EMBEDDING DIGITAL COMPETENCES IN THE CURRICULUM: A CASE STUDY ON STUDENT-EXPERIENCE OF AN ONLINE TECHNOLOGY-ENHANCED, ACTIVITY-BASED LEARNING DESIGN

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Introduction

The purpose of this paper is to evaluate the student experience of an online technology-enhanced activity-based learning design that has been developed to facilitate the embedding of digital competences in the health education curriculum. Previous work has shown that digital literacy can be identified as the collection of digital competences and skills that can be measured (Evangelinos & Holley, 2014b); however the qualitative interpretation of the results was standing on a complex, highly individual profile for each participant (Evangelinos & Holley, 2014a). The conceptual model for curriculum development is founded on the premise that technology-enhanced, activity-based and collaborative learning (Goodyear, 2001) interventions should become an integral part of the curriculum design and delivery as there is wide consensus on the increasing trend of using digital technologies in all professional and employment sectors (Didero, Husing & Korte, 2009; The Economist, 2014) including health and education. Digital skills are the most transferable skills (Balcar et al., 2011) especially relevant to life-long and life-wide professional development (Figel', 2007). Literature in general, widely supports that within education, the communication of knowledge has drastically changed because of the fast rates of development of digital technologies and the associated implications upon society (Hanna, 2011). Digital proficiency is acquired; therefore, it should be measured in the context of specific tasks.

The intervention was delivered via the institutional Virtual Learning Environment (VLE) by means of eight online study activities. The content of the activities was based on aspects of the existing curriculum but each activity introduced elements of digital competences identified by the European Union Digital Competence (DIGCOMP) framework (Ferrari, 2013). The nature of digital competences and the delivery mode of the module necessitated the embedding of digital skills within the curriculum so as to make them relevant for incorporation into the existing study programme for two equally important reasons: i) the students should be able to develop the digital skills needed for successful studies; ii) there is evidence that digital skills are best 'embedded' in the 'normal' curriculum and should not be offered as a separate training course difficult to relate to and incorporate into the students' busy workload (Leeds Metropolitan University, 2011; Thomson et al., 2014). The purpose of the case study was to pilot a Learning Design (Dalziel et al., 2013) activity-based approach for embedding digital

literacies in the curriculum and assess the student experience of undertaking technology-enhanced learning activities. The curriculum development model and the digital competence framework used to map digital literacy are transferable to different disciplines.

Methodology

The technology-enhanced curriculum intervention was offered to 102 first-year Midwifery students and was delivered via the institutional VLE through eight electronic activities following Salmon's (2002) 'e-Tivity' model. The research schema comprised of eight sessions starting with a pre-course questionnaire, six technology-enhanced learning interventions and the final session focussed on reviewing the student experience through short reflective diaries. The intervention was part of their first study module that was selected because of the suitability of its scheduling and the enthusiasm of the module team to experiment with technology-enhanced learning designs. The selection of a first-year module was purposeful as it alleviated concerns around student preconceptions of what a standard 'face-to-face' delivery should entail. Since the intervention was offered as an add-on, it was delivered via the institutional VLE in a blended-learning fashion utilising an activity problem-based approach in addition to the scheduled content of the module because of restrictions imposed by the institution's module validation and quality assurance processes. At the time of the intervention the module was taught by a number of tutors under the co-ordination of the module leader in two different campuses. In order to maintain parity of the student experience two student groups were formed based on the geographical location of their studies. Both groups were given exactly the same information and were subjected to the same research protocol. Explanations of all the ethical considerations regarding confidentiality of collected data, anonymity of the subjects and ownership of the study were transparent; informed consent in writing was provided by the participants who were given the choice of participating anonymously, withdrawing without penalties or even dictating conditions on the use of data.

The first activity required the students to answer a bespoke self-assessment questionnaire (Evangelinos & Holley, 2014b) that established the digital-competences potential across the groups and highlighted areas of interest. The toolkit, comprised of the twelve digital competence areas identified by Janssen and Stoyanov (2012), allowed the creation of group digital competence 'maps' used to quickly identify areas of interest. The six activities that followed were technology-enhanced e-tivities aiming to deliver different aspects of digital competences by presenting short problem-based tasks on midwifery-related content. These tasks had to be researched, compiled and presented electronically and required the utilisation of a variety of digital skills. The last activity asked the students to report reflectively on their experiences of undertaking the learning activities with respect to developing their digital competences by keeping a short reflective diary that was completed by 20 students (19% participation rate). A grid of the mapping of the eight e-tivities against the twelve digital competence areas can be seen in Table 1 below.

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George Evangelinos, Debbie Holley

Table 1:   e-Tivities Mapped against the early version of the DIGCOMP Framework Digital Competence Areas

E-Tivity / Digital Competences	1. General knowledge and functional skills	2. Use in everyday life	3. Specialized and advanced skills for work and creative expression	4. Technology mediated communication and collaboration	5. Information processing and management	6. Privacy and security	7. Legal and ethical aspects	8. Balanced attitude towards technology	9. Understanding and awareness of the role of ICT in society	10. Learning about and with digital technologies	11. Informed decisions on appropriate digital technologies	12. Seamless use demonstrating self-efficacy
01	✓											
02												✓
03					✓							
04			✓									
05										✓		
06				✓								
07											✓	
08	✓											

The student experience and the impact of the interventions were documented by conducting two focus groups, one for each location, that were attended by 32 students (31% participation rate). The focus groups were conducted in a semi-structured approach by projecting a presentation onto the screen with questions prompting the students to elicit answers, thus maintaining concentration on the key questions. The students were encouraged to comment as they pleased, elude and/or expand to any other relevant areas. The discussions within the focus groups were recorded, transcribed and analysed through the use of QSR NVivo software. The analysis was conducted by coding the focus group corpora and the reflective diaries into themes following Glaser and Strauss' (1967) Grounded Theory approach and the coding recommendations from Miles and Huberman (1994) and Guest et al. (2012).

Results and analysis

The evaluation of the student experience was carried out through the analysis of short reflective diaries produced by the students when asked to report reflectively on their experience of undertaking the learning activities with respect to developing their digital competences. Two semi-structured focus groups were conducted to capture the participants' most prominent thoughts and feelings. The diaries and transcribed focus groups were studied through thematic analysis that involved the coding, refining and summarising of emergent concepts into categories and themes. In the analysis below only the themes mentioned by most (n > 10) of the participants were included as representative of the majority of the views of the participating student population. The stacked bars in Figure 1 below correspond to references to each theme extracted from the focus-groups (FG) discussions and the reflective diaries (RD). The 'ticks' on the line labelled 'Sources FG and RD' that is running across the themes denote the relative 'power' of each theme measured by the number of participants that made a reference relevant to the theme.
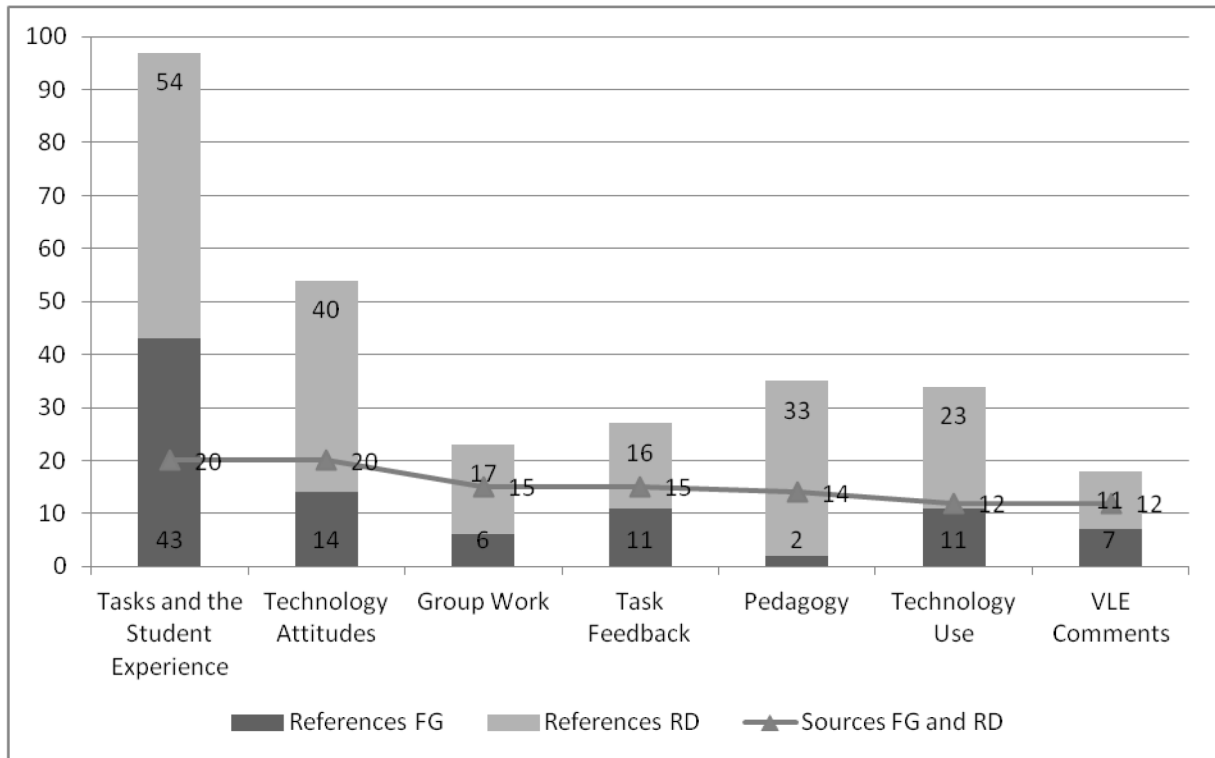
Figure 1. The Focus Group and Reflective Diary Themes

The participants found the tasks interesting and enjoyable and felt that the tasks motivated their learning, allowed them to learn at their own pace remotely, minimised the need for travelling, allowed them to revisit the material at any time and enhanced their digital skills and confidence. They liked the use of multimedia such as videos and interactive learning objects rather than the usual text-based resources and the 'loose' deadlines imposed for the completion of the tasks. A significant minority of participants liked the honing of self-directed learning skills that made them feel more capable, independent learners and cultivated their research skills. A small number of participants felt that the activities did not really enhance their digital skills as they were not stretching enough. Less technically able students found some of the activities challenging. The majority reported that they gained or refreshed existing skills by completing the activities. The online delivery of the activities was described as distracting for some participants who preferred a more instructional approach rather than the self-directed learning of un-facilitated online activities that caused confusion about the depth and breadth of the detail needed for the completion of the tasks. This aspect was also identified through comments on the variety of the learning resources and in particular the varied levels of difficulty some activity resources presented. It was reported difficulty in managing the study-schedules due to competing commitments such as summative assessments and other placement responsibilities.

The attitudes towards technology were fairly diverse having the same participant reporting positive and negative experiences. A number of them reported a realisation of the increased communication channels offered by technology, elevated self-awareness and an appreciation for the impact of new technological developments such as social media. Some participants

enjoyed to be taken out of their comfort zone through challenging tasks but others felt less comfortable especially when they realised that learning technological skills could be time-consuming and were worried on the impact this might have on their already busy schedules. Concerns were raised in the broad assumption that using technological systems in healthcare is always time and effort efficient where some participants reported experiences about the opposite. The availability of technology does not readily result in its increased use especially when technology is to be used in demanding or difficult situations. The importance of training and support for the use of technology was emphasised by extensive consensus.

For the provision of feedback on the tasks the participants expressed strong views. A number of them reported positive experiences of receiving meaningful, positive and timely feedback; however, there were inconsistencies across the groups as some tutors took a lot longer to reply. Some participants did not like the lack of a direct way of acquiring feedback on the tasks other than emailing the tutors. The participants requested for examples in the belief that these could make it easier for them to understand the nature of the type of work required.

The students greatly appreciated group work as it allowed them to get to know their peers and share their knowledge and skills; it facilitated the exchange of ideas and approaches and generally it was characterised as an enjoyable experience. Peer group exchanges on the various topics studied were also well received as people recognised the benefits of sharing the knowledge and research results across the different groups. Networking and socialising with their colleagues was also well received and the group-work tasks were seen as an ice-breaker that allowed people to meet and socialise in a more direct way. Team-formation dynamics were identified when people were asked to work together. Some groups decided to equally share responsibilities while others assumed a management model where roles were negotiated and leaders, managers and workers were identified. A small number of participants reported that they found group work difficult because they lived far away from the university campus and group meetings involved extra travel but otherwise they found the experience of engaging in meaningful study-tasks positive.

From the pedagogic perspective, participants found that the activities developed their information and research literacies as they encouraged them to search through multiple channels of information dissemination and critically evaluate the appropriateness and credibility of the sources. They chose resources relevant and suitable to their own learning styles as some preferred to learn by utilising audio-visual material rather than text-based resources. Self-directed learning blended with instructional approaches seemed to work well for some of the participants evidenced by the self-actualisation of the learning processes and, in one case, a transformation from inexperienced to confident student through self-directed study was reported. Some felt a bit uncomfortable with the use of perceived non-authoritative resources and they would prefer a standardised list of tutor-reviewed and approved resources. The activity of creating their own mini questionnaires around a topic made them consolidate their knowledge and double-check their understanding although some were not confident enough about the quality of their produced outputs.

The reported technology use involved the utilisation of digital devices such as desktop and laptop computers, mobile tablets and telephones, and a variety of software packages. The participants were primarily concerned with either not acquiring enough of the technological skills or getting too involved in technology rather than in the content. Some experimented with using technologies more creatively to deliver the tasks but they reported that when they started feeling the pressure of their other studying commitments they quickly reverted to using the technologies they were already familiar with, thus losing the opportunity to broaden their skills. Some felt intimidated by the quality of work their more technically able peers had produced. Many pursued the help of digitally competent friends or relatives to learn how to use a piece of technology. Some reported they struggled for completing the tasks from a technological perspective but, nevertheless, they did their best to complete them.

The Virtual Learning Environment (VLE) was reported as easy to use and a great tool for accessing the module resources, collaborating, sharing and reviewing the work with their tutors and peers. Others initially found the VLE difficult to use but this was overcome after they were shown how to use it. A significant number reported problems when dealing with video files on the VLE, but investigation proved that this was down to technical limitations of the system. Some usability issues were also reported when trying to connect with the VLE via mobile devices as the system was not optimised for the smaller screen sizes and the lack of mouse and keyboard inputting devices. Overall, most students coped well with the system, felt supported when things went wrong and found undertaking this kind of online activity-based learning on the VLE genuinely useful and suitable to their learning style.

Discussion

The digital competence self-assessment toolkit was used to baseline the overall level of digital competence of the group but it was not used to develop the activities as the decision on the content of the activities had been made prior to administering the questionnaire for reasons of practicality, imposed by the nature of this pilot project, and because the university procedures at that time did not allow for agile course curriculum redefinition and redevelopment. The digital competence maps were used to baseline the average competence level of the group.

Due to restrictions imposed by the piloting nature of the project two more factors that influenced the student experience need to be carefully examined: a) the lack of protected time within the curriculum delivery to undertake the activities and b) the lack of an accreditation scheme. The same also affected indirectly the tutors' available time for providing feedback, which is another major concern recorded by the students. Potential solutions to address these major concerns are: the embedding of this type of activity into the normal curriculum delivery from the design stage so as to integrate it within the available time, and the use of formative and summative assessments to accredit the effort, acknowledge participation and, most important, to ring-fence/allocate tutorial time for marking and feedback.

There is need the curriculum content of the activities and the embedding of digital skills to be balanced carefully so as to ensure that the benefit of acquiring sufficient 'technological competence' is not gained on expense of the actual-learning content. The mapping of the potential technology-enhanced learning interventions against the curriculum content and the digital skills should be considered carefully in order to balance the informative with the other activities that deliver the wide gamut of digital skills required by modern healthcare professionals. The wide variation of digital skills and competences among a group that includes complete novices, competent users and expert individuals complicates the task of making the technological perspective interesting and challenging without rendering it too difficult or even out of reach for a significant number of people. There was also agreement in that the participants would have liked informal training and support in order to acquire or enhance their digital skills.

The analysis of the reflective diaries and the transcribed focus-group corpora falls within the qualitative research paradigm; therefore, it can only be characterised as an interpretation of the views of the participants, summarised at group level to elucidate the general group trends and opinions. In order to strengthen the validity of this type of analysis only the themes mentioned by the majority of the participants have been presented. The relative 'power' of each theme has been determined by counting the number of references that have been grouped under the identified themes mentioned by the participants and the number of individuals reporting on a theme.

The most prominent criticism concerned the online activity tasks and the perceived lack of clarity on the depth and breadth required for successful completion. It is interesting to note that these comments referred to the contextual content and not to the technical aspects of the activities. Consideration of whether the activities should have been more prescriptive was given prior to the intervention but the module leader decided to loosely define the activities so as to allow for flexibility in their interpretation. As this was the first time of piloting this type of intervention the module leader did not want to impose strict criteria and inhibit the creativity of the students. The level of knowledge and the digital competence of the individuals were unknown at the time of preparation of the pilot and a strict definition of the tasks could render participation in this intervention very difficult for the less able or uninteresting for the competent students.

Concluding remarks

The results showed that participants overall evaluated the interventions as interesting, worthwhile and useful for their learning. Improvements that could enhance their overall experience were: personalisation and flexibility at the curriculum-content level and digital-competence skills to ensure that every student enjoyed the maximum benefit, irrespective to their starting competence point.

This case study should be of interest to anyone that would like to enrich their curriculum offering by embedding digital skills into the curriculum design and delivering technology-enhanced, activity-based learning that has the potential to increase student engagement and enhance the student experience. Moving forward this process should be rationalised as a quality enhancement procedure that can be utilised by academic professionals working with large groups of students across a variety of disciplines.

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