiz CintArt;
BETWEEN = ValAvg ContrAvg Female Age;
CLUSTER = Person;

Define: CENTER Value Control (GROUPMEAN);
CENTER ValAvg ContrAvg (Grandmean);
interact = Value*Control;
VintDis = Value*DisDum;
VintQuiz = Value*QuizDum;
VintArt = Value*ArtDum;
CintDis = Control*DisDum;
CintQuiz = Control*QuizDum;
CintArt = Control*ArtDum;

ANALYSIS:

TYPE = TWOLEVEL; !random;

Model:

%WITHIN%
!interact
!VintDis VintQuiz VintArt CintDis CintQuiz CintArt

Confused on DisDum;
Confused on QuizDum;
Confused on ArtDum;

Confused on Value Control interact;

Confused on VintDis VintQuiz VintArt;

Confused on CintDis CintQuiz CintArt;
!value with control;

%BETWEEN%
Confused on ValAvg ContrAvg Female Age;

Output: sampstat stdy stdyx;

*** WARNING

One or more individual-level variables have no variation within a cluster for the following clusters.

Variable Cluster IDs with no within-cluster variation

CONFUSED 63 95 38 67 24 81 25 64 49 91 62 41 40
DISDUM 72 52 63 15 95 82 38 67 85 37 36 56 88 29 24 51 50 81 6 44 4 3 2 1 35 30 41
QUIZDUM 94
ARTDUM 72 52 63 95 82 38 67 79
INTERACT 72 52 63 15 95 82 38 67 85 56 79 6 27 7 20 93 41 19 71 16
VINTDIS 72 52 63 15 95 82 38 67 85 37 36 56 88 29 24 51 50 81 79 6 44 4 3 2 27 7 20
1 93 35 30 62 41 16
VINTQUIZ 72 15 67 85 56 79 6 27 7 20 93 91 41 94 16
VINTART 72 52 63 15 95 82 38 67 85 56 79 6 44 27 7 20 18 1 93 91 62 41 53 16
CINTDIS 72 52 63 15 95 82 38 67 85 37 36 56 88 29 24 51 50 81 79 6 44 4 3 2 77 1 35
30 62 41 19 13 71
CINTQUIZ 67 85 6 41 19 94 71
CINTART 72 52 63 95 82 38 67 85 79 6 77 62 41 19 71

*** WARNING

Data set contains cases with missing on x-variables.
These cases were not included in the analysis.
Number of cases with missing on x-variables: 6

*** WARNING

Data set contains cases with missing on all variables except x-variables. These cases were not included in the analysis.
Number of cases with missing on all variables except x-variables: 9
3 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS

Elaine Phd data version 2
Multilevel (explore within and between level variation)

(Predictor group mean centering)

SUMMARY OF ANALYSIS

Number of groups 1
Number of observations 525

Number of dependent variables	1
Number of independent variables	16
Number of continuous latent variables	0

Observed dependent variables

Continuous
CONFUSED

Observed independent variables

VALUE	CONTROL	DISDUM	QUIZDUM	ARTDUM	VALAVG
CONTRAVG	FEMALE	AGE	INTERACT	VINTDIS	VINTQUIZ
VINTART	CINTDIS	CINTQUIZ	CINTART		

Variables with special functions

Cluster variable PERSON

Within variables

VALUE	CONTROL	DISDUM	QUIZDUM	ARTDUM	INTERACT
VINTDIS	VINTQUIZ	VINTART	CINTDIS	CINTQUIZ	CINTART

Between variables

VALAVG	CONTRAVG	FEMALE	AGE
--------	----------	--------	-----

Centering (GRANDMEAN)

VALAVG	CONTRAVG
--------	----------

Centering (GROUPMEAN)

VALUE	CONTROL
-------	---------

Estimator	MLR
Information matrix	OBSERVED
Maximum number of iterations	100
Convergence criterion	0.100D-05
Maximum number of EM iterations	500
Convergence criteria for the EM algorithm	
Loglikelihood change	0.100D-02
Relative loglikelihood change	0.100D-05
Derivative	0.100D-03
Minimum variance	0.100D-03
Maximum number of steepest descent iterations	20
Maximum number of iterations for H1	2000
Convergence criterion for H1	0.100D-03
Optimization algorithm	EMA

Input data file(s)

quant_MS_Mplus2.csv

Input data format FREE

SUMMARY OF DATA

Number of missing data patterns 1
 Number of clusters 93

Average cluster size 5.645

Estimated Intraclass Correlations for the Y Variables

Variable	Intraclass Correlation
CONFUSED	0.422

COVARIANCE COVERAGE OF DATA

Minimum covariance coverage value 0.100

PROPORTION OF DATA PRESENT

	Covariance Coverage				
	CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
CONFUSED	1.000				
VALUE	1.000	1.000			
CONTROL	1.000	1.000	1.000		
DISDUM	1.000	1.000	1.000	1.000	
QUIZDUM	1.000	1.000	1.000	1.000	1.000
ARTDUM	1.000	1.000	1.000	1.000	1.000
INTERACT	1.000	1.000	1.000	1.000	1.000
VINTDIS	1.000	1.000	1.000	1.000	1.000
VINTQUIZ	1.000	1.000	1.000	1.000	1.000
VINTART	1.000	1.000	1.000	1.000	1.000
CINTDIS	1.000	1.000	1.000	1.000	1.000
CINTQUIZ	1.000	1.000	1.000	1.000	1.000
CINTART	1.000	1.000	1.000	1.000	1.000
VALAVG	1.000	1.000	1.000	1.000	1.000
CONTRAVG	1.000	1.000	1.000	1.000	1.000
FEMALE	1.000	1.000	1.000	1.000	1.000
AGE	1.000	1.000	1.000	1.000	1.000

	Covariance Coverage				
	ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
ARTDUM	1.000				
INTERACT	1.000	1.000			
VINTDIS	1.000	1.000	1.000		
VINTQUIZ	1.000	1.000	1.000	1.000	
VINTART	1.000	1.000	1.000	1.000	1.000

CINTDIS	1.000	1.000	1.000	1.000	1.000
CINTQUIZ	1.000	1.000	1.000	1.000	1.000
CINTART	1.000	1.000	1.000	1.000	1.000
VALAVG	1.000	1.000	1.000	1.000	1.000
CONTRAVG	1.000	1.000	1.000	1.000	1.000
FEMALE	1.000	1.000	1.000	1.000	1.000
AGE	1.000	1.000	1.000	1.000	1.000

Covariance Coverage

	CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
CINTDIS	1.000				
CINTQUIZ	1.000	1.000			
CINTART	1.000	1.000	1.000		
VALAVG	1.000	1.000	1.000	1.000	
CONTRAVG	1.000	1.000	1.000	1.000	1.000
FEMALE	1.000	1.000	1.000	1.000	1.000
AGE	1.000	1.000	1.000	1.000	1.000

Covariance Coverage

	FEMALE	AGE
FEMALE	1.000	
AGE	1.000	1.000

SAMPLE STATISTICS

NOTE: The sample statistics for within and between refer to the maximum-likelihood estimated within and between covariance matrices, respectively.

ESTIMATED SAMPLE STATISTICS FOR WITHIN

Means

CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
0.000	0.000	0.000	0.168	0.297

Means

ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
0.265	0.435	-0.017	-0.013	0.030

Means

CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
---------	----------	---------	--------	----------

-0.037 0.060 -0.018 0.000 0.000

Means

FEMALE	AGE
0.000	0.000

Covariances

	CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
CONFUSED	0.678				
VALUE	-0.029	0.758			
CONTROL	-0.312	0.435	1.137		
DISDUM	-0.034	-0.017	-0.037	0.140	
QUIZDUM	-0.042	-0.013	0.060	-0.050	0.209
ARTDUM	0.079	0.030	-0.018	-0.044	-0.079
INTERACT	-0.218	-0.877	-0.905	0.074	-0.017
VINTDIS	0.022	0.192	0.147	-0.014	0.005
VINTQUIZ	-0.009	0.245	0.112	0.002	-0.009
VINTART	-0.015	0.090	0.044	-0.005	-0.009
CINTDIS	-0.029	0.147	0.270	-0.031	0.011
CINTQUIZ	-0.106	0.112	0.346	-0.010	0.042
CINTART	-0.122	0.044	0.234	0.003	0.005
VALAVG	0.000	0.000	0.000	0.000	0.000
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Covariances

	ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
ARTDUM	0.195				
INTERACT	-0.071	4.799			
VINTDIS	0.005	-0.492	0.191		
VINTQUIZ	0.004	-0.104	0.000	0.244	
VINTART	0.022	-0.015	0.001	0.000	0.089
CINTDIS	0.010	-0.412	0.146	0.000	0.001
CINTQUIZ	-0.016	-0.274	0.001	0.113	-0.002
CINTART	-0.013	0.059	0.000	0.000	0.045
VALAVG	0.000	0.000	0.000	0.000	0.000
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Covariances

	CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
CINTDIS	0.269				
CINTQUIZ	0.002	0.343			

CINTART	-0.001	0.001	0.233		
VALAVG	0.000	0.000	0.000	0.000	
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Covariances

	FEMALE	AGE
FEMALE	0.000	
AGE	0.000	0.000

Correlations

	CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
CONFUSED	1.000				
VALUE	-0.040	1.000			
CONTROL	-0.355	0.468	1.000		
DISDUM	-0.112	-0.053	-0.092	1.000	
QUIZDUM	-0.112	-0.034	0.124	-0.292	1.000
ARTDUM	0.218	0.079	-0.037	-0.269	-0.390
INTERACT	-0.121	-0.460	-0.388	0.091	-0.017
VINTDIS	0.060	0.503	0.315	-0.089	0.026
VINTQUIZ	-0.022	0.568	0.212	0.012	-0.042
VINTART	-0.061	0.347	0.138	-0.046	-0.066
CINTDIS	-0.068	0.325	0.489	-0.158	0.046
CINTQUIZ	-0.219	0.220	0.555	-0.046	0.159
CINTART	-0.308	0.105	0.454	0.016	0.024
VALAVG	0.000	0.000	0.000	0.000	0.000
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Correlations

	ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
ARTDUM	1.000				
INTERACT	-0.073	1.000			
VINTDIS	0.024	-0.513	1.000		
VINTQUIZ	0.016	-0.096	-0.001	1.000	
VINTART	0.169	-0.023	0.004	0.003	1.000
CINTDIS	0.043	-0.363	0.645	-0.002	0.007
CINTQUIZ	-0.062	-0.214	0.004	0.389	-0.010
CINTART	-0.061	0.055	-0.001	-0.001	0.309
VALAVG	0.000	0.000	0.000	0.000	0.000
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Correlations

	CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
CINTDIS	1.000				
CINTQUIZ	0.007	1.000			
CINTART	-0.003	0.004	1.000		
VALAVG	0.000	0.000	0.000	1.000	
CONTRAVG	0.000	0.000	0.000	0.000	1.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Correlations

	FEMALE	AGE
FEMALE	1.000	
AGE	0.000	1.000

ESTIMATED SAMPLE STATISTICS FOR BETWEEN

Means

	CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
	1.942	0.000	0.000	0.000	0.000

Means

	ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
	0.000	0.000	0.000	0.000	0.000

Means

	CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
	0.000	0.000	0.000	0.000	0.000

Means

	FEMALE	AGE
	0.731	4.237

Covariances

	CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
CONFUSED	0.494				
VALUE	0.000	0.000			
CONTROL	0.000	0.000	0.000		
DISDUM	0.000	0.000	0.000	0.000	
QUIZDUM	0.000	0.000	0.000	0.000	0.000

ARTDUM	0.000	0.000	0.000	0.000	0.000
INTERACT	0.000	0.000	0.000	0.000	0.000
VINTDIS	0.000	0.000	0.000	0.000	0.000
VINTQUIZ	0.000	0.000	0.000	0.000	0.000
VINTART	0.000	0.000	0.000	0.000	0.000
CINTDIS	0.000	0.000	0.000	0.000	0.000
CINTQUIZ	0.000	0.000	0.000	0.000	0.000
CINTART	0.000	0.000	0.000	0.000	0.000
VALAVG	-0.299	0.000	0.000	0.000	0.000
CONTRAVG	-0.438	0.000	0.000	0.000	0.000
FEMALE	0.027	0.000	0.000	0.000	0.000
AGE	0.040	0.000	0.000	0.000	0.000

Covariances

	ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
ARTDUM	0.000				
INTERACT	0.000	0.000			
VINTDIS	0.000	0.000	0.000		
VINTQUIZ	0.000	0.000	0.000	0.000	
VINTART	0.000	0.000	0.000	0.000	0.000
CINTDIS	0.000	0.000	0.000	0.000	0.000
CINTQUIZ	0.000	0.000	0.000	0.000	0.000
CINTART	0.000	0.000	0.000	0.000	0.000
VALAVG	0.000	0.000	0.000	0.000	0.000
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Covariances

	CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
CINTDIS	0.000				
CINTQUIZ	0.000	0.000			
CINTART	0.000	0.000	0.000		
VALAVG	0.000	0.000	0.000	0.766	
CONTRAVG	0.000	0.000	0.000	0.368	0.787
FEMALE	0.000	0.000	0.000	-0.007	-0.090
AGE	0.000	0.000	0.000	0.313	-0.123

Covariances

	FEMALE	AGE
FEMALE	0.197	
AGE	-0.076	2.181

Correlations

CONFUSED	VALUE	CONTROL	DISDUM	QUIZDUM
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CONFUSED	1.000				
VALUE	0.000	0.000			
CONTROL	0.000	0.000	0.000		
DISDUM	0.000	0.000	0.000	0.000	
QUIZDUM	0.000	0.000	0.000	0.000	0.000
ARTDUM	0.000	0.000	0.000	0.000	0.000
INTERACT	0.000	0.000	0.000	0.000	0.000
VINTDIS	0.000	0.000	0.000	0.000	0.000
VINTQUIZ	0.000	0.000	0.000	0.000	0.000
VINTART	0.000	0.000	0.000	0.000	0.000
CINTDIS	0.000	0.000	0.000	0.000	0.000
CINTQUIZ	0.000	0.000	0.000	0.000	0.000
CINTART	0.000	0.000	0.000	0.000	0.000
VALAVG	-0.487	0.000	0.000	0.000	0.000
CONTRAVG	-0.702	0.000	0.000	0.000	0.000
FEMALE	0.088	0.000	0.000	0.000	0.000
AGE	0.039	0.000	0.000	0.000	0.000

Correlations

	ARTDUM	INTERACT	VINTDIS	VINTQUIZ	VINTART
ARTDUM	0.000				
INTERACT	0.000	0.000			
VINTDIS	0.000	0.000	0.000		
VINTQUIZ	0.000	0.000	0.000	0.000	
VINTART	0.000	0.000	0.000	0.000	0.000
CINTDIS	0.000	0.000	0.000	0.000	0.000
CINTQUIZ	0.000	0.000	0.000	0.000	0.000
CINTART	0.000	0.000	0.000	0.000	0.000
VALAVG	0.000	0.000	0.000	0.000	0.000
CONTRAVG	0.000	0.000	0.000	0.000	0.000
FEMALE	0.000	0.000	0.000	0.000	0.000
AGE	0.000	0.000	0.000	0.000	0.000

Correlations

	CINTDIS	CINTQUIZ	CINTART	VALAVG	CONTRAVG
CINTDIS	0.000				
CINTQUIZ	0.000	0.000			
CINTART	0.000	0.000	0.000		
VALAVG	0.000	0.000	0.000	1.000	
CONTRAVG	0.000	0.000	0.000	0.475	1.000
FEMALE	0.000	0.000	0.000	-0.018	-0.229
AGE	0.000	0.000	0.000	0.242	-0.094

Correlations

	FEMALE	AGE
FEMALE	1.000	
AGE	-0.116	1.000

MAXIMUM LOG-LIKELIHOOD VALUE FOR THE UNRESTRICTED (H1) MODEL IS -
616.827

UNIVARIATE SAMPLE STATISTICS

UNIVARIATE HIGHER-ORDER MOMENT DESCRIPTIVE STATISTICS

Variable/ Sample Size	Mean/ Variance	Skewness/ Kurtosis	Minimum/ Maximum	% with Min/Max	20%/60%	Percentiles 40%/80%	Median
CONFUSED	1.947	0.867	1.000	44.19%	1.000	1.000	2.000
525.000	1.083	-0.138	5.000	1.52%	2.000	3.000	
VALUE	0.000	-2.125	-5.143	0.19%	-0.500	0.000	0.083
525.000	0.758	9.260	2.333	0.19%	0.200	0.500	
CONTROL	0.000	-1.110	-5.143	0.19%	-0.667	0.000	0.091
525.000	1.137	2.703	2.667	0.19%	0.333	0.750	
DISDUM	0.168	1.780	0.000	83.24%	0.000	0.000	0.000
525.000	0.140	1.167	1.000	16.76%	0.000	0.000	
QUIZDUM	0.297	0.888	0.000	70.29%	0.000	0.000	0.000
525.000	0.209	-1.212	1.000	29.71%	0.000	1.000	
ARTDUM	0.265	1.066	0.000	73.52%	0.000	0.000	0.000
525.000	0.195	-0.863	1.000	26.48%	0.000	1.000	
INTERACT	0.435	7.831	-7.222	0.19%	-0.042	0.000	0.021
525.000	4.799	77.667	26.449	0.19%	0.150	0.600	
VINTDIS	-0.017	-6.428	-5.143	0.19%	0.000	0.000	0.000
525.000	0.191	69.764	1.833	0.19%	0.000	0.000	
VINTQUIZ	-0.013	-3.583	-4.909	0.19%	0.000	0.000	0.000
525.000	0.244	30.520	1.833	0.19%	0.000	0.000	
VINTART	0.030	0.835	-1.455	0.38%	0.000	0.000	0.000
525.000	0.089	11.682	1.833	0.19%	0.000	0.000	
CINTDIS	-0.037	-3.775	-5.143	0.19%	0.000	0.000	0.000
525.000	0.269	30.441	2.250	0.19%	0.000	0.000	
CINTQUIZ	0.060	-1.338	-4.455	0.19%	0.000	0.000	0.000
525.000	0.343	14.574	2.667	0.19%	0.000	0.000	
CINTART	-0.018	-1.784	-3.750	0.19%	0.000	0.000	0.000
525.000	0.233	16.850	2.000	0.57%	0.000	0.000	
VALAVG	0.000	-1.760	-4.027	1.08%	-0.527	-0.027	-0.027
93.000	0.766	4.734	0.973	13.98%	0.306	0.723	
CONTRAVG	0.000	-0.747	-2.483	1.08%	-0.816	-0.066	0.184
93.000	0.787	0.038	1.184	12.90%	0.184	0.684	
FEMALE	0.731	-1.043	0.000	26.88%	0.000	1.000	1.000
93.000	0.197	-0.912	1.000	73.12%	1.000	1.000	
AGE	4.237	0.170	2.000	15.05%	3.000	4.000	4.000
93.000	2.181	-0.704	8.000	1.08%	5.000	5.000	

THE MODEL ESTIMATION TERMINATED NORMALLY

MODEL FIT INFORMATION

Number of Free Parameters 19

Loglikelihood

H0 Value	-616.827
H0 Scaling Correction Factor for MLR	1.0879
H1 Value	-616.827
H1 Scaling Correction Factor for MLR	1.0879

Information Criteria

Akaike (AIC)	1271.653
Bayesian (BIC)	1352.658
Sample-Size Adjusted BIC ($n^* = (n + 2) / 24$)	1292.347

Chi-Square Test of Model Fit

Value	0.000*
Degrees of Freedom	0
P-Value	1.0000
Scaling Correction Factor for MLR	1.0000

* The chi-square value for MLM, MLMV, MLR, ULSMV, WLSM and WLSMV cannot be used for chi-square difference testing in the regular way. MLM, MLR and WLSM chi-square difference testing is described on the Mplus website. MLMV, WLSMV, and ULSMV difference testing is done using the DIFFTEST option.

RMSEA (Root Mean Square Error Of Approximation)

Estimate	0.000
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CFI/TLI

CFI	1.000
TLI	1.000

Chi-Square Test of Model Fit for the Baseline Model

Value	188.204
Degrees of Freedom	16
P-Value	0.0000

SRMR (Standardized Root Mean Square Residual)

Value for Within	0.000
Value for Between	0.000

MODEL RESULTS

	Two-Tailed			
	Estimate	S.E.	Est./S.E.	P-Value
Within Level				
CONFUSED ON				
DISDUM	-0.218	0.079	-2.747	0.006
QUIZDUM	-0.051	0.075	-0.684	0.494
ARTDUM	0.258	0.073	3.507	0.000
VALUE	-0.078	0.073	-1.078	0.281
CONTROL	-0.240	0.073	-3.285	0.001
INTERACT	-0.087	0.021	-4.066	0.000
VINTDIS	0.211	0.112	1.875	0.061
VINTQUIZ	0.182	0.111	1.645	0.100
VINTART	0.048	0.156	0.307	0.759
CINTDIS	-0.104	0.104	-1.001	0.317
CINTQUIZ	-0.157	0.095	-1.652	0.099
CINTART	-0.238	0.094	-2.517	0.012
Residual Variances				
CONFUSED	0.501	0.044	11.457	0.000
Between Level				
CONFUSED ON				
VALAVG	-0.161	0.098	-1.641	0.101
CONTRAVG	-0.489	0.097	-5.044	0.000
FEMALE	-0.087	0.192	-0.451	0.652
AGE	0.011	0.047	0.233	0.815
Intercepts				
CONFUSED	1.986	0.330	6.018	0.000
Residual Variances				
CONFUSED	0.234	0.056	4.169	0.000

STANDARDIZED MODEL RESULTS

STDYX Standardization

	Two-Tailed			
	Estimate	S.E.	Est./S.E.	P-Value
Within Level				
CONFUSED ON				
DISDUM	-0.099	0.036	-2.770	0.006
QUIZDUM	-0.028	0.042	-0.682	0.495
ARTDUM	0.138	0.037	3.693	0.000

VALUE	-0.083	0.077	-1.075	0.282
CONTROL	-0.310	0.092	-3.375	0.001
INTERACT	-0.232	0.055	-4.232	0.000
VINTDIS	0.112	0.060	1.870	0.061
VINTQUIZ	0.109	0.067	1.633	0.102
VINTART	0.017	0.057	0.307	0.759
CINTDIS	-0.066	0.066	-0.996	0.319
CINTQUIZ	-0.112	0.067	-1.675	0.094
CINTART	-0.140	0.055	-2.516	0.012

Residual Variances				
CONFUSED	0.739	0.042	17.711	0.000

Between Level

CONFUSED ON				
VALAVG	-0.200	0.121	-1.652	0.099
CONTRAVG	-0.617	0.113	-5.472	0.000
FEMALE	-0.055	0.121	-0.452	0.651
AGE	0.023	0.098	0.233	0.816

Intercepts				
CONFUSED	2.827	0.480	5.889	0.000

Residual Variances				
CONFUSED	0.473	0.111	4.259	0.000

STDY Standardization

	Two-Tailed			
	Estimate	S.E.	Est./S.E.	P-Value
Within Level				
CONFUSED ON				
DISDUM	-0.264	0.095	-2.780	0.005
QUIZDUM	-0.062	0.091	-0.682	0.495
ARTDUM	0.313	0.084	3.715	0.000
VALUE	-0.095	0.088	-1.076	0.282
CONTROL	-0.291	0.086	-3.389	0.001
INTERACT	-0.106	0.025	-4.268	0.000
VINTDIS	0.256	0.137	1.873	0.061
VINTQUIZ	0.221	0.135	1.635	0.102
VINTART	0.058	0.190	0.307	0.759
CINTDIS	-0.127	0.127	-0.997	0.319
CINTQUIZ	-0.191	0.114	-1.677	0.094
CINTART	-0.289	0.115	-2.522	0.012
Residual Variances				
CONFUSED	0.739	0.042	17.711	0.000
Between Level				

CONFUSED ON				
VALAVG	-0.229	0.138	-1.659	0.097
CONTRAVG	-0.696	0.127	-5.478	0.000
FEMALE	-0.123	0.272	-0.452	0.651
AGE	0.015	0.066	0.233	0.816

Intercepts				
CONFUSED	2.827	0.480	5.889	0.000

Residual Variances				
CONFUSED	0.473	0.111	4.259	0.000

R-SQUARE

Within Level

Observed Variable	Estimate	S.E.	Two-Tailed Est./S.E.	P-Value
CONFUSED	0.261	0.042	6.252	0.000

Between Level

Observed Variable	Estimate	S.E.	Two-Tailed Est./S.E.	P-Value
CONFUSED	0.527	0.111	4.743	0.000

QUALITY OF NUMERICAL RESULTS

Condition Number for the Information Matrix 0.194E-02
(ratio of smallest to largest eigenvalue)

DIAGRAM INFORMATION

Mplus diagrams are currently not available for multilevel analysis.
No diagram output was produced.

Beginning Time: 19:57:26
Ending Time: 19:57:27
Elapsed Time: 00:00:01

MUTHEN & MUTHEN
3463 Stoner Ave.
Los Angeles, CA 90066

Tel: (310) 391-9971

Fax: (310) 391-8971
Web: www.StatModel.com
Support: Support@StatModel.com

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Appendix E.4 Summary of Model Fit Statistics

	ICC	DF	Log-Lik.	R ²		X ²	P-value	RMSEA	CFI	SRMR	
				Within	Between					Within	Between
Frustration	0.432	19	-562.663	0.206**	0.595**	0.000	1.000	0.000	1.000	0.000	0.000
Confusion	0.422	19	-616.827	0.261**	0.527**	0.000	1.000	0.000	1.000	0.000	0.000
Anxiety	0.381	19	-596.172	0.133**	0.535**	0.000	1.000	0.000	1.000	0.000	0.000
Anger	0.298	19	-220.793	0.054	0.537**	0.000	1.000	0.000	1.000	0.000	0.000
Boredom	0.440	19	-420.404	0.249**	0.495**	0.000	1.000	0.000	1.000	0.000	0.000
Pride	0.447	19	-695.733	0.234**	0.287**	0.000	1.000	0.000	1.000	0.000	0.000
Curiosity	0.460	19	-653.811	0.129**	0.108	0.000	1.000	0.000	1.000	0.000	0.000
Surprise	0.556	19	-708.916	0.054**	0.145*	0.000	0.000	0.000	1.000	0.000	0.000
Excitement	0.557	19	-682.625	0.118**	0.284**	0.000	1.000	0.000	1.000	0.000	0.000
Hope	0.528	19	-654.614	0.069**	0.212**	0.000	1.000	0.000	1.000	0.000	0.000
Hopelessness	0.359	19	-390.555	0.115**	0.479**	0.000	1.000	0.000	1.000	0.000	0.000

