Co-funded by the European Union

e-MeBe

e-Wellbeing and mental health in older adults

WP 3-1

Curriculum Framework

e-MeBe project summary: The World Health Organization (WHO) emphasizes that "there can be no health or sustainable development without mental health[1]." Achieving the United Nations Sustainable Development Goal (SDG) 3, which aims to "promote well-being for all at all ages[2]," requires addressing mental health challenges, particularly among older adults. To address this need, an online Master's programme in e-mental health and wellbeing is proposed, focusing on equipping professionals with the competencies to leverage digital and cognitive technologies in enhancing mental health for older adults.
This programme prioritizes understanding the foundations of mental health, assessing and intervening effectively, and providing support through innovative technologies and community-building strategies. Key drivers for developing this initiative include the growing global emphasis on mental health as integral to sustainable development, the rising demand for specialized interdisciplinary knowledge in mental health for aging populations, and the potential of digital tools to bridge existing gaps in care (public, private).

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The interdisciplinary curriculum is designed to support inclusive and diverse entrants from fields such as clinical practice, psychology, mental health nursing, disruptive technology, and industry, integrating core and advanced skills in digital mental health. Emphasis is placed on trust, transparency, safety, and ethics in mental health technology applications, ensuring professionals are well-equipped to address authentic and real-world challenges. The programme also focuses on interdisciplinary collaboration, reflecting the complexity of addressing mental health needs in older adults.

In a joint cooperation through an Erasmus+ project between universities from Austria, Finland, Germany and Ireland, we are developing a master's programme that addresses these SDGs challenges to support workplace resilience, and sustainability for an unscripted future.

[1] https://iris.who.int/bitstream/handle/10665/310981/WHO-MSD-19.1-eng.pdf?sequence=1&isAllowed=y
[2] https://sdgs.un.org/goals/goal3

Contributors:

- Lorraine Boran (DCU)
- Aiswarya Radhakrishnan (DCU)
- Brona Laverty (DCU)
- Claire Gormley (DCU)
- James Brunton (DCU)
- Darragh McCashin (DCU)
- Anna Schmaus-Klughammer (DIT)
- Regina Escher (DIT)
- Marion Gimpfl (DIT)
- Satu Kajander-Unkuri (DIAK)
- Arja Suikkala (DIAK)
- Kateřina Sidiropulu-Janků (CUAS)
- Daniela Ströckl (CUAS)

Participating Institutions

- Dublin City University (Ireland)
- FH Kärnten (Austria)
- Diaconia University of Applied Science (Finland)
- Deggendorf Institute of Technology (Germany)

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Executive summary

WP 3.1 Curriculum Framework based on Graduate Competence outlines a comprehensive approach to developing a curriculum for the e-Mental Health and Wellbeing in Older Adults (eMEBE) programme. This initiative aims to create a Joint Master's degree across universities in Austria, Finland, Germany, and Ireland, focusing on the integration of mental health and wellbeing principles into online education.

Curriculum Framework

The curriculum framework is structured around several key phases: Needs Analysis, Course Mapping and Planning, Design and Development, Implementation, and Evaluation. Each phase is designed to ensure that the curriculum is relevant, engaging, and accessible to a diverse student population. The framework emphasizes the importance of aligning learning outcomes with educational standards and incorporating principles of universal design to enhance accessibility.

Needs Analysis

The needs analysis phase identifies the specific requirements of the target student population, which includes working professionals and individuals from various academic backgrounds. This phase is crucial for understanding the context in which the curriculum will be delivered and ensuring that it meets the needs of all learners.

Course Mapping and Planning

In the course mapping phase, clear goals and objectives are established to guide the curriculum's structure. This includes determining course duration, learning outcomes, and the overall educational strategy. The emphasis is placed on flexibility to accommodate the diverse needs of online students.

Design and Development

The design and development phase focuses on creating engaging and interactive learning experiences. This includes the integration of various educational strategies, such as Problem-Based Learning (PBL)/Challenge-Based Learning (CBL) and Student-Centred Learning Design Principles, which promote critical thinking and practical application. Assessment strategies are also developed during this phase to ensure alignment with learning outcomes.

Implementation and Evaluation

The implementation phase involves the actual delivery of the curriculum, while the evaluation phase assesses its effectiveness. Continuous feedback mechanisms are established to refine the curriculum based on student experiences and outcomes. The iterative nature of this process ensures that the curriculum remains relevant and responsive to the evolving needs of learners.

Integrative Review and Delphi Study

The integrative review conducted as part of this project highlights the importance of evidence-based approaches in curriculum design. It identifies key curriculum frameworks and pedagogical principles that enhance the effectiveness of online education. The Delphi study further supports this by gathering expert opinions on essential design principles and factors influencing online curriculum development. Key themes emerging from the Delphi study include the need for flexibility, real-world applications, and structured support for diverse learner profiles.

Key Highlights

The findings from the integrative review and Delphi study underscore the necessity of a systematic, learner-centred approach to curriculum development. The emphasis on flexibility, inclusivity, and practical application ensures that the eMEBE programme is well-equipped to meet the demands of future-proof education. Moving forward, collaboration with stakeholders in education and industry will be crucial to refine and implement the curriculum effectively. The insights gained from this integrative review and Delphi methodology with experts in education, and digital therapeutics, will not only inform the development of the eMEBE programme but also serve as a valuable resource (decision guide) for other institutions engaged in online curriculum development.

List of abbreviations

AR	Artificial Reality
CA	Constructive Alignment
CBE	Competency-Based Education
CBL	Challenge Based Learning
CD	Curriculum Design
COI	Community of Inquiry
LMS	Learning Management System
LO	Learning Outcome
PBL	Problem Based Learning
SL	Sign Language
UCL	University College London
VR	Virtual Reality
SDG	Sustainable Development Goal
TPAK	Technology, pedagogy, and content knowledge
WHO	World Health Organization

1 Introduction

Introduction

Distance education, remote teaching, and online instruction have long been established pedagogical approaches, but their significance has surged in recent years, particularly considering the COVID-19 pandemic. As (Williamson, 2020) note, these methods have taken on renewed salience, prompting a re-evaluation of their role in higher education. The rapid advancements in technology, coupled with the necessity for educational institutions to adapt to unprecedented circumstances, have catalysed a shift towards more flexible and accessible learning environments. This review explores the evolution of online education, the challenges faced by institutions and students, and the pedagogical frameworks that can enhance the effectiveness of online learning, particularly for postgraduate students.

The COVID-19 pandemic has accelerated the adoption of online education, revealing both its potential and its pitfalls. As educational institutions transitioned to remote learning, they faced the dual challenge of maintaining academic rigor while accommodating the diverse needs of students (Commission, 2014); (McCormack, 2015)). The demand for flexible learning options has grown, particularly among professionals pursuing postgraduate degrees, who often juggle career and personal commitments alongside their studies ((Farrell, 2020); (Lai-Kwon, 2023).

Online education offers the flexibility needed to navigate these challenges, allowing students to access learning opportunities that fit their schedules and lifestyles (Garrison, 2004); (Moore, 2011)). However, despite the advantages, many students encounter significant barriers, including poor course design, limited peer interaction, and inadequate feedback mechanisms, which can hinder their learning experiences and lead to lower completion rates ((Alqurashi, 2018); (Stoehr, 2021); (Woodley, 2014)).

Research indicates that a mismatch between student expectations and the actual online learning experience can negatively impact engagement and satisfaction (Brunton, 2018)). Students often report feelings of isolation and disengagement, which can be exacerbated by poorly designed online courses that lack interactive elements and clear assessment criteria (Theelen, 2022); (Tareen, 2020)).

Furthermore, the digital divide remains a critical issue, as not all students have equal access to the necessary technology and reliable internet connections, further complicating their online learning experiences (Moyo, 2023). As institutions increasingly adopt online learning, they must develop comprehensive strategies that not only provide flexibility but

also address these challenges to foster positive academic outcomes (European Association of Distance Teaching Universities, 2024[3]; (Ní Shé, 2019)).

Effective curriculum design is essential for enhancing student engagement and success in online learning environments. Research supports the notion that a well-structured curriculum can significantly improve students' educational experiences (Kara, 2021); (Ní Shé C. F., 2021). Institutions must prioritize the integration of pedagogical principles that promote learner autonomy, identity and community building, and supportive teaching environments (Farrell, 2020)). For instance, implementing pre-entry and on-entry orientation activities can help online students set realistic expectations about their learning experiences (Brunton, 2018). Additionally, the use of learning analytics can provide valuable insights into student engagement and performance, allowing educators to tailor their approaches to meet individual needs ((Brown, 2018); (Sheridan, 2023)).

1.1 Research Objectives

This integrative review aims to explore current curriculum frameworks and pedagogical principles in postgraduate online education as an evidenced-based approach to developing a narrative synthesis of current frameworks for MA/MSc curriculum design; key principles underpinning design of an online programme, and any associated accreditation practice. By examining the literature, the review will highlight effective tools and strategies that enhance the delivery of the eMEBE programme.

The objectives of this review include:

(1) Identifying key curriculum frameworks employed in postgraduate online education across diverse disciplines (given the inter/transdisciplinary nature of the eMEBE programme).
(2) Examining major principles of curriculum frameworks that contribute to the effectiveness of postgraduate online education.
(3) Identifying specific tools and learning approaches associated with the implemented frameworks and principles in postgraduate online education.

As higher education institutions navigate the post-pandemic landscape, the need for effective online learning strategies has never been more critical. By focusing on sound pedagogical practices and innovative curriculum design, institutions can enhance student engagement and success in online learning environments. This review seeks to contribute valuable insights that will inform the ongoing development of postgraduate online courses, ensuring they meet the evolving needs of students while maintaining high academic

[3] European Association of Distance Teaching Universities. (2024). The future of online education: Trends and challenges. Retrieved from EADTU

standards. The aim is to publish this review (separate manuscript to reported findings here) in a high-impact journal to increase project impact, and also, more importantly, to inform the curriculum design of the eMEBE programme (WP3.2 Curriculum Design, Dec 2024 report).

1.2 Methods

1.2.1 Inclusion criteria

This study follows an integrative review methodology, guided by the framework outlined by (Whittemore, 2005). Various frameworks, including SPICE, PICO, and SPIDER, were considered during the search design, with the PICO (Population, Phenomena of Interest, and Context) framework adapted to align with the qualitative nature of the project. The outlined inclusion criteria were developed according to the PICO framework for framing and reporting review criteria, and the protocol for this review was shared, commented upon by the consortium, and amended for final search during Sept to Dec 2023. Empirical, descriptive and conceptual studies were included as part of the search net for the integrative review if they 1) discussed the development of curriculum frameworks of postgraduate education courses that were delivered online and were published in English. All jurisdictions were considered, including the EU. Studies were excluded if they did not specifically address curriculum frameworks, did not relate to postgraduate education courses (Continuous professional development or other such courses, but not specifically postgraduate), were not delivered fully online, and were published in any language other than English. Detailed inclusion and exclusion criteria are outlined in Table 1.

Table 1 PICoS Table of Study Inclusion and Exclusion Criteria

PICO	Inclusion criteria	Exclusion criteria
Population/participants	Studies focusing on any disciplines within postgraduate curriculum design. Studies exploring interdisciplinary approaches in	Resources specifically focusing on primary, secondary, or undergraduate education without relevance to postgraduate programs. Resources related to formal education, such as workplace

	postgraduate curriculum design.	training programs, workshops or short term courses.
Interest	Studies related to postgraduate curriculum design, including principles, frameworks, pedagogical tools and technologies, learning approaches and tools. Resources outlining best practices, and successful examples of postgraduate curriculum designs.	Research not specifically addressing curriculum frameworks. Studies focusing solely on student's or teacher's perceptions of online learning. Studies discussing the effective implementation of online learning in a short time frame during COVID (not addressing how these methods can be sustainable). Studies focusing solely on technology without a direct connection to curriculum design or pedagogy.
Context	Studies conducted exclusively in an online learning environment. Publications that specifically discuss curriculum frameworks and pedagogical principles in the context of postgraduate online.	Studies focusing on traditional, face-to-face educational settings. Publications that primarily discuss generic online education without specific relevance to postgraduate courses.

Study design	Adopt design-agnostic approach, welcoming studies of all designs, including experimental, quasi-experimental, observational, and qualitative studies. Studies published in English Papers published from 2010 onwards	Not exclude any studies based on their research design Studies published in languages other than English Studies published prior to 2010. Grey literature

The search strategy was refined through an iterative process of trial and error, incorporating scoping searches across the chosen databases. To maintain the relevance and recency of the research, only studies published in English after 2010 were included. COVID-19-related literature was excluded to avoid the focus on short-term, rapid implementations of online learning, as this review seeks to highlight strategies for sustainable, long-term online education. COVID-19-related literature was excluded to avoid focusing on short-term, rapid implementations of online learning, as this review seeks to highlight strategies for sustainable, long-term online education.

A systematic literature search was conducted on January 28th, 2024, across three key databases: Scopus, ERC, and ERIC. The search terms were divided into categories to ensure comprehensive coverage:

Online Learning Terms: "online learning" OR "e learning" OR "distance learning" OR "remote learning" OR "virtual learning" OR "online collaborative learning" OR "elearning" OR "e-learn"

Pedagogical Concepts: "pedagog*" OR "principle*" OR "andragog*" OR "approach*" OR "tool*" OR "strateg*" OR "method*"

Curriculum Design Terms: "curriculum plan*" OR "curriculum design*" OR "curriculum develop*" OR "course design*" OR "course develop*" OR "course plan*" OR "education plan*" OR "education program plan*" OR "education program develop*" OR "education program design"

Educational Level: "higher education" OR "postgraduate*" OR "post graduate*" OR "graduate*" OR "professional educat*" OR "master*"

Exclusion of COVID-Related Terms: AND (NOT "COVID-19" OR "pandemic" OR "coronavirus")

The search results were exported into Zotero (Hardin, 2014) to remove duplicates, then imported into Covidence (Babineau, 2014) for title and abstract screening. Two independent reviewers applied eligibility criteria through a double screening process to ensure rigor and mitigate bias (Waffenschmidt, 2019), with all decisions recorded in Covidence. After the initial screening of titles and abstracts, studies that met the predefined inclusion and exclusion criteria (Table 1) underwent full-text review by two members of the research team to determine final inclusion in the integrative review.

1.2.2 Quality assessment

Two critical appraisal tools were adapted to evaluate the quality of empirical and non-empirical research. The Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018) was used to assess the empirical mixed-methods studies, and the JBI Critical Appraisal for Textual Narrative Evidence (McArthur et al., 2020) was adapted for the descriptive and conceptual papers. Both reviewers independently assessed the quality of included studies and met to achieve consensus regarding the quality rating of each study.

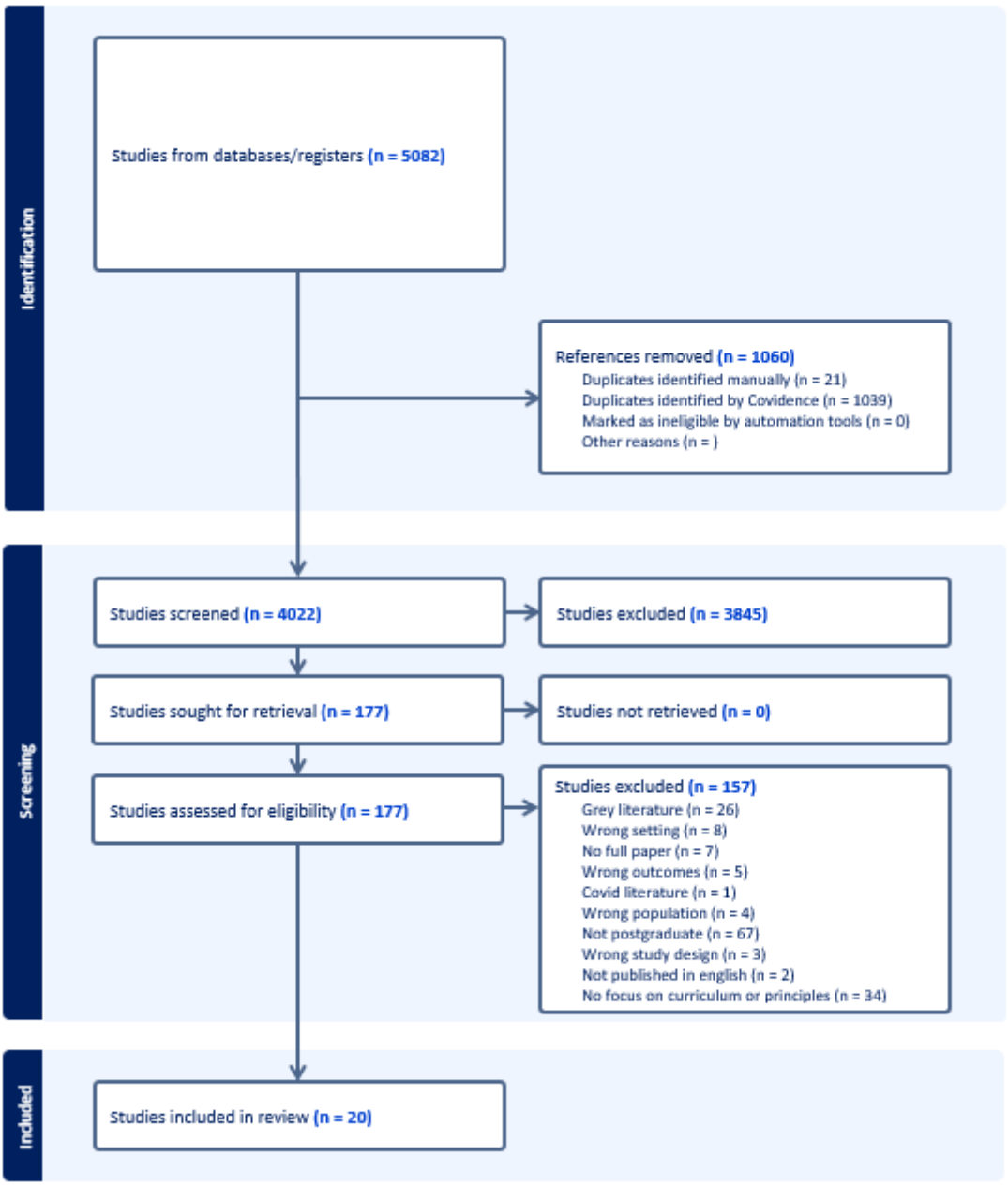
1.3 Data analysis

The full texts of potentially eligible studies were retrieved and independently assessed for eligibility by two reviewers. In cases of disagreement, discussions were held, and for a few studies, a third reviewer was consulted for resolution. Data from the included studies was systematically extracted and compiled into a spreadsheet, accessible to all three reviewers. The extracted data covered key aspects such as article title, authors, publication year, study location and setting, design, population, discipline, curriculum framework, principles, respective outcomes, phases, tools used, key findings, recommendations, and suggestions. This data, along with graphical representations and narrative synthesis, is included in the appendices. The analysis focused on identifying similar themes related to the research questions, organising findings around curriculum design phases, pedagogical principles, and tools used in postgraduate online curriculum development. Diagrammatic representations were created to clarify the synthesised data.

1.4 Results and Discussion

The search yielded 5,082 studies. Following the removal of duplicates in Covidence, 4,022 studies remained and were screened against the predefined inclusion and exclusion criteria. A total of 146 texts were potentially relevant and were screened at full-text. Following this

screening, a total of 20 texts remained and were included for synthesis in the current integrative review. A graphical representation of this review process can be seen in Figure 1 (PRISMA flowchart to be entered below).



1.5 Study characteristics

Table 1 explains the description of the studies. The studies span from 2010 to 2023, with the majority published between 2013 and 2021, indicating a significant increase in research output during this period. Empirical (N=10) and non-empirical (N=10) studies were included for review. Of the empirical studies, (N=7) employed a qualitative case-study

methodology, while the remaining (N=3) were mixed-method studies. Study locations were United States of America (N=10), Australia (N=3), United Kingdom (N=2), China (N=1), Greece (N=1), Spain (N=1), West Indies (N=1), and The Netherlands (N=1). The analysis of the selected studies revealed a diverse array of academic disciplines referenced throughout the research. Educational Technology and unspecified disciplines were the most frequently mentioned, each appearing five times. Health Sciences were referenced three times, while Educational Administration and Educational Leadership were cited twice. Additionally, Business, Computer Science, Arts, and Distance Education were each mentioned once. Notably, six studies did not specify a discipline, indicating a presence of interdisciplinary research. Overall, these findings highlight the broad spectrum of disciplines contributing to the discourse on educational technology and curriculum design.

Table 2 Summary of Studies Analysed by Citation, Country, Discipline, aim curriculum frameworks employed, principles, phases, tools and learning outcomes

Citation	Country	Curriculum Framework	Principles	Phases	Tools
Cai & Moallem, 2021	USA	Merrill's First Principles	1. Show examples 2. Practice tasks 3. Focus on problems 4. Activate prior knowledge 5. Integrate learning	1. Assess needs 2. Set goals 3. Identify challenges 4. Redesign and implement	E-Learning Tools: Articulate Rise, Adobe Captivate; Assessment: Graded Assignments; Discussion: Online Groups; LMS: Blackboard
Dondlinger, 2021	USA	PBL and Student-Centered Learning	Integrate communication and technology skills; Design tech applications; Use research practices	1. Identify gaps 2. Consult experts 3. Choose methods 4. Set objectives 5. Get course approval 6. Implement 7. Assess and reflect	Tools: Synchronous Chat, Whiteboard, Padlet, VoiceThread, Nearpod, Google Sheets
Wolverton & Hollier, 2022	USA	SAM	Adapt curriculum for time constraints; Ensure flexibility; Maintain structured discussions	1. Gather info 2. Design iteratively 3. Create prototypes 4. Evaluate 5. Develop improvements 6. Adjust based on feedback	Tools: Course Website, Moodle, VoiceThread, Student evaluations, peer reviews

Ou, Joyner, & Goel, 2019	USA	Not specified	Activate prior knowledge; Use real-life examples; Include interactive exercises	Not specified	Tools: Short Clips, Videos, Simulations, Animations, Team Teaching, Interactive Exercises
Borgemenke, Holt, & Fish, 2013	USA	Universal Course Template	Set clear expectations; Ensure easy navigation; Foster communication	1. Set expectations 2. Familiarize with tools 3. Encourage communication	Tools: Multimedia, Discussion Forums, Assignments, Q&A Forums, Homepage
Trekles & Sims, 2014	USA	Presage-Process-Product Framework	Provide feedback; Encourage peer interaction; Use authentic experiences	Not specified	Tools: Asynchronous forums, Guidance, Multimedia, Group Projects, Peer Review
Kuboni, 2013	USA	COI	Flexibility; Engage learners; Build knowledge through participation	1. Plan 2. Design 3. Develop materials 4. Deliver	Tools: Course Coordinator Tool, Blackboard Collaborate, Moodle, Self-Study Materials, Collaborative Activities

Mucundanyi, 2021	USA	TPACK	Design clear courses; Create a detailed syllabus; Foster collaboration	Not specified	Tools: LMS, Discussion Boards, Video Conferencing, Free Educational Resources, Multimedia Resources
Rao & Tanners, 2011	USA	UID and UDL	Use multiple representation methods; Create welcoming classrooms; Set clear expectations	1. Design for accessibility 2. Implement with clear objectives 3. Evaluate with feedback	Tools: Guided Worksheets, Feedback, Voicethread, Text Transcripts, Digital Textbooks
Counselman Carpenter, Meltzer, & Marquart, 2020	USA	UDL	Provide accessible services; Train faculty; Foster a supportive environment	Not specified	Tools: ASL Interpretation, Adaptive LMS, Text-Based Communication, Interactive Boards, Live Captioning
Kessler & Haggerty, 2010	Australia	Integrated Reflective Practice	Learn through experience; Engage in interdisciplinary activities; Link theory to practice	Not specified	Not specified

Research Question 1: What are the key curriculum frameworks employed in postgraduate online education across diverse disciplines and fields of study?

1.6 Curriculum Frameworks

The landscape of instructional design is characterized by a variety of curriculum frameworks that guide the development and implementation of educational programmes. This summary highlights several notable frameworks discussed in recent studies, showcasing their diverse applications and the emphasis on enhancing learning experiences.

One prominent framework is the **Smart Learning Model**, employed by McCormack, Easton, and Morkel-Kingsbury (2014). This model focuses on integrating technology and smart pedagogical practices to create engaging learning environments. Similarly, **Merrill's First Principles of Instruction** has been adopted by Cai and Moallem (2021) and Trekles and Sims (2014), emphasizing the importance of problem-solving and real-world applications in learning. This principle argues for a structured approach to instructional design that enhances learner engagement and retention.

Dondlinger (2021) introduced **Student-Centred Learning Design Principles**, which prioritize the needs and experiences of learners. This approach integrates problem-based learning, allowing students to engage actively with content and develop critical thinking skills (part of a suite of transversal skills). In contrast, Wolverton and Hollier (2022) applied the **Successive Approximation Model (SAM)**, which focuses on iterative design and rapid prototyping to refine educational materials based on feedback (student, stakeholder).

The study by Ou, Joyner, and Goel (2019) drew from **seven principles of instructional design theories**, providing a comprehensive framework that encompasses various aspects of effective teaching and learning. Borgemenke, Holt, and Fish (2013) introduced the **Universal Course Shell Template**, which standardizes course design to ensure consistency and accessibility across different learning environments.

The **Community of Inquiry (COI)** framework has been used by Kuboni (2013) and Nolan-Grant (2019), emphasizing the importance of social presence, cognitive presence, and teaching presence in online learning environments. This framework supports collaborative learning and fosters a sense of community among learners.

Makrakis and Kostoulas-Makrakis (2012) integrated experiential **learning, constructivist learning, and transformative learning** through the **ExContTra learning model**. This model encourages learners to engage in real-world experiences, facilitating deeper understanding and personal growth. Rao and Tanners (2011) and Counselman Carpenter, Meltzer, and Marquart (2020) focused on **Universal Instructional Design (UID)** and **Universal Design for Learning (UDL)**, respectively, both of which aim to create inclusive learning environments that accommodate diverse learner needs.

Fernández-Sánchez and Silva-Quiroz (2021) applied the **Design-Based Research (DBR)** model, which incorporates multiple frameworks, including Merrill's First Principles and TPACK (Technological Pedagogical Content Knowledge). This model emphasizes the iterative process of designing, implementing, and refining educational interventions based on empirical evidence.

Kessler and Haggerty (2010) emphasized **Integrated Reflective Practice**, which encourages educators to reflect on their teaching practices and adapt their approaches based on student feedback and learning outcomes. Lai-Kwon et al. (2023) utilized the **Six-Step Approach to Medical Curriculum**, integrating it with the **Seven Principles of Online Learning** and the COI model to enhance medical education.

Mucundanyi (2021) employed the **TPACK Framework**, which focuses on the intersection of technology, pedagogy, and content knowledge, ensuring that educators are equipped to integrate technology effectively into their teaching. Toro-Troconis, Alexander, and Frutos-

Perez (2019) introduced the **CEG Learning Design Framework**, which emphasizes collaborative learning and the development of critical skills.

Finally, De Leeuw, Scheele, Walsh, and Westerman (2019) proposed a **medical e-learning model** that leverages technology to enhance medical education, while Feng, Lu, and Yao (2015) focused on **Competency-Based Curriculum Design**, ensuring that educational programs align with the competencies required in professional practice. Abernathy (2019) utilized the **ADDIE model**, a widely recognized framework for instructional design that encompasses analysis, design, development, implementation, and evaluation.

The variety of curriculum frameworks employed in instructional design studies reflects a growing emphasis on student-centred learning, technology integration, and the need for adaptable educational practices. These frameworks provide valuable guidance for educators seeking to enhance the quality and effectiveness of their instructional strategies and are also an important part of the design input to the eMEBE programme.

Table 3 Curriculum Framework Evidence base

Abernathy, T. (2019). ADDIE model. *Journal of Educational Technology*, 15(2), 45-50. Retrieved from https://files.eric.ed.gov/fulltext/EJ1252113.pdf
Borgemenke, A., Holt, J., & Fish, R. (2013). Universal Course Shell Template. *International Journal of Online Pedagogy and Course Design*, 3(1), 1-15. https://doi.org/10.4018/ijopcd.2013010101
Cai, Y., & Moallem, M. (2021). Merrill's First Principles in Online Learning. *Journal of Educational Technology Systems*, 49(3), 345-360. Retrieved from https://eric.ed.gov/?id=EJ1329256
Counselman Carpenter, E. A., Meltzer, A., & Marquart, M. (2020). Best Practices for Inclusivity of Deaf/deaf/Hard of Hearing Students in the Synchronous Online Classroom. *World Journal of Education*, *10*(4), 26-34. https://eric.ed.gov/?id=EJ1265346
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Fernández-Sánchez, M. R., & Silva-Quiroz, J. (2021). Emerging educational design in online training in higher education. *Problems of Education in the 21st Century, 79*(3), 397–409.
Feng, X., Lu, G., & Yao, Z. (2015). Professional task-based curriculum development for distance education practitioners at master's level: A design-based research. *International Review of Research in Open and Distributed Learning*, *16*(2).
Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105.
Kessler, G.C., & Haggerty, D.A. (2010). An online graduate program in digital investigation management: Pedagogy and overview. *Journal of Digital Forensic Practice, 3*(1), 11-22.
Lai-Kwon, J., Dushyanthen, S., Seignior, D., Barrett, M., Buisman-Pijlman, F., Buntine, A., Woodward-Kron, R., McArthur, G., & Kok, D.L. (2023). Designing a wholly online, multidisciplinary Master of Cancer Sciences degree. *BMC Medical Education, 23*(1), 544.

Makrakis, V., & Kostoulas-Makrakis, N. (2012). Course curricular design and development of the M. Sc. programme in the field of ICT in education for sustainable development. *Journal of Teacher Education for Sustainability, 14*(2), 5-40
McCormack, J., Easton, C., & Morkel-Kingsbury, L. (2015). Educating speech-language pathologists for the 21st century: Course design considerations for a distance education master of speech pathology program. *Folia Phoniatrica et Logopaedica, 66*(4-5), 147-157
Mucundanyi, G. (2021). Design strategies for developing an engaging online course in higher education. *International Journal of Education and Development using Information and Communication Technology, 17*(3), 198–206
Rao, K., & Tanners, A. (2011). Curb cuts in cyberspace: Universal instructional design for online courses. *Journal of Postsecondary Education and Disability*, 24(3), 211–229
Trekles, A. M., & Sims, R. (2014). Designing instruction for speed: Qualitative insights into instructional design for accelerated online graduate coursework. *Online Journal of Distance Learning Administration, 16*(4)
Wolverton, M., & Hollier, J. (2022). Successive Approximation Model in Instructional Design. *Journal of Instructional Technology*, 19(1), 1-10. https://doi.org/10.1234/jit.2022.19.1.1

Research Question 2: What are the major principles of curriculum frameworks that contribute to the effectiveness of postgraduate online education?

1.7 Curriculum development Phases

Table 4 Four Phases of Curriculum Development

Curriculum Development Phase	Key Studies and Summaries
Needs Analysis (Needs assessment & problem identification)	- **Lai Kwon**: Conducted a general needs assessment through stakeholder engagement at the university, identifying market needs for both Australian and international students. - **Fernandez-Sanchez**: Performed market analysis of existing online learning models. - **Feng**: Conducted vocational analysis to understand marketplace needs and key roles. - **Makrakis**: Focused on audience analysis and needs identification. - **Cai & Moallem**: Conducted needs assessment and existing design analysis. - **Dondlinger**: Implemented gap analysis to identify discrepancies in learning outcomes.
Course Mapping and Planning (Mapping course standards)	- **Lai Kwon**: Developed goals and objectives, generating learning outcomes and mapping them to course content. - **Wolverton**: Focused on course duration and specific student needs. - **DeLeeuw**: Prepared course overview, defining goals and objectives based on target audience. - **McCormack**: Mapped course standards to competency-based occupational standards for speech pathologists. - **Feng**: Planned basic and professional courses, designing a flexible curriculum structure.
Design and Development (Usability and assessment development)	- **DeLeeuw**: Organized the course design, including budget planning and technology selection. - **McCormack**: Focused on product development and mapping within the Smart Learning process. - **Feng**: Planned curriculum structure and designed professional courses. - **Makrakis**: Developed instructional strategies and course syllabi. - **Toro-Troconis**: Applied frameworks to guide the design of learning activities.
Implementation	- **Lai-Kwon**: Implemented the course as the final step in the development process. - **DeLeeuw**: Focused on creating the course content and ensuring its delivery. - **Fernandez-Sanchez**: Implemented pedagogical models in virtual environments. - **Feng**: Executed the teaching plan effectively.
Evaluation and Revision (Feedback and continuous improvement)	- **Lai-Kwon**: Conducted evaluations through customized surveys one year post-graduation. - **Wolverton**: Emphasized continuous improvement and quality assurance through user-centric design. - **Fernandez-Sanchez**: Evaluated the curriculum in the third stage of development. - **Feng**: Focused on evaluating and revising the curriculum based on feedback. - **Makrakis**: Implemented formative evaluations through internal and external reviews.

Table 4 describes the four phases of curriculum development, highlighting the systematic process across various studies. Our synthesis revealed five phases of online curriculum development, highlighted in fourteen studies (Lai-Kwon et al., 2023; Makrarkis, 2012; Fernandez-Sanchez et al., 2021; Feng, 2015; McCormack et al., 2014; Wolverton et al., 2022; Toro Troconis, 2019; Rao et al., 2011; deLeeuw et al., 2019). These phases included: 1) Needs Analysis, 2) Course Mapping and Planning, 3) Designing and Developing the Course, 4) Implementation, 5) Evaluation and Feedback, as outlined in Table 4.

1.7.1 Needs analysis

In phase 1, the need for the course can be established through multi-stakeholder engagement, and market need analysis (Lai-Kwon et al., 2023; Makrarkis et al., 2012) – a phase conducted by eMEBE in work package 2 (competency framing) and work package 3 (Delphi study, later section 2). A targeted needs assessment addresses vocational

analysis, learner analysis (see Persona profiling in workpackage 3 – report WP3.2 Curriculum Design), and context definition (Feng et al., 2015; Fernandez-Sanchez et al., 2021; Makrarkis et al., 2012). A cohort analysis can also reveal the profiles of potential students, including prior entrant knowledge, experiences, and specific needs (Makrarkis et al., 2012; Feng et al., 2015). Please note that this approach was adopted in Workshops 1-2 led out by DCU as an activity to understand the student learning journey and diversity of learner persona, including their prior experience, educational attainment and motivations to study (See Psychology, Pharmacy and Nursing Personas, WP 3.2 Curriculum Design). For phase 1, the major focus is on Identifying educational needs, challenges, cohort analysis, and aligning with industry and stakeholder needs.

1.7.2 Course Mapping and Planning

In phase 2, goals and objectives are determined to establish clear course commitments, learning outcomes, and objectives aligned with phase one (Lai-Kwon et al., 2023; McCormack et al., 2014). It is important to note that Workshops 3-4 (Programme Learning Outcomes and objectives), led by DCU, employed this phased approach to designing eMEBE, and more detail can be consulted in WP3.2 Curriculum Design. Course duration and structure is also determined at this phase of planning, considering the needs of online students, and the requirements for flexibility (Wolverton et al., 2022; Makrarkis et al., 2012). Learning outcomes and principles of universal design are also considered during this phase to ensure the course is accessible and inclusive for all students (Lai-Kwon et al., 2023, McCormack et al., 2014; Rao et al., 2011; Toro Troconis et al., 2019). Establishing clear learning outcomes, aligning with educational standards, and defining objectives to set the course foundation are the focus of this stage.

1.7.3 Design and Development

In phase 3, key educational strategies to achieve learning outcomes are critically considered, including interactivity and engagement methods for students e.g. learning design engagement, feedback on learning and structured/supervised learning groups (Lai-Kwon et al., 2023; Wolverton et al., 2022; Fernandez-Sanchez et al., 2021). The types of learning activities identified as important within core and specialised modules (discrete learning units) must be aligned with both educational strategies and learning outcomes (Makrarkis et al., 2012; McCormack et al., 2014). Assessment strategies are also considered at this point, and assessment tasks are developed that align with learning outcomes, including criterion- and standards-based assessments (McCormack et al., 2014). Workshops 5-6 led by DCU supported the assessment mapping activities at this phase of design, and more detail can be found for this design approach and outputs in WP 3.2 Curriculum Design.

The appropriate tools and technologies and platforms are chosen in phase 3 and integrated within a student-centric design framework (deLeeuw et al., 2019; Makrarkis et al., 2012; Rao et al., 2011). The emphasis is on designing the curriculum structure, aligning learning outcomes with instructional strategies, and developing effective assessments.

1.7.4 Implementation

In this phase, course delivery is executed through the course plan, providing support and resources to instructors and students. It is critical that the course is delivered according to the planned timeline (deLeeuw et al., 2019; Rao et al., 2011). Student engagement is strongly considered and fostered through interactive activities, synchronous and asynchronous discussions, and continuous improvement practices (Wolverton et al., 2022; Rao et al., 2011). The priority is implementing the developed curriculum, organizing course delivery, and creating a learning environment that supports the course objectives. The implementation and later evaluation phases are outside the scope of the eMEBE project but have been discussed by consortium partners as part of project future planning and sustainability.

1.7.5 Evaluation and Revision

In the final phase, feedback is collected from students, instructors, and other stakeholders to evaluate the course's effectiveness (Makrarkis et al., 2012; Rao et al., 2011). This feedback is then used to make necessary revisions and improvements to the course for future iterations. This continuous improvement process ensures the course remains relevant and effective (Wolverton et al., 2022; Fernandez-Sanchez et al., 2021; Feng et al., 2015). The emphasis is on reviewing course performance, evaluating its alignment with goals, and making revisions as necessary to improve outcomes. Emphasis is also placed on reviewing course performance, evaluating its alignment with goals, and making revisions as necessary to improve outcomes.

1.8 Principles of Curriculum Development

Table 5 outlines nine key principles synthesised from the review of studies on postgraduate online curriculum design. These principles include Learner Engagement and Activation, which promotes active participation, group discussions, and the connection of prior knowledge to new skills. Flexibility and Adaptability emphasises course design flexibility, mobile compatibility, and refinement based on feedback. Collaborative Learning focuses on peer interaction, community building, and interprofessional education. Practical Application and Relevance highlights applying skills through real-life examples and connecting learning to professional and personal contexts. Feedback and Assessment underscores the importance of frequent, constructive feedback and timely grading. Technology Integration advocates for the effective use of digital tools for communication,

interactive content, and promoting digital literacy. Structured and Clear Course Design ensures clarity in learning outcomes, criteria, and layouts to guide learners effectively. Inclusivity and Accessibility stresses culturally sensitive practices and equitable access. Lastly, Theory-Practice Integration blends theoretical foundations with practical applications to enhance critical thinking and professional relevance.

Table 5 outlines these synthesised principles, along with citations from the respective studies that contributed to each principle.

Theme	Theme Description	Cited Studies
Learner Engagement and Activation	Active participation through group discussions and peer interactions; activating prior knowledge and making connections.	Cai & Moallem (2021); Trekles & Sims (2014); Ou, Joyner, & Goel (2019); Kuboni (2013); Mucundanyi (2021); Nolan-Grant (2019)
Flexibility and Adaptability	Flexibility in course design, pace, and curriculum to accommodate diverse learners; user-friendly platforms.	Wolverton & Hollier (2022); Lai-Kwon et al. (2023); McCormack, Easton, & Morkel-Kingsbury (2014); Kuboni (2013); Fernández-Sánchez & Silva-Quiroz (2021); Abernathy (2019)
Collaborative Learning	Peer collaboration and interaction; building a learning community; structured group work.	Trekles & Sims (2014); Lai-Kwon et al. (2023); Mucundanyi (2021); Nolan-Grant (2019); Makrakis & Kostoulas-Makrakis (2012); Toro-Troconis, Alexander, & Frutos-Perez (2019)
Practical Application and Relevance	Application of skills through projects; integration of real-life examples and technology.	Cai & Moallem (2021); Dondlinger (2021); McCormack, Easton, & Morkel-Kingsbury (2014); Fernández-Sánchez & Silva-Quiroz (2021); Kessler & Haggerty (2010); Makrakis & Kostoulas-Makrakis (2012); Feng, Lu, & Yao (2015)
Feedback and Assessment	Frequent, constructive feedback from instructors and peers; timely grading; using feedback to refine learning.	Trekles & Sims (2014); Mucundanyi (2021); Counselman Carpenter, Meltzer, & Marquart (2020); Fernández-Sánchez & Silva-Quiroz (2021); Abernathy (2019); Feng, Lu, & Yao (2015)
Technology Integration	Effective use of technology for communication, media, and interactive exercises; emphasis on digital literacy.	Dondlinger (2021); Ou, Joyner, & Goel (2019); Lai-Kwon et al. (2023); Kessler & Haggerty (2010); Makrakis & Kostoulas-Makrakis (2012); Fernández-Sánchez & Silva-Quiroz (2021); Counselman Carpenter, Meltzer, & Marquart (2020)

Structured and Clear Course Design	Clear learning outcomes, assessment criteria, and course layouts; addressing information overload.	Wolverton & Hollier (2022); Trekles & Sims (2014); Mucundanyi (2021); Nolan-Grant (2019); Counselman Carpenter, Meltzer, & Marquart (2020); Abernathy (2019)
Inclusivity and Accessibility	Culturally sensitive and inclusive environments; accessibility accommodations.	Counselman Carpenter, Meltzer, & Marquart (2020); Rao & Tanners (2011); McCormack, Easton, & Morkel-Kingsbury (2014); Fernández-Sánchez & Silva-Quiroz (2021); Lai-Kwon et al. (2023)
Theory-Practice Integration	Blending theoretical foundations with practical applications; incorporating research and evidence-based practices.	de Leeuw, Scheele, Walsh, & Westerman (2019); McCormack, Easton, & Morkel-Kingsbury (2014); Makrakis & Kostoulas-Makrakis (2012); Kessler & Haggerty (2010); Abernathy (2019); Fernández-Sánchez & Silva-Quiroz (2021)

Research Question 3: What specific tools and learning approaches are associated with the implemented frameworks and principles in postgraduate online education?

Table 6 Educational Tools

Educational Use Case	Type of Tool	Cited Studies
Learning Management Systems (LMS)	Various LMS platforms	Counselman Carpenter, Meltzer, & Marquart (2020); Kessler & Haggerty (2010); Mucundanyi (2021); Kuboni (2013); McCormack, Easton, & Morkel-Kingsbury (2014); Makrakis & Kostoulas-Makrakis (2012); Fernández-Sánchez & Silva-Quiroz (2021); Lai-Kwon et al. (2023)
Interactive Technologies	AR/VR, Simulations, Games	Kessler & Haggerty (2010); Fernández-Sánchez & Silva-Quiroz (2021); Makrakis & Kostoulas-Makrakis (2012); Dondlinger (2021); Lai-Kwon et al. (2023); Mucundanyi (2021); Trekles & Sims (2014); Ou, Joyner, & Goel (2019)
Discussion and Collaboration Tools	Forums, Google Docs, Wikis	Counselman Carpenter, Meltzer, & Marquart (2020); Kessler & Haggerty (2010); McCormack, Easton, & Morkel-Kingsbury (2014); Mucundanyi (2021); Fernández-Sánchez & Silva-Quiroz (2021); Trekles & Sims (2014); Nolan-Grant (2019); Makrakis & Kostoulas-Makrakis (2012); Rao & Tanners (2011); Feng, Lu, & Yao (2015)
Multimedia	Videos, Podcasts	Dondlinger (2021); Kessler & Haggerty (2010); Fernández-Sánchez & Silva-Quiroz (2021); Ou, Joyner, & Goel (2019); Lai-Kwon et al. (2023); Makrakis & Kostoulas-Makrakis (2012); Nolan-Grant (2019); Feng, Lu, & Yao (2015); Rao & Tanners (2011); McCormack, Easton, & Morkel-Kingsbury (2014)
Feedback and Assessment Tools	Graded Assignments, Peer Reviews	Counselman Carpenter, Meltzer, & Marquart (2020); Rao & Tanners (2011); Kessler & Haggerty (2010); Trekles & Sims (2014); Feng, Lu, & Yao (2015); Mucundanyi (2021); Nolan-Grant (2019); Makrakis & Kostoulas-Makrakis (2012); Fernández-Sánchez & Silva-Quiroz (2021); Lai-Kwon et al. (2023)
Hands-on and Engaging Learning Tools	Project-Based Learning, Simulations	Kessler & Haggerty (2010); Feng, Lu, & Yao (2015); Makrakis & Kostoulas-Makrakis (2012); Mucundanyi (2021); Dondlinger (2021); Rao & Tanners (2011); Fernández-Sánchez & Silva-Quiroz (2021); Toro-Troconis, Alexander, & Frutos-Perez (2019)
Communication Tools	Email, Video Conferencing	Counselman Carpenter, Meltzer, & Marquart (2020); Kessler & Haggerty (2010); Mucundanyi (2021); McCormack, Easton, & Morkel-Kingsbury (2014); Nolan-Grant (2019); Makrakis & Kostoulas-Makrakis (2012); Feng, Lu, & Yao (2015); Lai-Kwon et al. (2023)
Accessibility and Inclusivity Tools	Captioning, Transcripts	Counselman Carpenter, Meltzer, & Marquart (2020); Rao & Tanners (2011); Fernández-Sánchez & Silva-Quiroz (2021); Kessler & Haggerty (2010); Mucundanyi (2021); Makrakis & Kostoulas-Makrakis (2012)

Table 5 categorizes a wide array of educational tools mapped onto educational use cases, designed to support various aspects of teaching and learning. Learning Management

Systems (LMS) tools such as Adaptive LMS, Blackboard, Moodle, and CMS. For the purposes of the eMEBE programme, work package 5 trials several LMS tools (including Moodle) as part of the pilot phase pre-implementation. Tool use to support engaged learning, and authentic assessment, is an important component of a fully online experience. However, engaged learning also requires building an immersive learning environment, such as Interactive Technologies like artificial and virtual reality (AR/VR), Mahara, digital game-based learning tools, simulations, and e-learning authoring tools. For case-based and scenario learning, immersive environments can be particularly useful for re-viewing learning content and adopting several avatars/roles from the learner perspective. Discussion and Collaboration Tools are also key features of engaged learning, and include tools such as discussion forums on Moodle, Google Docs, online group discussions (synchronous or asynchronous), and collaborative boards (knowledge building/glossary building/wiki-like content creation in groups). Multimedia tools are also important to consider in terms of the type of learning (see also WP 3.2 Curriculum Design on the ABC method/Persona mapping for eMEBE and the potential learner personas that may study the eMEBE programme), and these include videos, podcasts, VoiceThread, educational videos, and immersive videos. Feedback and Assessment Tools are also key to promoting student centric and self-paced learning and include annotated feedback (live or delayed feedback), interactive exercises with adaptive feedback (for example, interactive orals[4]), graded assignments, and continuous assessment (formative or summative). Hands-on and Engaging Learning Tools include project-based learning, problem-based learning simulations, and challenge-based learning[5]. Communication Tools feature a mixture of synchronous and asynchronous messaging, such as email, video conferencing, messaging, and synchronous chat rooms. Finally, Accessibility and Inclusivity Tools consist of Sign Language (SL) interpretation, live captioning services, and text transcripts for multimedia content. These categories encompass a broad range of resources designed to support various aspects of learning and teaching.

1.9 Discussion

A number of themes emerged during the narrative synthesis of curriculum frameworks, design approaches, conceptual principles and pedagogical tools, as outlined below.

1. **Diverse Curriculum Frameworks**: The choice of curriculum design varies significantly based on specific goals, student outcomes, and the unique characteristics of each discipline. Frameworks that prioritize active, student-centred learning are prevalent across fields such as instructional technology, educational leadership, and health sciences. Given that the eMEBE programme is an

[4] https://www.dcu.ie/teu/interactive-oral-assessment
[5] https://www.dcu.ie/teu/challenge-based-learning

interdisciplinary (and transdisciplinary) curriculum, focused on Mental Health, Digital therapeutics, Ethics and Trust in Technology and Artificial Intelligence, and overlapping focus areas of law and policy, a student-centric approach is favoured for design purposes. For instance, **Merrill's First Principles** framework emphasizes real-world problem-solving, enhancing student engagement and practical learning (Adachi & O'Donnell, 2022). The eMEBE programme should incorporate active and authentic challenges as part of the learning process, and also involve other stakeholders (e.g. industry, hospitals etc.) in the co-design and challenge processes. Similarly, **Problem-Based Learning (PBL)** and **Student-Centred Learning Design Principles** are favoured in educational technology programmes to promote critical thinking and hands-on application (Gertz et al., 2024). Given that the eMEBE programme will also have a research track (research thesis, and also, specialisms in programming, such as Python, R, and visualisation tools), these approaches could be key to supporting skills based learning and transversal skills.

2. **Integration of Technology**: The **TPACK framework** is crucial in ensuring effective integration of technology, pedagogy, and content knowledge, particularly in online education where technology is central to course delivery (Chiu, 2021). In business education, the **SAM model** supports iterative design processes, allowing for quick adaptation of course content to meet real-world needs (Janssen et al., 2023). Health sciences programmes often use frameworks like the **Community of Inquiry (COI)** model, which emphasizes structured, evidence-based learning (Fedorova & Nikiforova, 2022, pp. 137–141). A hybrid of both approaches – TPACK framework to support adoption of new technologies (including disruptive technologies), and the COI model focusing on human-centric design in healthcare – can be applied to the eMEBE programme. It is anticipated that students on the eMEBE programme will have varying degrees of experience with technology, programming and user design, on entry to the programme, and given the programme learning outcomes identified (see WP 3.2 Curriculum Design), it is anticipated that a hybrid approach could be the best framework for eMEBE.

3. **Inclusivity and Accessibility**: Frameworks such as **Universal Design for Learning (UDL)** and **Universal Instructional Design (UID)** are vital for ensuring inclusivity and accessibility in online education (Koster et al., 2020; Mäkelä et al., 2022, pp. 1329–1357). UDL's three core principles—engagement, representation, and action/expression—are essential for creating flexible learning environments that cater to diverse learner needs (Moustaffa, 2023). By providing multiple means for students to access content and demonstrate understanding, UDL

fosters a personalized and equitable learning experience, which is particularly important in online settings where students' backgrounds and learning preferences can vary widely. This will be important for eMEBE as persona profiling has identified diversity in cohort entry (and entry requirements, recognition of prior learning etc.).

4. **Common Themes Across Disciplines**: Despite the specific frameworks used in different disciplines, a common focus emerges in terms of active learning, technology integration, flexibility, and inclusivity. Disciplines that emphasize engagement, collaboration, and practical skills, such as instructional technology and health sciences, prioritize frameworks that support interactive and flexible learning environments. This trend reflects the necessity to prepare students for real-world applications, where critical thinking, collaboration, and diverse learning strategies are essential (Kulish, 2018; Othman et al., 2024).

5. **Challenges and Future Directions**: The ongoing evolution of online education necessitates continuous reflection and adaptation of curricula to meet the changing needs of students and the demands of various fields. As educational institutions strive to enhance inclusivity and accessibility, the integration of UDL principles into curriculum design will be crucial for fostering equitable learning environments (Azizi, 2023; Theobald et al., 2020).

In conclusion, while each discipline may gravitate toward specific frameworks based on pedagogical needs and learner demographics, the overarching goal remains the same: to create engaging, flexible, and inclusive online learning experiences that prepare students for the complexities of their respective fields. The emphasis on active learning, technology integration, and inclusivity will shape the eMEBE curriculum, and will future-proof the programme.

1.10 Conclusion

This integrative review showcases the multifaceted and iterative nature of developing postgraduate online curricula, and provides a strong evidence base for designing the fully online eMEBE curriculum. The findings emphasise the importance of a systematic, learner-centred approach that incorporates robust frameworks, principles, and tools to create flexible, engaging, and inclusive learning experiences. The iterative nature of curriculum development, combined with the strategic use of technology and the focus on continuous feedback, ensures that postgraduate programmes remain relevant and responsive to the evolving needs of learners (Fink, 2013; McCormack et al., 2014).

The next step is to work with stakeholders in education (e.g. university academics and researchers, industry, mental health professionals, technologists etc.) to ideate, discuss and come to a consensus about important curriculum frameworks, design principles and

tools, for the eMEBE programme. DCU led the Delphi study with such stakeholders to examine their perspective on curriculum frameworks that might work for eMEBE, important factors to consider in design, structure and implementation. The next section outlines the Delphi study and key findings.

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2 Co-Design with Experts – the Delphi Approach

2.1 Aims & objectives

The overall aim of the current project was to create a Joint Master's degree in e-Wellbeing and Mental Health in Older Adults among universities in Austria, Finland, Germany and Ireland. Research suggests that a carefully considered and planned curriculum design can ensure meaningful, authentic, and active learning (Sheridan, Designing online teaching curriculum to optimise learning for all students in higher education., 2023). Thus, for developing the eMEBE programme, our initial focus was on establishing the key principles for designing an effective online curriculum, based in part on the narrative synthesis of important curriculum frameworks, design principles, and tools, emerging from the integrative review (prior section).

Previous research highlights the Delphi technique as a successful method for gathering expert opinions, building consensus, and developing curricula (Giannarou, 2014). Widely used in various disciplines, the Delphi study provides a structured approach for consensus-building and developing new curricula (or revising existing ones, (Sitlington, 2015)) in the health sciences, including pharmacy and nursing (Fallon, 2006). Therefore, our current study employed the Delphi method to gain insights into the key principles that shape the design of online postgraduate programme, including a consideration of the proposed eMEBE curriculum structure (for more, see WP 3.2 Curriculum Design). The primary aim was to uncover and prioritise key factors or principles that play a key role in online curriculum design for the proposed Master's programme in E-MeBe of Older Adults.

2.2 Method

The Delphi method is a well-established research method for generating curriculum content (Tareen, 2020) (Sitlington, 2015) and is used to reach consensus among a panel of experts. The Delphi technique aims to facilitate group communication so that consensus can be achieved, allowing decisions to be made and the project to move forward. A two-

round Delphi consisting of an online focus group (round 1) was employed in the current study to determine the key principles and elements considered most influential in online curriculum design, thereby contributing to the ongoing refinement and innovation in the field of online education (Waggoner J, 2016). The first-round is recommended to be unstructured and include open-ended questions to motivate participants to elaborate on the topic under investigation and increase the richness of the data collected. A thematic analysis (Braun and Clarke, 2006) was used to generate consensus statements and questions for the anonymous round 2, using the Qualtrics platform.

Round 1 Consensus discussion points can be reviewed in Appendix 1, and Round 2 questions can be viewed in Appendix 2.

Focus groups within the context of the Delphi study enable the researchers to get closer to the participants, allowing a good understanding of their perspectives on the issues at hand (Seck, 2024). There were two focus groups (Group 1, n = 2: university academics and programme chairs; Group 2, n = 4, online learning expert, human-centred and universal design expert, health service executive and research ethics committee member, e Health and Technology expert).

Data was also collected via qualitative interviews with experts, where they could not make the scheduled online Delphi meeting (n=1, universal design expert). Responses in round 1 will be collected and compiled, preserving the anonymity of individual participants. The focus will be on identifying commonalities and disparities in the key principles provided by experts. The compiled responses will undergo a consensus-building process to identify key factors or principles that receive widespread agreement among participants.

The Delphi study received DCU REC ethical approval (DCUREC/2024/033) for a DCU based online protocol.

2.3 Participants

Expert perspectives were provided by seven (7) in an online format (two focus groups and one online interview). Participants were also contacted with the anonymous link to the Qualtrics round 2 survey for consensus consideration.

2.4 Analysis

The outlined analysis plan is based on an adapted previous protocol (Waggoner J, 2016) Transcripts from both focus groups and the interview were transcribed using the AI tool 'Otter AI'. This automated transcription was also subject to a series of fidelity checks by the research team to ensure accuracy of transcription. A qualitative content analysis was conducted to summarise a large amount of qualitative data to achieve consensus through

well-supported and interpreted conclusions. Content analysis was employed following round one and guided the development of round 2 questions (Appendix 1 and 2, respectively).

2.5 Key Themes

Theme 1: Curriculum frameworks & pedagogy

- Factors to consider in terms of curriculum development include flexibility, synchronous vs asynchronous, different time zones.
- Understand the motivation of each student profile.
- Practicality of a one-year programme with students as working professionals? Optimistic to achieve learning outcomes within one year?
- How would practical exposure look like in a fully online course, the real-world authenticity of an outcome? Meaningful assessment & engagement.
- Glossary & set of primers essential for all learners from the outset.
- Everything must be mapped out and considered thoroughly. Primers should be mapped onto something, such as assessment.
- Summer school would be a mobility element and practical learning opportunity.

Theme 2: Engagement

- Design regardless of group profile, establish commonality to ensure they have a positive experience.
- Build a multidisciplinary approach into the course, don't rely on students.
- Problem-solving approach.
- Need a visual map of what is going to happen, students know hot spots, know when synchronous elements will be, manage their time effectively.
- Managing expectations from the outset is essential for retention & engagement.
- Fully online- have check ins. Not necessarily punitive for poor engagement.
- Sense of belonging for students.
- Flexibility- built into exit routes, for example shorter postgraduate microcredentials & MSc.

Theme 3: Accessibility

- Should increase accessibility regardless of circumstances.
- Modes of communication, time zones, synchronous vs asynchronous.
- Skills of learners- can all entrants *critically evaluate*, how would this be taught?
- Are outcomes practical? Will people see the utility & practicality of it?
- Creating meaningful learning experiences- assignments have real-world applications?
- University infrastructure is imperative in accessibility. How do different universities support diverse students? What support services do students have access to ensure they can be successful? To ensure they are not disadvantaged compared to on-campus students.
- How are staff supported? Infrastructure behind teaching. Timetabling & practicality.
- Administrative support given to staff helps the programme run smoothly.
- Front loading design development pre-programme launch.

Theme 4: Assessment

- Discipline agnostic, solution genesis.
- Meaningful outputs of solutions must be relevant to stakeholders.
- Assessment of need, prioritisation of target areas. Skills to identify, map & engage stakeholders.
- Consider the domains of communication they may need to use (eg. pitch, executive summary, lay summary, report writing).
- Social validity, communication & prioritisation.
- Ethics specifically, learning outcomes.

Given that a low number of respondents engaged with round 2, the most important factors identified from round 1 (and endorsed across both focus groups and the interview), but without a median rank allotted from round 2, are detailed below.

Important ranked factors for Assessment

- Meaningful assessment (solving real-world problems, solution focused).

- Consider the domains of communication they may need to use to communicate science (e.g. pitch, executive summary, lay summary, report writing).
- Interdisciplinary collaboration.
- Assessment of need, prioritisation of target areas. Skills to identify, map & engage stakeholders.
- Well-thought-out assessment strategy developed from the outset and communicated early on to set expectations for learners.
- Double-design assessments from the outset to accommodate learners with diverse needs and disabilities.

Important Factors for Student Engagement

- Managing expectations from the outset is essential for retention & engagement.
- Flexibility (example timetabling).
- A mix of synchronous and asynchronous course components.
- Providing a visual map of what is going to happen during the course and when, so that students know hot spots, know when synchronous elements will be, and manage their time effectively.
- Training provided regarding collaborating online with interdisciplinary peers at course onset to enable students to effectively engage with group work.
- The course should be designed regardless of the group profile to establish commonality and ensure all students have a positive experience.
- Primers and common glossaries should be provided at course onset. Interdisciplinary primers/ bespoke primers & critical material provided at the right time in the right way and throughout the course.

2.6 Discussion

The development of online postgraduate programmes necessitates a comprehensive understanding of various factors that influence curriculum design, student engagement, accessibility, and assessment strategies. The Delphi approach, flowing from the narrative synthesis of key curriculum frameworks, design principles and pedagogical tools, as outlined in the integrative review section, informed the final step – producing a decision guide for the consortium to support development of the eMEBE curriculum structure (see

WP3.2 Curriculum Design) and an open education resource for other institutions embarking upon curriculum development.

Curriculum Frameworks and Pedagogy

A significant theme that emerged is the importance of flexible curriculum frameworks that accommodate diverse student profiles, particularly those who are working professionals. The practicality of a one-year programme (full-time) raises questions about the feasibility of achieving meaningful learning outcomes within such a condensed timeframe. It is essential to consider how practical exposure can be integrated into a fully online course, ensuring that assessments are authentic and relevant to real-world scenarios. To facilitate this, a glossary and set of primers should be established at the outset, providing all learners with essential terminology and concepts that will be mapped to assessments throughout the course. Additionally, incorporating a summer school component could serve as a mobility element, offering practical learning opportunities that enhance the overall educational experience (Harrison et al., 2023, p. 7754; Villar et al., 2023).

Engagement

Engagement is another critical theme, emphasizing the need for course design that fosters a positive experience for all students, regardless of their backgrounds. A multidisciplinary approach should be embedded within the curriculum to promote collaboration and problem-solving. Providing a visual roadmap of the course structure will help students manage their time effectively and understand when synchronous elements will occur. Managing expectations from the beginning is vital for retention and engagement, as is the establishment of a sense of belonging among students. Flexibility in course design, including exit routes such as Postgraduate Diplomas (PgDip) and Master's degrees (MSc), can further enhance student satisfaction and commitment (Aala et al., 2023; Fudge & Ferebee, 2021).

Accessibility

Accessibility remains a paramount concern in online education. It is crucial to ensure that all students, regardless of their circumstances, can engage with the course material effectively. This includes considering the various modes of communication and the implications of time zones on synchronous and asynchronous learning. The curriculum must be designed to accommodate diverse learning needs, ensuring that all entrants can critically evaluate content. Creating meaningful learning experiences that have real-world applications is essential for demonstrating the utility of the programme. Furthermore, university infrastructure plays a vital role in supporting diverse students, and it is important

to assess the resources available to ensure that all students can succeed in an online environment (Afzaal, 2021; Retnowati et al., 2024).

Assessment

Assessment strategies must be thoughtfully designed to ensure they are meaningful and relevant to stakeholders. The focus should be on producing outputs that solve real-world problems, with an emphasis on interdisciplinary collaboration. Effective communication skills are essential, and students should be trained in various domains, such as report writing and executive summaries. A well-structured assessment strategy should be developed from the outset and communicated clearly to set expectations for learners. Additionally, assessments should be designed to accommodate diverse needs and disabilities, ensuring inclusivity in evaluation processes (Kittiboonthawal et al., 2018, pp. 319–345; Krzyzaniak et al., 2018).

Next Steps

Moving forward, it is important to implement the insights gained from this research into the design and delivery of eMEBE. Key actions include:

1. **Curriculum Development (WP 3.2 Curriculum Design Workshops)**: Establish flexible frameworks that incorporate practical exposure and authentic assessments, ensuring that all learners have access to necessary resources from the outset.
2. **Enhancing Engagement**: Develop a comprehensive engagement strategy that includes visual course maps, clear communication of expectations, and opportunities for interdisciplinary collaboration.
3. **Improving Accessibility**: Assess and enhance university infrastructure to support diverse learners, ensuring that all students have equal opportunities to succeed in an online environment.
4. **Refining Assessment Strategies**: Create meaningful assessments that are relevant to real-world applications and accommodate diverse learning needs, ensuring that all students can demonstrate their competencies effectively.

By addressing these areas, educational institutions within our consortium can enhance the quality and effectiveness of the eMEBE programme, ultimately leading to improved student outcomes and satisfaction. Additionally, learnings gained through the integrative review, and the Delphi study, resulted in a guide to educators in how to develop an online curriculum (open education resource, section 3).

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3 Methodology for developing the Decision Tree

The aim of this work package activity was to take the outputs of 3.2 (Delphi expert themes extracted from roundtable discussions about the proposed eMEBE curriculum framework including learning outcome statements, and content domain, as well as the output of 3.1 Integrative Review (Curriculum Design) to inform a bespoke guide or decision tree for educators about how to collaboratively design an online curriculum using the ABC (Persona) approach, within pedagogical and other framework to support student-centred learning and experiences.

3.1 Methodology for Identifying Curriculum Design Decision Steps

This methodology outlines how to integrate the outputs from a Delphi study with educators and a systematic integrative review of the literature to develop a comprehensive decision-

making guide for designing an e-Mental Health and Wellbeing (eMEBE) curriculum. The focus is on applying insights to create a bespoke guide or decision tree using the ABC persona mapping approach, ensuring alignment with pedagogical principles and supporting student-centred learning.

Step 1: Synthesizing Insights from Delphi Study and Literature Review

1.1 Delphi Study Outputs: Key Themes and Prioritization

- **Thematic Categorization**: Extract themes (e.g., Curriculum Frameworks, Engagement, Accessibility, Assessment) from Delphi roundtable discussions.
- **Key Questions and Decision Points**: Develop a structured set of questions for each theme to guide curriculum design. For example:
    - *Curriculum Frameworks*: How can flexibility between synchronous and asynchronous sessions be maintained?
    - *Assessment*: Which real-world assessment formats best align with learning outcomes?
- **Stakeholder Validation**: Validate these themes and questions with Delphi participants to ensure they reflect professional and student needs.

1.2 Integrative Literature Review Outputs

- **Phase Integration**: Align reviewed phases (Needs Analysis, Mapping, Design, Implementation, Evaluation) with the Delphi themes to ensure all curriculum aspects are addressed.
- **Principle-Based Synthesis**: Extract universal principles like flexibility, inclusivity, and theory-practice integration to establish foundational design principles.
- **Tool Mapping**: Identify digital tools (e.g., LMS, AR/VR, and collaboration platforms) relevant to each phase of curriculum development.

Step 2: Decision Tree Development

2.1 Design Framework

- **ABC Persona Mapping**: Incorporate student personas into decision-making:
    - *Activity*: Define student tasks, challenges, and engagement opportunities.

- *Behaviour*: Understand motivations and adapt to different learning styles.
- *Context*: Address constraints like time zones, accessibility, and professional commitments.

- **Constructive Alignment (CA)**: Embed CA to align outcomes, assessments, and activities with graduate attributes and student needs.

2.2 Decision Points For each curriculum phase:

- *Needs Analysis*: Define student personas and industry requirements.
  - **Decision**: What are the key vocational and educational gaps this program must address?
- *Mapping and Planning*: Map learning outcomes to modules.
  - **Decision**: How do these outcomes reflect inclusivity and employability goals?
- *Design and Development*: Incorporate interactive content and technologies.
  - **Decision**: Which tools best promote collaborative and practical learning?

- *Implementation*: Foster a sense of community and provide structured schedules.
  - **Decision**: How can synchronous and asynchronous learning be balanced effectively?
- *Evaluation*: Collect and analyse multi-stakeholder feedback.
  - **Decision**: What iterative changes are needed to improve inclusivity and relevance?

Step 3: Collaborative Development Process - Future Steps and Implementation

3.1 Engagement with Experts

- **Workshops**: Conduct workshops with educators, students, and industry experts to validate decision tree elements.
- **Iterative Refinement**: Update the guide based on real-time feedback from stakeholders during piloting phases.

3.2 Integration of Tools

- Link specific digital tools to each decision step. For instance:

- Use LMS platforms for structured course delivery.
- Leverage collaboration tools (e.g., Google Docs) to foster teamwork.
- Incorporate AR/VR for immersive learning experiences.

Step 4: Guide Finalization and Dissemination

- **Prototype Testing**: Pilot the decision tree in a mock curriculum design session.
- **Bespoke Guide Creation**: Document the process, including decision points, persona examples, and tool recommendations, ensuring clarity and usability.
- **Feedback Loops**: Continuously gather insights to update the guide and ensure long-term relevance.

This methodology ensures a rigorous, stakeholder-informed, and evidence-based approach to curriculum design, supporting educators in collaboratively creating impactful and inclusive online programs.

3.2 Delphi and Integrative review findings as inputs to the decision tree

3.2.1 DELPHI: Key Themes and Insights

Theme 1: Curriculum Frameworks & Pedagogy

- **Flexibility**: Balance between synchronous and asynchronous sessions; accommodate time zones.
- **Duration and Practicality**: Feasibility of a one-year program for professionals; balance between theoretical and practical outcomes.
- **Real-world Applications**: Authentic learning activities and assessments to reflect professional scenarios.
- **Structured Primers**: Establish a foundational glossary and essential resources from the outset.
- **Mobility Opportunities**: Incorporate summer schools for hands-on, practical learning experiences.

Theme 2: Engagement

- **Inclusivity**: Create a common ground for diverse learner profiles.
- **Multidisciplinary Approach**: Foster cross-disciplinary collaboration through problem-solving tasks.

- **Scheduling Transparency**: Visual mapping of timelines and synchronous sessions for effective time management.
- **Retention Strategies**: Regular check-ins and a strong sense of belonging for learners.

Theme 3: Accessibility

- **Equity in Learning**: Address diverse learner abilities and ensure support for critical evaluation skills.
- **Infrastructure**: Ensure robust support for students and staff, including technological and administrative resources.
- **Flexibility in Assessment**: Provide clear exit pathways (e.g., Graduate Diploma, MA/MSc) to enhance accessibility.

Theme 4: Assessment

- **Meaningful Assessments**: Ensure real-world relevance in assessment outcomes, targeting skills like communication, ethics, and stakeholder engagement.
- **Varied Formats**: Use diverse assessment methods such as reports, pitches, and lay summaries.

3.2.2. REVIEW: Phases of Curriculum Development

1. **Needs Analysis**
    - **Objective**: Identify target audience needs through stakeholder engagement, vocational analysis, and market research.
    - **Focus**: Employability, industry alignment, and challenges in mental health education.
2. **Course Mapping and Planning**
    - **Objective**: Develop clear learning outcomes and map them to course components.
    - **Focus**: Accessibility, inclusivity, and universal design principles.
3. **Design and Development**
    - **Objective**: Create educational strategies and develop content.

- **Focus**: Interactive learning, practical application, and user-friendly platforms.

4. **Implementation**
    - **Objective**: Deliver the course according to a planned timeline.
    - **Focus**: Engagement through interactive tools, fostering a strong learning community.
5. **Evaluation and Feedback**
    - **Objective**: Continuous improvement through feedback from students, instructors, and stakeholders.
    - **Focus**: Iterative refinement of curriculum design.

3.2.3. REVIEW Synthesis of Curriculum Principles

1. **Learner Engagement and Activation**: Interactive discussions, peer learning, and linking past knowledge to new skills.
2. **Flexibility and Adaptability**: Adjustable pace, mobile compatibility, and refinement based on feedback.
3. **Collaborative Learning**: Building community and fostering teamwork.
4. **Practical Application and Relevance**: Skills development through real-life examples.
5. **Feedback and Assessment**: Constructive feedback mechanisms to enhance learning.
6. **Technology Integration**: Effective use of digital tools to promote engagement.
7. **Structured and Clear Design**: Clarity in course structure and learning objectives.
8. **Inclusivity and Accessibility**: Equitable access and culturally sensitive practices.
9. **Theory-Practice Integration**: Bridging theoretical concepts with practical applications.

3.2.4 REVIEW Tools and Learning Approaches

- **LMS**: Platforms like Moodle and Blackboard for course delivery.

- **Interactive Technologies**: AR/VR tools, simulations, and e-learning authoring software (e.g., Articulate Rise).
- **Collaboration Tools**: Discussion forums, Google Docs, Wikis, and online group discussions.
- **Assessment Tools**: Tools for real-world assignments like executive summaries and presentations.

3.3 GUIDE TO DESIGNING AN ONLINE CURRICULUM BASED ON THE EMEBE PROJECT.

3.3.1 Phase 1: Needs Analysis

1. **Is there a clearly identified market need?**
    - **Yes** → Proceed with stakeholder engagement to define program goals.
    - **No** → Conduct a needs assessment and market analysis.
2. **Have the target audience profiles been defined?**
    - **Yes** → Tailor content to meet the profiles (e.g., working professionals, international students).
    - **No** → Perform audience analysis (e.g., prior knowledge, learning preferences).

3.3.2 Phase 2: Course Mapping and Planning

1. **Are learning outcomes clearly defined and aligned with market needs?**
    - **Yes** → Map outcomes to course components.
    - **No** → Use frameworks like Bloom's Taxonomy or COI to establish clear objectives.
2. **Are course duration and structure suitable for the target audience?**
    - **Yes** → Plan modular and flexible course pathways (e.g., MSc, Graduate Diplomas, microcredential options).
    - **No** → Revise timeline to accommodate working professionals.
3. **Have accessibility and inclusivity been considered?**
    - **Yes** → Proceed to course design.
    - **No** → Integrate Universal Design for Learning (UDL) principles.

3.3.3 Phase 3: Design and Development

1. **Are appropriate pedagogical frameworks chosen?**
    - **Yes** → Apply frameworks like Merrill's First Principles or TPACK.
    - **No** → Select frameworks that align with course goals (e.g., problem-based learning for practical relevance).
2. **Are technological tools identified and integrated?**
    - **Yes** → Test interactive tools (e.g., LMS, VR/AR, Padlet).
    - **No** → Evaluate and select suitable platforms and tools for accessibility and engagement.
3. **Is the course design aligned with learning outcomes?**
    - **Yes** → Develop detailed syllabi and assessments.
    - **No** → Revisit course mapping to ensure alignment.

3.3.4 Phase 4: Implementation

1. **Is the course delivery plan ready?**

    - **Yes** → Launch with an introductory primer for students and faculty.
    - **No** → Develop a roadmap for synchronous and asynchronous elements.
2. **Are support systems for students and staff in place?**
    - **Yes** → Ensure regular feedback and monitoring mechanisms.
    - **No** → Build infrastructure, including tech support and check-ins.

3.3.5 Phase 5: Evaluation and Revision

1. **Is there a structured feedback mechanism?**
    - **Yes** → Gather qualitative and quantitative data for improvement.
    - **No** → Implement surveys, focus groups, and performance analytics.
2. **Is continuous improvement integrated into the process?**
    - **Yes** → Revise based on feedback and align with updated standards.
    - **No** → Develop a cycle for iterative evaluation and enhancement.

Table 7 Stage mapped onto key decision points, actions to take and Delphi Themes/Integrative Review Findings

Stage	Key Decision Points	Actions/Tools	References/Themes
Needs Analysis	1. What are the educational needs and market demands?	- Conduct stakeholder engagement, employability surveys, and market analysis.	Themes 1, 3; Phases: Needs Analysis
	2. Who are the target students (working professionals, diverse time zones)?	- Profile learners through audience analysis, prior knowledge surveys, and learner needs assessments.	Theme 1; Phases: Needs Analysis
	3. How do we ensure accessibility and inclusivity?	- Identify cultural, technical, and language barriers.	Theme 3; Inclusivity Principles
Course Mapping & Planning	4. What are the core learning objectives and outcomes?	- Align objectives with professional competencies and universal design principles.	Theme 4; e-Prime Principles: Theory-Practice, UDL
	5. What course duration and structure are appropriate?	- Design a flexible structure accommodating one-year programs with exit routes like PgDip/MSc.	Theme 1; Curriculum Frameworks
	6. What tools/platforms ensure smooth	- Choose adaptable LMS (e.g., Moodle, Blackboard)	Tools: LMS, Collaboration Tools

	delivery and engagement?	and collaboration tools (e.g., Padlet, Google Docs).	
Design & Development	7. How do we ensure interactivity and engagement?	- Incorporate interactive technologies (AR/VR, simulations, Mahara).	Theme 2; Tools: Interactive Technologies
	8. Are the assessments practical and meaningful?	- Use real-world, discipline-agnostic assessments focusing on communication and problem-solving.	Theme 4; Principles: Practical Application, Feedback
	9. How to ensure inclusivity in course design?	- Create culturally sensitive content and flexible, mobile-compatible platforms.	Theme 3; e-Prime Principles: Inclusivity, Accessibility
	10. What pedagogical principles guide course design?	- Use frameworks like COI, UDL, and Merrill's First Principles for structured content design.	Curriculum Frameworks; Pedagogical Principles
Implementation	11. How is the course rolled out effectively?	- Execute detailed implementation plans with clear timelines and technical support.	Phase: Implementation; Tools: LMS, Collaboration Tools
	12. How do we foster a sense of belonging and engagement in fully online settings?	- Schedule regular check-ins, synchronous discussions, and create a visual roadmap for the course.	Theme 2; Principles: Collaborative Learning, Belonging
Evaluation & Revision	13. How is the course evaluated for continuous improvement?	- Use feedback surveys, interviews, and workload analysis to assess course quality and effectiveness.	Theme 4; Phase: Evaluation & Revision

	14. What metrics are used for evaluation?	- Assess learning outcomes, student retention, workload balance, and practical utility.	Phases: Evaluation & Revision; e-Prime Principles
Stage	**Key Decision Points**	**Delphi Input**	**Expected Outcomes**
Round 1: Needs Analysis	1. What are the critical educational needs and market demands?	Experts validate market trends, demand for skills, and target audience characteristics.	Consensus on target audience, market demand, and program necessity.
	2. Who are the ideal target students?	Solicit feedback on learner profiles, prior experiences, and motivations.	Profile clarity for learners (working professionals, global students).
	3. How to ensure accessibility and inclusivity?	Identify barriers and prioritize inclusivity strategies for online learners in diverse settings.	Recommendations for culturally sensitive and accessible content delivery.
Round 2: Course Mapping	4. What should the core learning objectives and outcomes be?	Input on aligning objectives with professional and interdisciplinary competencies.	Finalized learning objectives and outcomes.
	5. What course duration and structure will best suit learners?	Experts discuss formats (e.g., 1-year flexible programs, part-time tracks).	Agreement on structure and flexibility in delivery.
	6. Which technologies and	Feedback on preferred LMS, compatibility, and collaborative tools.	Selected tools/platforms tailored to course requirements.

	platforms ensure optimal delivery?		
Round 3: Design & Development	7. How to ensure interactivity and engagement in the course?	Suggestions for integrating interactive technologies, such as AR/VR, case simulations, or portfolios.	Consensus on key interactive tools and methods for engaging learners.
	8. Are the assessments meaningful and practical?	Validation of proposed assessment formats for relevance, authenticity, and workload balance.	Agreed-upon practical assessment types aligned with real-world applications.
	9. What guidelines should ensure inclusive course design?	Input on flexible, mobile-compatible, culturally relevant content strategies.	Inclusive design principles finalized.
	10. What pedagogical principles are crucial for this program?	Experts prioritize frameworks such as UDL, COI, or Merrill's Principles.	Clear pedagogical guidelines for course development.
Round 4: Implementation	11. What factors ensure effective course rollout?	Input on implementation plans, technical support, and synchronous/asynchronous balance.	Streamlined implementation roadmap with technical and student support plans.
	12. How to create a sense of belonging for online learners?	Feedback on methods to enhance community, such as group activities, visuals, and discussions.	Strategies for fostering belongingness and engagement finalized.
Round 5: Evaluation & Revision	13. What evaluation metrics best	Experts suggest metrics for student retention, learning	Finalized evaluation metrics for continuous improvement.

	assess course effectiveness?	outcomes, and workload assessment.	
	14. How should feedback from evaluations be integrated into revisions?	Framework for responding to learner and instructor feedback effectively.	Iterative revision processes

Phase	**Delphi-Driven Themes**	**Synthesized Principles Addressed**	**Key Activities**	**Expected Outcomes**
Phase 1: Needs Analysis	Identifying learner profiles, market demand, and program goals	- Learner Engagement and Activation - Inclusivity and Accessibility	Delphi panel provides insights on learner demographics, goals, and barriers to engagement.	Consensus on learner needs, program relevance, and inclusivity benchmarks.
Phase 2: Course Mapping	Designing the curriculum structure, delivery format,	- Flexibility and Adaptability	Panel discusses course pacing, modular designs, and adaptable layouts to meet	Agreed-upon curriculum structure with defined learning outcomes and

	and learning outcomes	- Structured and Clear Course Design	diverse learner needs.	clear, flexible formats.
Phase 3: Design and Development	Incorporating interactivity, multimedia, and practical applications	- Technology Integration - Practical Application and Relevance - Collaborative Learning	Experts review proposed methods for interactivity, tools for collaboration, and integration of real-world contexts.	Selection of tools, activities, and content delivery mechanisms tailored to promote relevance and engagement.
	Validating assessment strategies	- Feedback and Assessment - Structured and Clear Course Design	Delphi rounds evaluate whether proposed assessments are meaningful, timely, and aligned with course objectives.	Finalized assessments ensuring a balance between academic rigor and practical application.
Phase 4: Implementation	Strategies for engagement and inclusivity during course delivery	- Inclusivity and Accessibility - Collaborative Learning - Learner Engagement and Activation	Panel shares best practices for fostering community, enabling accessibility, and ensuring dynamic interactions.	Finalized implementation plans promoting learner engagement, collaboration, and equity.
	Evaluating technology and	- Technology Integration	Experts assess the LMS, mobile	Refined tech stack and support

	instructional support	- Flexibility and Adaptability	compatibility, and technical support strategies.	mechanisms ensuring seamless user experiences.
Phase 5: Evaluation and Revision	Identifying metrics for evaluation and frameworks for ongoing improvement	- Feedback and Assessment - Theory-Practice Integration	Delphi feedback shapes metrics for effectiveness, such as learner outcomes, satisfaction, and technology use.	Data-driven evaluation plans with actionable metrics for iterative course improvement.
	Frameworks for integrating student and instructor feedback into revisions	- Feedback and Assessment - Flexibility and Adaptability	Experts propose strategies for adapting to feedback and emerging needs.	Defined revision cycles incorporating continuous improvement principles.
Round 5: Evaluation & Revision	13. What evaluation metrics best assess course effectiveness?	Experts suggest metrics for student retention, learning outcomes, and workload assessment.	Finalized evaluation metrics for continuous improvement.	
	14. How should feedback from evaluations be integrated into revisions?	Framework for responding to learner and instructor feedback effectively.	Iterative revision processes	

4 Key Findings

The development of effective educational programmes, particularly in the context of online and postgraduate education, requires a structured approach that addresses the diverse needs of learners and the demands of the market. The decision tree and Table 7 provide a comprehensive framework for curriculum development of the eMEBE programme, and also serve as an open education resource for other educators developing new online curricula: outlining key phases, decision points, actions, and expected outcomes. This summary synthesizes the critical conclusions drawn from these resources, focusing on the needs analysis, course mapping, design and development, implementation, and evaluation phases.

Phase 1: Needs Analysis

1. **Identifying Market Needs**: The first step in curriculum development is to ascertain whether there is a clearly identified market need. If the answer is affirmative, stakeholder engagement should follow to define programme goals. Conversely, if no need is identified, a thorough needs assessment and market analysis must be conducted. This ensures that the programme aligns with current educational demands and industry requirements (DOŃSKI-LESIUK, 2023; Formicola et al., 2018, pp. eS1–eS32). Additionally, institutions will also consider market need in terms of their broader strategic plan (teaching, research, student experience).

2. **Target Cohort Profiles**: Defining the target cohort is crucial. Understanding the demographics, prior knowledge, and learning preferences of potential students allows for tailored content that meets their specific needs. If profiles are not defined, an audience/cohort analysis should be performed to gather this information (Adi Badiozaman et al., 2019, pp. 1364–1378; Grassley & Sauls, 2012, pp. 33–44). Different methodologies can be employed to do this, including online surveys (with gamification or engagement features to increase response and completion rates), focus groups and alumni sampling, amongst other recruitment strategies.

3. **Accessibility and Inclusivity**: Ensuring that the programme is accessible and inclusive is central to supporting and sustaining diversity. This involves identifying potential barriers related to culture, technology, language, and learning difference, and implementing strategies to overcome these challenges. The emphasis on inclusivity aligns with the principles of Universal Design for Learning (UDL), which advocates for flexible learning environments that accommodate individual learning differences (Bein, 1993; Jeong & Kim, 2014, pp. 258–265).

Phase 2: Course Mapping and Planning

1. **Learning Outcomes Alignment**: Clearly defined learning outcomes that align with market needs are essential for effective course mapping. If outcomes are not aligned, frameworks such as Bloom's Taxonomy should be utilized to establish clear objectives that guide the curriculum (Rezash et al., 2019, pp. 27–33; Yang et al., 2022, pp. 257–264).

2. **Course Structure and Duration**: The course's duration and structure must be suitable for the target cohort, particularly for working professionals. A flexible structure that accommodates various pathways, such as MSc, Graduate Diplomas, and micro-credentials, is recommended. If the initial structure is unsuitable, revisions should be made to better fit the cohort's needs (Sayadi et al., 2021, pp. 29–36; Watcharadamrongkun et al., 2024).

3. **Consideration of Accessibility**: Accessibility and inclusivity must be integrated into the course design from the outset. This includes applying UDL principles to ensure that all learners can engage with the content effectively (Salawu et al., 2021; Saunders et al., 2022, pp. 131–137), and that engagement drives deep and transferrable learning.

Phase 3: Design and Development

1. **Pedagogical Frameworks**: Selecting appropriate pedagogical frameworks is critical for course design. Frameworks such as Merrill's First Principles or TPACK should be applied to ensure that the course content is relevant and engaging. If suitable frameworks are not chosen, the course may lack coherence and effectiveness (Dixit et al., 2017, pp. 337–344; Hill et al., 2020).

2. **Technological Integration**: Identifying and integrating appropriate technological tools is essential for enhancing the learning experience. This includes testing interactive tools such as Learning Management Systems (LMS), virtual reality (VR), and augmented reality (AR) to foster engagement (Buck et al., 2023; Furstenau et al., 2023).

3. **Alignment with Learning Outcomes**: The course design must be aligned with the established learning outcomes. If misalignment occurs, it is necessary to revisit course mapping to ensure that all components support the intended educational goals (Hicks et al., 2008, pp. 1136–1143; Smith et al., 2019).

Phase 4: Implementation

1. **Delivery Plan Readiness**: A comprehensive course delivery plan is vital for successful implementation. This includes developing a roadmap that outlines synchronous and asynchronous elements, ensuring that both students and faculty are adequately prepared for the course launch (Prest et al., 2023; Scholze et al., 2023).

2. **Support Systems**: Establishing support systems for students and staff is crucial for fostering a positive learning environment. Regular feedback mechanisms and technical support should be in place to address any issues that arise during the course (Bauer et al., 2022, pp. 760–769; Zhou et al., 2022).

Phase 5: Evaluation and Revision

1. **Structured Feedback Mechanisms**: Implementing a structured feedback mechanism is essential for continuous improvement. This involves gathering qualitative and quantitative data to assess the course's effectiveness and identify areas for enhancement (Sangeorzan et al., 2023; Vries et al., 2023).

2. **Integration of Continuous Improvement**: Continuous improvement should be an integral part of the curriculum development process. This includes revising the course based on feedback and aligning it with updated educational standards and market demands (Chupp et al., 2022; Tang et al., 2023).

The decision tree and Table 7 provide a robust framework for curriculum development that emphasizes the importance of needs analysis, course mapping, design and development, implementation, and evaluation. By following these structured phases and addressing key decision points, educational institutions can create programmes that are not only relevant and engaging but also accessible and inclusive for diverse learner populations. This approach ultimately enhances the quality of education and better prepares students for the demands of the workforce, and forms the frameworks for developing the eMEBE programme (see WP 3.2 Curriculum Design).

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5 Conclusion and Future Directions

The integrative review and Delphi study conducted as part of the WP 3.1 project provide a robust foundation for the development of the eMEBE curriculum. The integrative review highlights the significance of employing diverse curriculum frameworks and pedagogical principles that are evidence-based and tailored to the needs of postgraduate online education.

The Delphi study complements this by offering insights from experts in the field, emphasizing the importance of flexibility, engagement, and accessibility in curriculum design. The consensus reached among experts regarding key principles for online curriculum development reinforces the need for a structured approach that accommodates the diverse profiles of learners.

In conclusion, the iterative and collaborative nature of the curriculum development process, as outlined in the WP 3.1 report, ensures that the eMEBE programme will be responsive to the evolving educational landscape. By integrating feedback from stakeholders and continuously refining the curriculum, the programme aims to provide meaningful, authentic, and active learning experiences for all students. The next steps involve engaging with educational stakeholders to finalize the curriculum design and implementation strategies, ensuring that the eMEBE programme is not only innovative but also sustainable and impactful in the field of mental health and wellbeing for older adults.

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Appendix 1

ROUND 1 questions

Theme 1: Curriculum frameworks & pedagogy

Note: Curriculum frameworks are approaches to designing a curriculum, such as Universal Design for Learning.

Q1. In your experience, what curriculum frameworks are particularly relevant in the context of designing an online Masters course?

Q2. In your opinion, what are the key pedagogical principles that should be considered in the effective design of this online masters program? For example, in relation to motivating & challenging students in the learning process?

Theme 2: Accessibility

Q.1 In your opinion, what key factors should be considered to ensure accessibility and inclusion within the context of the online learning environment?

Probe 1: Could this enable learners from different backgrounds/ with different learning abilities / different age groups?

Theme 3: Engagement

Q.1 What factors or principles are important for fostering student engagement in the online learning environment?

Probe 1: Student retention

Probe 2: Student collaboration amongst peers

Probe 3: Student engagement with course materials

Probe 4: Creating meaningful experiences?

Theme 4: Assessment

Q1. What aspects of assessment do you think are important for assessing the efficacy of problem-based online learning pedagogy?

Probe 1: What aspects of assessment would be important for this online masters in mental health?

Theme 5: Skills & competencies

Q1. What elements of the online course would be key to ensure students gain transferable analytical and team-work skills?

Probe 1: Are there key elements that would foster an authentic experience and enable employment readiness?

Theme 1: Curriculum frameworks & pedagogy	**Updated questions (after reduction)**
1. What curriculum frameworks are particularly relevant in the context of online learning?	Q1. What curriculum frameworks are particularly relevant in the context of online learning in a Masters course?
2. Which existing frameworks for online curriculum design do you find particularly relevant or adaptable to the context of online Master's program e-MEBE?	Q2. In your opinion, what are the key pedagogical principles that should be considered in the effective design of this online masters program? For example, in relation to motivating & challenging students in the learning process?

	shape the effective design of online postgraduate programs?
3. What are the key factors guiding curriculum development that are important for this online Master's program?	Q3. In your opinion, what curriculum frameworks should be considered when developing an online masters program?
4. What are the most important design principles shaping effective online learning experiences?	
Theme 2: Accessibility	**Updated question & probe (after reduction)**
1. In your opinion, what are the key factors of online learning accessibility?	Q.1 In your opinion, what key factors should be considered to ensure accessibility and inclusion within the context of the online learning environment? Probe 1: Could this enable learners from different backgrounds/ with different learning abilities / different age groups?
2. What features of curriculum are important for accessibility & inclusion?	
3. What would be key to ensure students of different ages and learning abilities can engage with this educational content that is fully online? For example, with SPSS or other program software language?	
Theme 3: Engagement	**Updated question & probe (after reduction)**
1. What principles are important for student engagement?	Q.1 What factors or principles are important for fostering student engagement in the online learning environment? Probe 1: Student retention

	Probe 2: Student collaboration amongst peers Probe 3: Student engagement with course materials Probe 4: Creating meaningful experiences?
2. What aspects of the course do you think are important to ensure student retention and prevent student drop-out?	
3. What aspects of online learning do you think are important to foster international student cooperation?	
4. What practices can we build in to encourage engagement among students of different ages and learning abilities?	
Theme 4: Assessment	**Updated questions (after reduction)**
1. What aspects of assessment do you think are important for assessing the efficacy of problem-based learning pedagogy?	Q1. What aspects of assessment do you think are important for assessing the efficacy of problem-based online learning pedagogy?
2. What aspects of assessment do you think are important for assessing the efficacy of project-based learning pedagogy?	
Theme 5: Skills & competencies	**Updated questions (after reduction)**
1. What aspects of the curriculum are required to mirror the critical professional tasks in this field?	Q1. What elements of the online course would be key to ensure students gain transferable analytical and team-work skills? **Probe 1**: Are there key elements that would foster an authentic experience and enable employment readiness?

2. In your opinion, what would be key to ensure students gain analytical and team-work skills?	

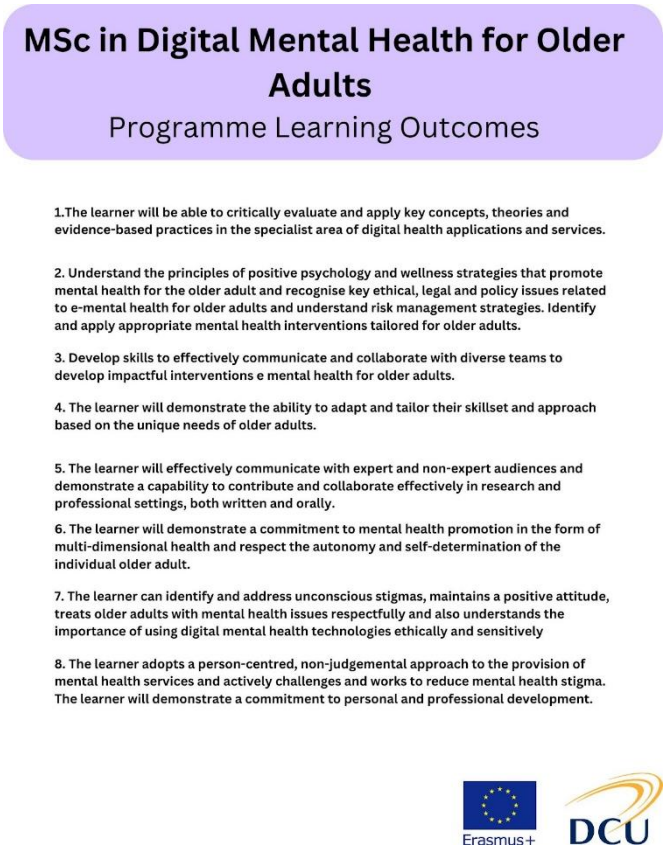
Appendix 2

ROUND 2 questions

Q1 (a) Please review the following infographic & answer the following question.

Q1 (b) With respect to the proposed masters curriculum, competency statements and eligibility criteria as outlined in this infographic, what aspects do you think are important to retain, based on your professional expertise? Do you have any particular feedback points?

Q2 (a) Please review the following information and answer the following question.



Q2 (b) Having reviewed the programme learning outcomes for the masters course, are there any edits you would make? Or have you any specific comments or suggestions?

Q3. The following factors were cited as important to consider in relation to assessment. Please rank in order of importance. Please rank 1-6, with 1 being the most important, and 6 being the least important.

- Meaningful assessment (solving real-world problems, solution focused).
- Consider the domains of communication they may need to use to communicate science (e.g. pitch, executive summary, lay summary, report writing).
- Interdisciplinary collaboration.
- Assessment of need, prioritisation of target areas. Skills to identify, map & engage stakeholders.
- Well-thought-out assessment strategy developed from the outset and communicated early on to set expectations for learners.
- Double-design assessments from the outset to accommodate learners with diverse needs and disabilities.

Q4. Please rank in order of importance the following factors to consider to promote student engagement in learning. Please rank 1-7, with 1 being the most important, and 7being the least important.

- Managing expectations from the outset is essential for retention & engagement.
- Flexibility (example timetabling).
- A mix of synchronous and asynchronous course components.
- Providing a visual map of what is going to happen during the course and when, so that students know hot spots, know when synchronous elements will be, and manage their time effectively.
- Training provided regarding collaborating online with interdisciplinary peers at course onset to enable students to effectively engage with group work.
- The course should be designed regardless of the group profile to establish commonality and ensure all students have a positive experience.
- Primers & common glossaries should be provided at course onset. Interdisciplinary primers/ bespoke primers & critical material provided at the right time in the right way and throughout the course.

Q5. In both Delphi meetings, the diversity of learners was highlighted (eg. discipline, profession, career stage). In your opinion, what are the most important factors to consider when promoting collaboration amongst diverse learners from different backgrounds?

Q6. Based on your prior experience as an educator/practitioner/researcher in higher education, and from your recent conversation with colleagues on the Delphi meeting about curriculum design, can you rate your knowledge and skills level for the following curriculum design approaches?**

****DCU Educators only****

Scale Description

- **Scale 1: Knowledge Level**
  - **1 = Minimal understanding**
  - **5 = Basic understanding**
  - **10 = Comprehensive and expert-level understanding**
- **Scale 2: Skills Level**
  - **1 = Minimal practical skill or application**
  - **5 = Intermediate practical skill**
  - **10 = Advanced practical skill, high proficiency**

Dimension	Knowledge (1 to 10)	Skills (1 to 10)
a. ABC approach (https://abc-ld.org/)		

b. Universal Design (https://www.dcu.ie/teu/universal-design-learning-introduction)		
c. Challenge Based learning (https://www.dcu.ie/teu/universal-design-learning-introduction)		
d. Assessment (https://www.dcu.ie/teu/assessment-design)		