Towards Developing a Collaborative Video Platform for Learning

Peter Tiernan MSc.
School of Education Studies
Dublin City University
peter.d.tiernan@dcu.ie

Cathal Gurrin PhD.
CLARITY Centre for Sensor Web Technologies
Dublin City University
cgurrin@computing.dcu.ie

Abstract

The work presented in this paper outlines issues relating to the development of a collaborative video platform for learning. Student adoption of collaborative and video technology is increasing dramatically, becoming part of their everyday lives. The aim of this paper is to propose a system and framework for the successful integration of these technologies into teaching and learning. At the outset we assess current trends and previous research, using these findings to inform the development of a new platform. System specifications are then presented with specific needs identified for students and educators. Finally our tentative framework for a integrating a collaborative video platform for learning is presented.

1. Introduction

The purpose of this paper is to outline our ideas for developing a collaborative video platform for learning. Within these pages you will find a justification of our belief that developments in this area are necessary. Included also is a summary of previous research carried out, exploring the impact of findings. Furthermore we use these results to inform the development of our platform, including the pedagogical grounding in using collaborative and video technologies.

We know from previous work (outlined in the following section) that a collaborative video platform for learning has immense potential. However, in order for this potential to be fully realised, the platform must be built on a solid educational framework [1].

The use of video and collaborative technologies has been advancing at pace in recent years, culminating in its use for collaborative learning and creative expression. The challenge that now faces educators is to provide students with a framework that enables them to learn using new media. Meaning they can think, analyse, create, and share information using digital media [2]. In meeting this challenge it is imperative that we provide a rich and varied approach to instruction, blending these technologies with traditional teaching strategies, thus providing a well rounded learning environment [3]. We must also recognize that technology alone does not engender innovation. It is instead when technology and instructional pedagogy are fused, that something truly new is created [4]. Over the next number of pages we will establish the background to our work, summarising research which we believe promotes the integration of these tools. We will then introduce our system specifications and learning framework, which are brought to life using collaborative and video technology.

2. Background

We began by examining student attitudes to collaborative and video tools currently available. We found that use of social networking sites (SNS) and video sharing sites (VSS) is extremely high, both for personal and academic life. Many students are using these platforms to collaborate on ideas and assignments. Interestingly, students report that while institutional use of technology has a mixed impact on their learning, personal use of SNS and VSS to debate topics and collaborate has a significant one [5]. Kaufman & Mohan [6] found that while students are becoming more comfortable collaborating with video content online, this has not been met with

increased integration into teaching and learning in their institutions. This does not however, as it would initially appear, signify a lack of interest on the part of educators. If fact educators from across the spectrum are hungry to provide their students with collaborative, on-demand video services. They recognise the merit in facilitating student collaboration and discussion, especially around short, focused video clips, suitable for learning. Educators seek more sophisticated ways to integrate these technologies without the current burdens of time, access to content, technical skills and human resources to maintain them [6][7].

We then moved to evaluate video as an instructional tool. Video can increase student motivation and willingness to learn. It encourages interaction with peers and educators, while offering true-to-life scenarios and viewpoints to which students can relate. In the right hands video can spark debate by broadening outlooks and offering different perspectives on topics being discussed [8][9]. In addition, empowering students to become content creators using video helps to draw out their creativity in ways that are not possible using conventional assessment methods [10]. This act of expression through digital media helps to ensure their potential is reached in a curriculum currently dominated by a single representation of understanding [11]. The ideal environment for learning provides students with the tools to collaborate with one another on common tasks, while also offering them the tools to create exemplary content to share [7].

Having established student utilisation of collaborative tools and the benefits of video for learning, it was pertinent to review previous studies carried out on video services. Initial trials were conducted in Dublin City University using a video-on-demand service with some collaborative features. These features included: content overview, interactive controls, and the ability to create custom video descriptions. The study found both staff and students valued the service. Staff regarded the ability to sort and tag video into relevant clusters for student viewing as an important step forward in linking concepts. Students main attraction to the system was the ability to control their learning, allowing them to pause, rewind and review content. This degree of control allowed time to absorb information and take supplementary notes where necessary. During feedback, students requested a more personalised, social system that would enable them to bookmark, annotate, and share opinions and video clips with peers [12]. A similar trial conducted in Iowa State University found that while making use of the video-on-demand service mandatory, and in particular linking its use to continuous assessment, yielded the greatest results. Students had a similar appetite for more interactive ways of engaging with peers and content [13]. Access to content is also a critical factor, with the best results being achieved when material is available through a web interface both on and off campus. Content should be openly available before and after topics are covered during lectures, giving students time to digest and assimilate information [14].

Video search technology has enjoyed much development in recent years. It is essential to understand how these developments will affect the design and functionally of a new platform. It is now possible to search the entire, media rich content of a video and return a list of relevant, concise video segments for the user to choose from [15]. Using advanced video search techniques (spoken & written word, annotation, images) reduces the amount of time required to find content, while offering more accurate and targeted results. Content is equally important and a platform must contain the right quantity of news, current affairs and documentary programming in order to appeal to a wide range of users and uses [16]. Recent advances in search design put the power of search into the hands of the user. Techniques such as facial detection and recognition, video segmentation and speech-to-text based searches have huge educational potential linking content by words, imagery and topic [17].

The above research has established that both students and educators value the impact video and collaborative technologies can have on teaching and learning. To realise the untapped potential, strategies must be employed to encourage engagement and interaction with content, educators and peers [18]. Improvements must be made in access to content, organisation of content for retrieval, and assimilation with discussion and collaboration tools. These tools must be brought together using an intuitive user interface that focuses on learning not mastering the technology [19].

3. System design and framework

Further investigation of the above works allows us to collate the information into the following lists of criteria for our collaborative video platform.

3.1 Search Criteria

Search criteria (Figure 1) outlines in detail the search parameters our platform will need to offer. Users require detailed search by content type: defining their search in terms of news, documentary, skills based material etc. Users also require search 'descriptions' to refine their search e.g. introduction, summary etc.

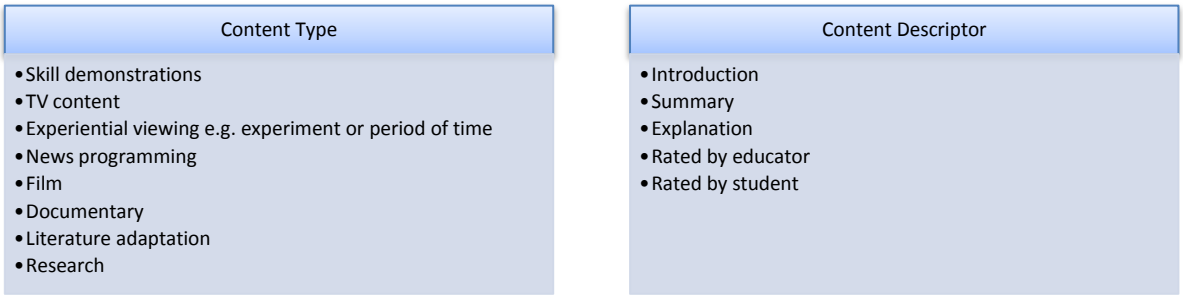

Figure 1. Search Criteria

3.2 Educator needs

Specific requirements identified for educators (Figure 2) indicate a sophisticated level of control over search functionality is desired, for example the ability to search for content by difficulty level and region. Teaching and learning information such as lesson plans and discussion points, are also desired. Finally, the incorporation of a "teachers area", allowing educators to create and share resources with others, would greatly benefit the functionality of the platform.

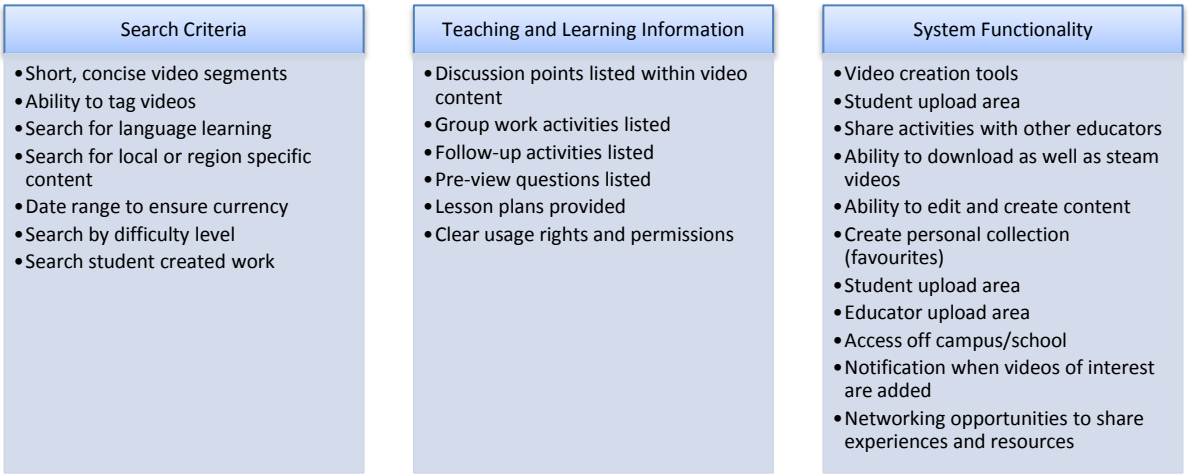

Figure 2. Educator needs

3.3 Student Needs

Students needs (Figure 3) centre around ownership and access to the platform, search functionality, and collaborative features. The platform should complement, not replace existing teaching strategies. Access should be personalised and unrestricted, allowing for the creation of content. The user interface should be intuitive and allow for full control when viewing content. Collaborative features should allow students to tag, annotate and highlight video segments for discussion

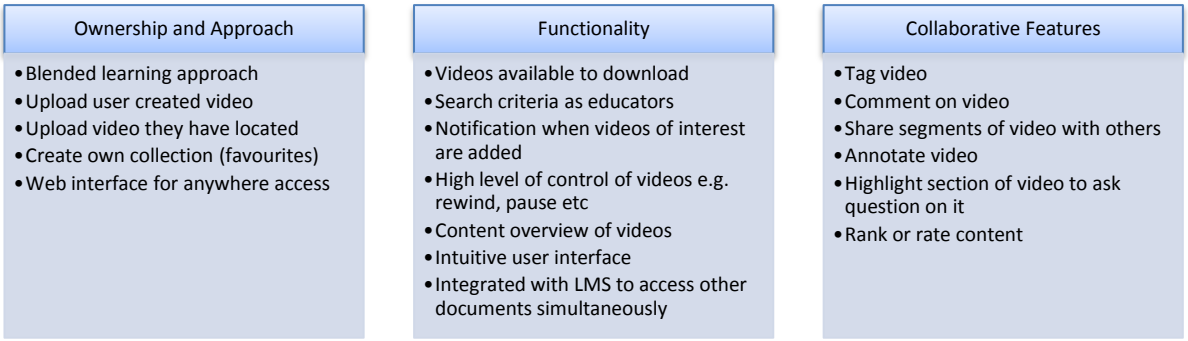

Figure 3. Student needs

3.4 UISCE Framework

In addition to the technological requirements outlined above, information was used to develop a pedagogical framework to support the integration of our platform into teaching and learning. We believe that a blended learning approach is most effective and that our collaborative video platform can be used in conjunction with, and to augment traditional teaching strategies. Our pedagogical framework, UISCE, highlights what we believe are the most important factors in its integration.

U - Understanding - The overall aim of this framework is to improve teaching and learning. We are not concerned with the promotion of technology, but promoting the development of pedagogical approaches to the use of a collaborative video platform. These approaches are designed to benefit the widest range of students and are outlined below.

I – Inquiry – To take full advantage of the advanced search and collaborative features provided, students should be assigned problems and tasks to complete individually and in groups. These tasks should be exploratory in nature; encouraging students to source and evaluate information, then discuss, debate, and find solutions.

S – Support – Support must be provided through traditional face-to-face teaching approaches. This gives context to collaborative work and provides space for traditional engagement. Support must also be provided during learning using the platform. Tools such as (virtual) notes pads, chat functionality, mind maps and bookmarks, give students the tools they need to learn and collaborate online.

C – Collaboration – Using the tools outlined above students should be given opportunities to work together to complete tasks. Course and assignment work should incorporate working together using the platform to achieve a common goal. Additional collaborative opportunities should be provided by ranking and evaluating video content.

E – Expression – Students should be given the opportunity to express their learning through video and collaboration. Assessments should involve the creation of video artefacts. This allows students to express themselves in new ways and display their creativity. Real learning occurs when students combine lectures, readings, video and collaborative activities into their own video representations.

4. Conclusion

Over the preceding pages we have demonstrated the need for a framework for the integration of a collaborative video platform for learning. We have shown that student use of these technologies is increasing and that both they and their educators are hungry to use these tools. Through our examination of case studies we have highlighted the benefits of using video in education, drawn out learning from similar trials and outlined future possibilities in the area. We have also proposed a system specification based on student and educator requirements. Finally we introduced our framework for collaborative video learning, identifying the key elements we feel are necessary for both educators and students to fully engage with the system and ensure a positive impact on teaching and learning.

5. Future Work

The next step in the process is to construct the platform and conduct trials with a wide range of students. This will lead to a greater understanding of our platforms ability to promote learning.

6. References

[1] S. Crump, "e-education: electronic, emotionless and efficient", journal of education policy 14:6, Routledge, 1999, pp. 631-637.

[2] M. Prensky, "H. sapiens digital: From digital immigrants and digital natives to digital wisdom", Innovate 5 (3), Fischler School of Education and Human Services, Nova Southeastern University, 2009.

[3] M.J.M. Farreira, "Intelligent classrooms and smart software: Teaching and learning in today's university", Springer Science and Business Media, Springer publications, 2010.

[4] M. Pearson and S. Naylor, "Changing contexts: Teacher professional development and ICT pedagogy", Springer Science and Business Media, Springer publications, 2006.

[5] S.D. Smith, "The ECAR Study of Undergraduate Students and Information Technology, 2010", Educase, Colorado, 2010.

[6] P.B. Kaufman and J. Mohan, "Video Use and Higher Education: Options for the Future", New York University, New York, 2009.

[7] M.A. Mardis, "Viewing Michigan's digital future: results of a survey of educators' use of digital video in the USA", Learning, Media and Technology 34:3, Routledge, Florida, 2009, pp. 243 - 257.

[8] D. Denning, "Video in Theory and Practice: Issues for Classroom Use and Teacher Video Evaluation", InNATURE Productions, Victoria, 1992.

[9] J.J. Gallagher, "Developing a Heritage and ICT project in 12 Irish Primary Schools, Education and Information Technologies 10:3, Springer publications, Sligo, 2005, pp. 165-175.

[10] M. Papastergiou, "Physical education and sport science undergraduate students as multimedia and web developers: Moving from the user's to the creator's perspective", Education and Information Technologies 16:3, Springer, 2011, pp. 281-299.

[11] J.R. Beilke and M.J. Stuve, "A teacher's use of digital video with urban middle school students: Expanding the definitions of representational literacy", The Teacher Educator 39:3, Routledge, London, 2010, pp. 157-169.

[12] C. Gurrin, P. MacNeela, A.F. Smeaton, H. Lee, P. Browne, and K. McDonald, "FISCHLÁR-NURSING, using digital video libraries to teach nursing students", ACM Symposium on Applied Computing, Nicosia, Cyprus, 2004, pp. 1084-1090.

[13] P. Mustillo, P. Bélanger, G. Fayad, and I. Menzies, "A User Interface Design for a Video-on-demand Service Trial in and Educational Setting", European Journal of Engineering Education 22:2, Taylor & Francis, London, 1997, pp. 135-142.

[14] I.N. Toppin, "Video lecture capture (VLC) system: A comparison of student versus faculty perceptions", Education and Information Technology 16:4, Kluwer Academic Publishers, Massachusetts, 2011, pp. 383-393.

[15] C. Gurrin, "content-based video retrieval", Encyclopaedia of database systems, Springer, USA, 2009, pp. 466-473.

[16] Smeaton, A. Content-based access to digital video: the Físchlár system and the TREC Video track. Paper presented at MMCBIR 2001 - Multimedia Content based Indexing and Retrieval (INRIA, Rocquencourt, France, September 2001. http://www.cdvp.dcu.ie/Papers/MMCBIR2001.pdf. Last accessed November 2010

[17] P. Ferguson, C. Gurrin, H. Lee, S. Sav, A. Smeaton, N. O'Connor, Y.H. Choi, and H. Park, "Enhancing the functionality of interactive TV with content based multimedia analysis, Multimedia, 2009, pp. 495-500.

[18] N. Davis and D.S. Niederhauser, "Socio-Cultural analysis of two cases of distance learning in secondary education", Education and Information Technologies 10:3, Iowa State University, 2005, pp. 249-262.

[19] R.M. Aiken and J.N. Aditya, "The golden rule and the ten commandments of teleteaching: harnessing the power of technology in education", Education and Information Technologies (2), Springer publications, 1997, pp. 5-15.

.