IMPLEMENTING A MODEL AND PROCESSES FOR MAPPING DIGITAL LITERACY IN THE CURRICULUM (ONLINE BADGES)

George Evangelinos, Anglia Ruskin University, Debbie Holley, Bournemouth University, Mark Kerrigan, Anglia Ruskin University, United Kingdom

Introduction

Digital literacy has been identified as an essential part of a number of other skills and competences that should be developed and are collectively known as 21st Century Skills (The Partnership for 21st Century Learning, 2015; United Nations Education Scientific and Cultural Organisation, 2008). The increasing demand for the workforce to become digitally competent compels educational institutions to review their programmes and ensure that digital skills become embedded as a graduate attribute (Figel', 2007; Quality Assurance Agency, 2014). In the UK and at a national level, the ambition to enhance the digital capability of the workforce and the population in general has been articulated in numerous occasions by a variety of stakeholders. Examples within Higher Education include national initiatives such as the Developing Digital Literacies programme (Joint Information Systems Committee, 2013), the Digital Literacies in the Disciplines programme (Higher Education Academy, 2014) and the Changing the Learning Landscape programme (Higher Education Funding Council England, 2015) to name a few. The main drivers for enhancing the digital capabilities of a diverse student population have been identified as a requirement by employers as well as by professional bodies; the same issue was also reflected in the Government and funding council's strategies and policies (House of Lords – Select Committee on Digital Skills, 2015; Quality Assurance Agency, 2014).

A unique perspective was gained whilst working within a faculty and supporting their learning-technology developmental needs as a professional practitioner. The need for a new approach to academic professional development of digital capabilities was identified. It was observed that the established methods of delivering technology training to academic staff had limited impact in increasing their digital capabilities in practice. This was particularly noticeable when examining the application of newly acquired digital skills to teaching practices and curriculum delivery. The main reasons identified from, but also documented in literature, were: (a) lack of structured models for developing and employing new and innovative digital approaches to teaching (and learning), (b) resistance to change, (c) failure to utilise the opportunities of informal learning (and teaching) and (d) difficulties to capitalising the affordances of technology for formative assessment (European Commission, 2014; Johnson et al., 2013; Johnson, Adams-Becker, Estrada, & Freeman, 2015).

Establishing a Framework to Describe Digital Literacy

Having established the above as challenges that had to be addressed, it became apparent that an effective process and operational model was required for the development of digital literacies of staff and students. The first major concern in designing the model was to establish a common language to describe what constituted *digital literacy* within higher education. Digital literacy is understood as describing the competences, skills and attitudes of people using digital technologies (Ala-Mutka, 2011; Ferrari, 2012). These skills and attitudes are constantly evolving as technology changes and the individuals become more technologically capable or acquire new technologically-enabled interests. Digital literacy is a general term that signifies competency in using digital technologies but its meaning is wide-ranging and not specific enough without further classification.

In order to investigate what digital literacy signified to academics, academic professionals and students in healthcare education the digital-literacy attributes had to be defined. Establishing an appropriate framework was an essential requirement for two reasons: (a) the framework had to be validated by the main stakeholders against its appropriateness and suitability to describe digital literacy in health education and (b) digital literacy is a generic, high-level concept difficult to define without significant elaboration of the specifics of the context. For this reason, and before engaging the non-expert stakeholders in the exploratory validation case-study, it was important to establish a common frame of reference on what digital literacy was. This was achieved by creating a self-assessment questionnaire (Evangelinos & Holley, 2014b) based on the initial results of the $DIGCOMP_{v.0}$ framework (Janssen et al., 2013) which was used to baseline the digital literacy characteristics of the participants, and as a research instrument for conducting the semi-structured interviews to validate the framework. The questionnaire included the twelve high-level competencies identified in the framework which were further defined by five statements per classification area. A six-point, Likert-type agreement scale was used to enable the participants to self-assess by agreeing or disagreeing with each statement. The results showed the questionnaire could be used to baseline the general level of digital competence of individuals and groups and visualise their digital competence characteristics.

A case study on the applicability of the European Union $DIGCOMP_{v0}$ framework when used in embedding digital literacy into the healthcare curriculum found that it was applicable as a generic framework for professional practice (Evangelinos & Holley, 2014a). The interview data from academics, students and administrative professionals indicated that participants demonstrated highly individualised digital-competence characteristics and behaviours. The results of this study have been updated to reflect the published $DIGCOMP_{v1}$ version (Ferrari, 2013) in a later study (Evangelinos & Holley, 2015a). The DIGCOMP framework was chosen as it defined digital literacy granularly and described its multi-dimensional components in generic terms and sufficient detail illustrated by specific examples.

The digital literacy self-assessment questionnaire was also updated to reflect the structure of the published version of the DIGCOMPv1 framework and utilise a new scenario-based approach to produce more accurate results. This updated questionnaire was used, alongside a survey of the student experience on using digital technologies, to assess the students' digital literacy when using tablet devices for the assessment of their clinical competences in practice (Evangelinos & Holley, 2016b). A staff-specific version of the questionnaire was developed along the same lines and was administered to academic staff merged with additional questions for the assessment of their professional digital practices; it aimed at investigating the potentials and limits of measuring the staff's digital capabilities.

Towards Embedding Digital Literacy in the Curriculum

The increasing digitisation of our society had a strong impact on the ways information is communicated in higher education. Students should develop their digital skills not only for the completion of their studies but also to become successful in their future career. Digital skills are acquired when engaging with digital technologies to carry out specific tasks. Evidence supports that digital capability is developed more efficiently when the digital skills are embedded in the curriculum (Leeds Metropolitan University, 2011; Thomson et al., 2014) and contextualised within a discipline.

Based on this principle a pragmatic approach utilised a model for developing digital literacy as a second-order learning outcome of technology-enhanced, activity-based learning designs. The concept of using a learning design to purposefully enhance the curriculum and deliver digital literacies has been explored as part of the Open University Learning Design Initiative (OULDI) project (Cross, Galley, Brasher, & Weller, 2012; Galley, 2011). Learning Design as a discipline is concerned with the development of a framework of educational notation that could be used to describe learning and teaching activities and facilitate the sharing of good practices among educational practitioners. As Dalziel et al (2013; p.1) explain in the opening page of the Larnaca Declaration on Learning Design aims "… to convey great teaching ideas among educators in order to improve student learning.' Learning Design is perceived as an abstract 'meta-model'" aiming to describe a variety of learning activities that could be based on different pedagogies and, in this light, it could be characterised as pedagogically neutral (Dalziel et al., 2013). The model was investigated by conducting two case studies that evaluated the student experience of undertaking technology-enhanced learning activities online (Evangelinos & Holley, 2015b) and when using mobile tablet devices in the classroom (Evangelinos & Holley, 2016a).

The first case study assessed the student experience of undertaking learning activities designed according to the classifications of the DIGCOMP$_{v0}$ framework to deliver parts of the curriculum content in a technologically-enabled way for the enhancement of their digital capabilities. The activities were delivered to the students by setting-up eight online study activities within a Virtual Learning Environment (VLE). The student experience was evaluated by asking the students to keep short, reflective diaries on the development of their digital capabilities when completing the activities. Students found the activities stimulating,

meaningful and importantly useful for their learning. Reflecting on the results revealed that the model could be further improved by constructing the curriculum content and the digitally-enabled activities in a flexible way that would allow personalisation so as to maximise the learning gain for all students regardless of their starting competence point.

The second case study documented the experience of a group of student midwives undertaking a similar set of ten technologically-enabled learning activities in the classroom by utilisation of tablet devices. The digital component of the learning activities had been modelled according to the DIGCOMP$_{v1}$ framework taxonomy and the student experience was evaluated by issuing a short questionnaire. The results of this second case study reinforced the previous findings, with the majority of the participants reporting that they enjoyed working collaboratively, benefited from engaging in activity-based learning and felt that they possessed the required digital skills to complete the activities. However, a significant minority reported that they needed to further develop their skills in using digital technologies. In general, participants acknowledged that technology-enabled, activity-based learning has been beneficial for their personal and professional development.

Having explored the implications of this technology-enhanced, activity-based learning-design model on the student experience, a further need was identified: to devise a plan for the staged implementation of this approach. Curriculum re-development is a time consuming and complex process, difficult to justify without having unambiguously established the student benefits and fully developed the necessary quality assurance processes. For these reasons a small funded project investigated the potential and limits of acknowledging the digital literacy characteristics existing in the curriculum. The project was designed to pilot a process and related tools for issuing online *badges* in recognition of the digital capabilities that students acquired by experiencing and successfully completing the modules in their respective programmes of study. The project started in October 2015 and is due to end in July 2016. The modules shortlisted for the pilot were mapped against a set of bespoke digital-literacy attributes that constituted the necessary qualities to be obtained by the graduates. This digital badging meta-framework (Kerrigan & Evangelinos, 2016) drew from the EU Digital Competence DIGCOMP$_{v1}$ framework (Ferrari, 2013), the work by Hinrichsen and Coombs (2014) and the Jisc-funded project Digital Literacy in transition (Kerrigan, Coombs, Walker, & Hinrichsen, 2013). Specifically, course teams were asked to identify where elements of digital literacy were delivered within their curriculum. The mapping process was documented by utilisation of a digital-literacy, curriculum-mapping tool (Kerrigan & Evangelinos, 2015). The tool was used, at a holistic level, to visualise the digital-literacy attributes developed within the pilot modules. The details of how digital literacy was taught or assessed within each module were recorded as evidence and used to quality-assure the process of issuing the digital badges to the students.

During the implementation of this project, unintended, although not unforeseen, quality-assurance implications were identified. Walker and Kerrigan (2016) identify the correlation of the digital capabilities of students and academic staff required for the successful delivery of technology-enhanced curriculum in recent literature. As a result of their triangulation model

a parallel need to quantify the digital-literacy complexity of learning designs that constitute the technology-enhanced curriculum emerged. The embedding of digital literacies in the curriculum raises questions on how to ensure that the technological-competence and learning-design complexity requirements could be aligned and optimised to serve a diverse student body, challenging the highly capable students while, at the same time, being inclusive for the less capable. These areas merit further investigation and development so as to establish tools for measuring the digital capabilities of students and tutors that will enable the optimisation of the curriculum.

Conclusion

The potential of the project concerning the enhancement of the student experience is multi-fold. Firstly the mapping of modules and courses will enhance the quality of the curriculum design ensuring that digital literacy is core to curriculum-design and delivery. It is envisaged that the process of identifying the digital-literacy attributes of modules and the issuing of badges to the students will reinforce the dialogue on how these graduate skills can be best delivered to students. This issue presents implications on how the institution supports the professional development of the academic personnel to ensure that they possess the technological-pedagogical knowledge (Koehler, Mishra, Akcaoglu, & Rosenberg, 2013) to deliver digital literacies within their curricula. The establishment of institutional quality-control processes will also ensure that students graduate with the digital skills required by their respective disciplines.

The issuing of digital badges can increase engagement (Anderson, Huttenlocher, Kleinberg, & Leskovec, 2013; Farzan et al., 2008) and learner motivation (Denny, 2013) despite the fact that learners present varying behaviours in the acquisition of badges (Abramovich, Schunn, & Higashi, 2013). Badging could also encourage students to take control of their own learning and become proactive and independent learners (Jarman, 2005). Digital badges, if properly designed, can act as indicators of the digital skills and competences required within a discipline (Kriplean, Beschastnikh, & McDonald, 2008). Importantly, the students will be able to identify these attributes when seeking for employment or further training, while the utilisation of the online badges will be providing an overview of their achievements, easily accessible on the Internet. This will enhance their employability prospects as it will allow them to articulate and evidence their digital capabilities, as these will be identified and delivered by their course. The nurturing of digital skills and competences in relation to their discipline presents the potential of encouraging graduates to become digital innovators and leaders within their disciplines. The digital online badges – based on the bespoke digital-literacy framework – should formulate the conceptual basis, and allow students to identify the digital capabilities developed when undertaking the modules within their programme of studies. Students are expected to acquire the necessary language so as to be able to describe their digital capabilities when they graduate.

Research on the student experience, conducted prior to the start of this project, indicated that although the majority of students evaluated the experience of undertaking digitally-enhanced learning activities as interesting, worthwhile and useful for their learning (Evangelinos & Holley, 2015b), a significant minority did not necessarily enjoy working collaboratively by completing technology-enhanced learning activities (Evangelinos & Holley, 2016b). For this reason, during any curriculum-development phase, attention should be given to appropriately diversifying the pedagogic/andragogic teaching approaches so as to create an inclusive environment whereby learners will be exposed to a variety of teaching methods that utilise technologies to facilitate learning and develop digital capabilities. It is important to recognise that the student population is diverse and exhibits a broad spectrum of digital capabilities, prior experiences and a variety of preferred approaches to learning. These features are intrinsic considerations in establishing a model and associated processes for embedding digital literacy in the curriculum by utilisation of technology-enhanced, activity-based learning designs. This project aims to evaluate the experience of students when awarded digital badges in recognition of the digital capabilities developed when undertaking the modules within their programmes of study. At the same time it brings together the findings of previous work in an attempt to explore the operationalisation implications of moving towards a curriculum-development model and associated quality-assurance processes needed for embedding digital literacies in the curriculum.

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