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A Qualitative Exploration of the DIGCOMP Digital Competence Framework: Attitudes of students, academics and administrative staff in the health faculty of a UK HEI

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Abstract

This paper reports upon findings of a series of semi-structured interviews with students, academics and administrative staff from a health care faculty in a UK Higher Education Institution (HEI). Exploring their experiences of mapping to the EU DIGCOMP Digital Competence Framework, a hermeneutic lens enables a more nuanced approach to attitudes towards Digital Competence (DC). One of the eight lifelong learning key-competences required for managers, doctors, nurses and other health-related professionals, DC is crucial to professional development. Defined by 14 themes, the findings express the participants' experiences, knowledge and level of comprehension of the subject. Our findings indicate students are conflating digital social media skills with their skills for the workplace, resulting in over-confidence; academics raising concerns about work/private life balance offered by the affordances of handheld devices; administrative staff that are far more confident and managing a range of technology's effectively. The research further reveals that the DIGICOMP framework is applicable as a generic framework for professional practice.

Keywords: digital competence, digital literacy, DIGCOMP framework, competence analytics

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1. Introduction

Digital competence is considered as the most transferable competence (Balcar et al., 2011) among eight key-competences for continuous, life-long learning (Figel', 2007). In 2011 the European Union Directorate-General for Education and Culture commissioned the Digital Competence (DIGCOMP) project. The project documented the current state of knowledge among experts in research, education, training and work. It utilised an iterative Delphi-type survey that recorded the views of experts, validated, refined and shared the results among the expert group, and collected feedback from peer review by engaging a significant number of 95 experts (Janssen and Stoyanov, 2012). Work on a review of the literature (Ala-Mutka, 2011) and the analysis and synthesis of existing digital competence frameworks (Ferrari, 2012) preceded this study and established a baseline of the prevailing digital competence and digital literacy theories.

In the Health Sector digital competences are a requirement for managers, doctors, nurses and other health-related professionals; digital technologies are increasingly used for office administration as well as for medical diagnostics and interventions. The pervasiveness of digital technology and the resulting demand for digitally-competent users can threaten traditional jobs; people who lack the required digital skills may see their

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positions worsening and progressively marginalised in the labour market (Didero, Husing and Korte, 2009; The Economist, 2014; Jones, 2014). Thus it can be argued that healthcare trainers have a duty to modernise their curricula and ensure that digital skills become a graduate attribute.

This paper documents a qualitative exploration of the DIGCOMP framework within a higher educational institution in the United Kingdom, and assesses its applicability as a theoretical framework for a wider research project aiming at embedding digital competences into curriculum development and delivery. The original analysis was based on the early version of the framework (Janssen and Stoyanov, 2012) and in this paper it has been extended to include the most recent iteration. This remapping enhances the original prototype by exploring and analysing the interview themes according to the digital competence areas and competences contained in each area.

2. Methodology

Participants completed a bespoke online digital competence self-assessment questionnaire prior to the interviews commencing. The Evangelinos and Holley questionnaire toolkit (Evangelinos and Holley, 2014) comprised of groups of five statements that described in detail each of the competence areas summarised in Table 1 below that emerged from the initial results of the DIGCOMP framework (Janssen and Stoyanov, 2012).

Table 1. DIGCOMP Framework Competence Areas (Early Version)

DIGCOMP Framework Digital Competence Areas	
▪ General knowledge and functional skills	▪ Legal and ethical aspects
▪ Use in everyday life	▪ Balanced attitude towards technology
▪ Specialized and advanced skills for work and creative expression	▪ Understanding and awareness of the role of ICT in society
▪ Technology mediated communication and collaboration	▪ Learning about and with digital technologies
▪ Information processing and management	▪ Informed decisions on appropriate digital technologies
▪ Privacy and security	▪ Seamless use demonstrating self-efficacy

Interviews were conducted according to the hermeneutic methodology (Denzin and Lincoln, 2011) utilising a dialectic approach with eleven participants who volunteered from a pool of healthcare trainees and academic professionals within the institution. Informed consent was obtained in writing according to the research protocol governed by the university's ethical procedures. To investigate the interviewees views, assess their experiences and gain an insight into perceptions on their digital competences they were asked to describe, comment and expand on their choices in the questionnaire. Barker and Johnson (1998), Walford (2001) and Kvale and Brinkmann (2009) all claim that this type of enquiry allows for a higher degree of variability of experiences, knowledge and level of comprehension of the subject matter among the research participants.

Five academics, three students, and three administrative professionals self-selected for interview and established the participant group. The inclusion of participants from all stakeholder groups of healthcare education was deliberate as the suitability of the framework had to be investigated from all perspectives and incorporate a variety of experiences and views. The audio recordings ranged from 90 to 120 minutes for each interview and produced a transcribed corpus of approximately 193,000 words. The interviews were recorded, transcribed and analysed through the use of the QSR NVivo software. The analysis was conducted by coding the interview corpora into emerging themes following recommendations provided by Miles and Huberman (1994) and Guest et al (2012). The theme patterns were formed through the counting of frequency - occurrence of the digital competence references mentioned by the participants - and the number of individuals reporting on a theme; these indicated its relative 'power'. The themes were then mapped onto the appropriate DIGCOMP framework area to investigate its suitability.

3. Results

Evangelinos and Holley's original paper identified twenty-two themes; twelve of them were mentioned by most of the participants. For purposes of additional depth and interpretation, the interview themes have been reallocated to the competence areas of the final version of the DIGCOMP framework. We work with the DIGCCOMP framework of five competence areas: Information, Communication, Content Creation, Safety and Problem Solving.

Ferrari (Ferrari, 2013) defined the 'Information' competence area as the identification, retrieval, storage, organisation, analysis of digital information and purposeful evaluation for a specific use. Communication was defined as communicating, sharing resources, linking and collaborating, interacting, facilitating cross-cultural awareness and participating in communities and networks by the utilisation of digital technologies. The 'Content Creation' definition included the creating and editing of multimedia content, appropriating and remixing of

existing content, producing creative expressions such as media artefacts and programming, dealing with and applying intellectual property rights and licencing. Safety was defined as protecting personal information including digital identity and data, the taking of security measures in the digital environment and safety, and sustainability when using digital technologies. The 'Problem Solving' competence area has been defined as the identification of digital needs and resources, the making of informed decisions on digital tools, solving problems by utilising digital technologies, creatively using technologies, solving technical problems and updating one's own and other's digital competences.

The competence areas and competences can be found on the left-hand side of Table 2. The 22 themes that arose from the interviews were redistributed to the competence areas according to the above definitions. Eight themes did not match the definitions of this final version and for this reason they have been omitted from remapping. This resulted in 14 remaining interview themes that are to be analysed. These can be found on the right-hand side of the table below.

Table 2. Interview Themes Mapped onto the DIGCOMP Framework Areas (Final Version)

Areas and Competences	Interview Themes
1. Information (11/140)	
1.1 Browsing, searching and filtering information	- Technology use in education (9/86)
1.2 Evaluating information	- Information management (11/54)
1.3 Storing and retrieving information	
2. Communication (11/89)	
2.1 Interacting through technologies	- Communication and collaboration (10/43)
2.2 Sharing information and content	- Social networks and media (11/37)
2.3 Engaging in online citizenship	- Communities of practice (5/9)
2.4 Collaborating through digital channels	
2.5 Netiquette	
2.6 Managing digital identity	
3. Content creation (11/55)	
3.1 Developing content	- Legal and ethical aspects (9/33)
3.2 Integrating and re-elaborating	- Content authoring and remixing (11/22)
3.3 Copyright and licences	
3.4 Programming	
4. Safety (11/140)	
4.1 Protecting devices	- Balanced use of technology (10/76)
4.2 Protecting personal data	- Security and privacy (11/55)
4.3 Protecting health	- Technology and the environment (4/9)
4.4 Protecting the environment	
5. Problem solving (11/122)	
5.1 Solving technical problems	- Learning skills and support (11/85)
5.2 Identifying needs and technological responses	- Manuals and instructions (7/16)
5.3 Innovating and creatively using technology	- Hardware and software (7/9)
5.4 Identifying digital competence gaps	- Learning about new technologies (6/12)

3.1. Analysis

Information

Themes that arose from the interviews that matched this definition were 'Technology-use in education' and 'Information management'. Technology-use in education was the most significant, due to the interests of the participants (all in a health faculty). Interviewees were expressing their lived experiences, and were drawing examples from their day-to-day engagement with the institution. Their examples can be split into technology-use in and outside the classroom. In-classroom technologies included the better utilisation of interactive boards, the use of digital assets such as hand-outs, visual aids and mind maps. The use of dynamic visualisation software, lecture capture/recording and the structured use

of multimedia such as video and audio to enhance the lecture with activities and make the delivery more interesting, interactive and engaging. All the referred examples illustrated how technology was used to store, retrieve and disseminate information, and facilitate teaching.

The information management theme included examples of information retrieval via specialised library search engines but these were not limited to digital texts and documents. Examples illustrated the use of a variety of multi-modal media such as newspaper articles, television programmes, various online video resources, digital artefacts, databases, animations and images. Notably, interviewees also described specific attitudes such as stating a preference for open access resources, ensuring the validity of the retrieved information by selecting authoritative sources and developing their own search strategies to locate and select appropriate information. Some interviewees exhibited advanced information competences such as validating information from multiple sources, refining the search terms and filtering, initiating their searches from official portals such as journals and government websites and reverting back to the academic sources once an initial online search has informed and framed their search strategy. Other participants demonstrated an understanding for the different purposes and motives of the search service providers that included online advertisement, aggregation engines and peer-review sites. We noted interesting behaviour where individuals were judging online resources for their validity by their design appearance and rating the ones that looked professional as more trustworthy. A small minority reported that they lacked the skills to carry out the information searches successfully in the digital domain and they had to seek for specialist support from the library support services in order to acquire the required digital information skills.

Communication

In the communication competence area the allocated interview themes were 'Communication and collaboration', 'Social networks and media' and 'Communities of practice'. Participants reported that they used a number of technologies for communication with friends, colleagues and family which were described in a variety of scenarios. The types of technologies included voice calls, mobile texting, audio-video conferencing and instant messaging. The prevailing reasons are practicality, ease-of-use and cost. Cost is an important factor especially when they need to communicate with people abroad or catch up with people they do not often meet. Using audio-video conferencing is perceived as an ecologically friendly solution that can reduce travelling time, petrol costs and allow the scheduling of online meetings at short notice. Communication technologies are used pervasively throughout their personal, professional and academic lives. A small minority reported that they feel uncomfortable with using video in tele-conferencing solutions and they would rather use only voice whenever possible. A significant minority reported that the selection of a communication system is often associated with a specific use and perceived as being appropriate only for this type of communication. For example, they felt that the use of the corporate fixed video-conferencing system was only appropriate for business meetings and conversely the use of free online conferencing tools only for private use, although both systems were simultaneously available.

The use of social media has been widespread although these were primarily used for personal communication and to a lesser extent for work and study. Social networking tools allowed the participants to stay in contact with their friends and family, thus strengthening the feeling of being connected. They also commented that the tools could be beneficially used for work and study as mediums for the gathering of information and networking. This was based on the fact that many of the established professional organisations in their discipline area were using them. At the same time most participants expressed concerns around privacy and security. They reported that when using social media they found it difficult to differentiate between their personal and professional identities. They were concerned for potential misuse of personal information and exposure to negative responses from the wider public including potential employers.

Participants also stated that social networking tools were generally useful in establishing study groups, exchange information, share their thoughts and participate in communities of practice. The social media enhanced their ways of learning by allowing them to engage in discussions, debate and learn from each other. People who had never been acquainted but had just met on the social networks were also included. Some were very strategic on how to use social media and targeted established expert online communities to network with experienced professionals and exchange ideas. This included the building of network 'trees' by associating with the contacts of other authoritative contacts, thus building a high-value network of contacts.

Content Creation

The interview themes that matched the definition of the content creation competence area were 'Legal and ethical aspects' and 'Content authoring and remixing'. Academics and students reported the use of a number of technologies to create and repurpose content. Examples included the creation and editing of images, videos, animations and digital texts. Repurposing digital assets was a widespread practice; it was perceived as time saving and an efficient way for creating high-quality media. One academic reported that they found it easier to create their own digital media from scratch than track and manipulate existing resources. There was consensus in that using a variety of media in the classroom enhanced the learning process as it helped keeping the students engaged. A small number of academics reported that they lacked the digital skills to repurpose digital content

although they could use basic technologies to author their own.

Academics, students and academic professionals were aware of the legal and ethical implications of using digital media. The legal implications of digital-media use, such as copyright and licencing, were mentioned by the majority. Most academics and academic professionals were aware of the broad guidelines on what they were legally allowed to use but were less aware of the details around specific forms of media, such as audio-video recordings and the specific academic licencing provisions. The group were also well aware and sensitive about the ethical implications of creating digital media. Examples included the acquiring of informed consent, retaining confidentiality, not making unjustified judgements or expressing opinions about people, adhering to professional etiquettes and policies and attributing the sources of information especially when repurposing existing media.

Safety

The safety competence area includes the interview themes of 'Balanced use of technology', 'Security and privacy' and 'Technology and the environment'. To some extent, everyone mentioned the importance of technology in their lives, and all but one reported negative consequences of lack of technology at their fingertips. However, one interviewee made a conscious effort not to be dependent on technology and actively avoided using it when not necessary. Comments such as '*I could survive but it will be hard*', '*iPad and phone are never off*' and '*...there are very close to my heart but I could survive without them*' indicate dependence on the use of technology. This view is strengthened by the fact that in certain cases technology is so embedded/merged in the participant's daily life that they are not aware they are using it and at times they are multi-tasking with two kinds of technology (for example, they are using a phone/tablet while watching TV). The health and safety aspects of using technology safely include posture, positioning, size of screen, keyboard layout, foot rest, use of light, document holder and hearing protection, just to name a few. Academics have often felt that the relentless use of technology induces a type of techno-stress that arises from endless information overflow that often acts sub-consciously.

Security and privacy issues were extensively discussed by the group. The most prominent topics were those of identity theft and online information management, computer viruses and related malware and electronic fraud such as 'phising' and 'scam' emails. The majority was also very cautious about using e-banking services and making online payments in general. A small minority were also aware of online tracking and content monitoring for advertising purposes but they admitted that this was a necessary compromise in return for enjoying the benefits of free services. Strategies to alleviate some of the dangers included the use of firewalls and anti-virus software, careful credential management, using online aliases and the use of intermediaries when making online payments. A couple of the participants mentioned that the best way to safely use technology was to be aware of the dangers and take the necessary precautions.

The environmental implications of technology use included discussions around the power consumption increase due to technology use and the production of electronic device wastage including the associated dangers of the toxic substances used in the components. Appropriate recycling and re-using of old devices were suggested as potential solutions to the wastage problem. Careful management of power consumption, such as using low-energy devices and switching them off or using stand-by modes were recommended as good ways to minimise power usage. The use of electronic texts instead of printed material was the most environmental-friendly way for avoiding the use of paper and saving trees.

Problem Solving

Problem solving was identified through interview themes such as 'Learning skills and support', 'Manuals and instructions', 'Hardware and software' and 'Learning about new technologies'. The participants preferred to acquire technological skills and support in a variety of ways. The traditional methods of learning (formal, classroom-based, self-directed, peer-learning and on-the-job) have been mentioned. Academics and academic professionals indicated they'd rather learn through examples relevant to their jobs and they would like to be given opportunities to try things out themselves (hands-on the job); they said they learn best what to do through example and demonstration, rather than through the narrative process. They would also like to engage with technology from an early stage and be informed about the ways this engagement could prove beneficial to them. Continuous support and available help were also their concerns; some of them admitted that without support and help they feel helpless and panic at times. The majority of the participants seek support and help from friends or family and only the confident ones search for answers online. Help sheets and/or online e-learning should be made available in addition to other forms of learning. All interviewees commented that they learn best if up-to-date software and other equipment are owned, since ownership provides them with opportunities to engage with technology in an informal way.

They rarely read the manuals and recourse to them only if or when they are facing problems. In some cases this is because they do not really understand the terminology, sometimes because they feel they do not really need it, but mainly because of the expectation that technology should be easy to use, 'plug-and-play'. Manuals are only used to find specific information and only in case complicated software or hardware needs to be set-up or operated. It was also noticed that nowadays most companies provide electronic manuals on a disc or online rather than in print.

The participants reported that they find out about new technologies mainly from friends and family, word of mouth, online and print reviews in general, and specialist

media outlets, advertisements and by browsing the shops. One academic professional reported that they use social media to pose questions to their contacts about technology choices and enrich their knowledge by interacting with their network and learn from the collective knowledge.

Most of the interviewees exhibited an understanding of what is meant by hardware and software in technology terms but admitted that they could not describe the differences in functionality, troubleshoot or differentiate potential faults.

4. Discussion

The aggregate numbers of mentions of the themes are ranked in Figure 1 below per each competence area. Arrangement of the data according to the final version of the DIGCOMP competence areas revealed that the most prominent areas were those of 'Information', 'Safety' and 'Problem solving'. Less prominent were the competence areas concerning 'Content creation' and 'Communication'. The results can be interpreted by examining the shared characteristics of the group of the participants who were all involved in academia as students, academics and academic professionals. The group's shared characteristics are strongly correlated to their everyday academic experiences, dominated by information manipulation and problem solving. The group's sensitivity around 'Safety' and in particular 'Security and Privacy' can be attributed to their identities as healthcare professionals and to their specific training that is permeated by codes of conduct aiming to maintain safety and ethics.

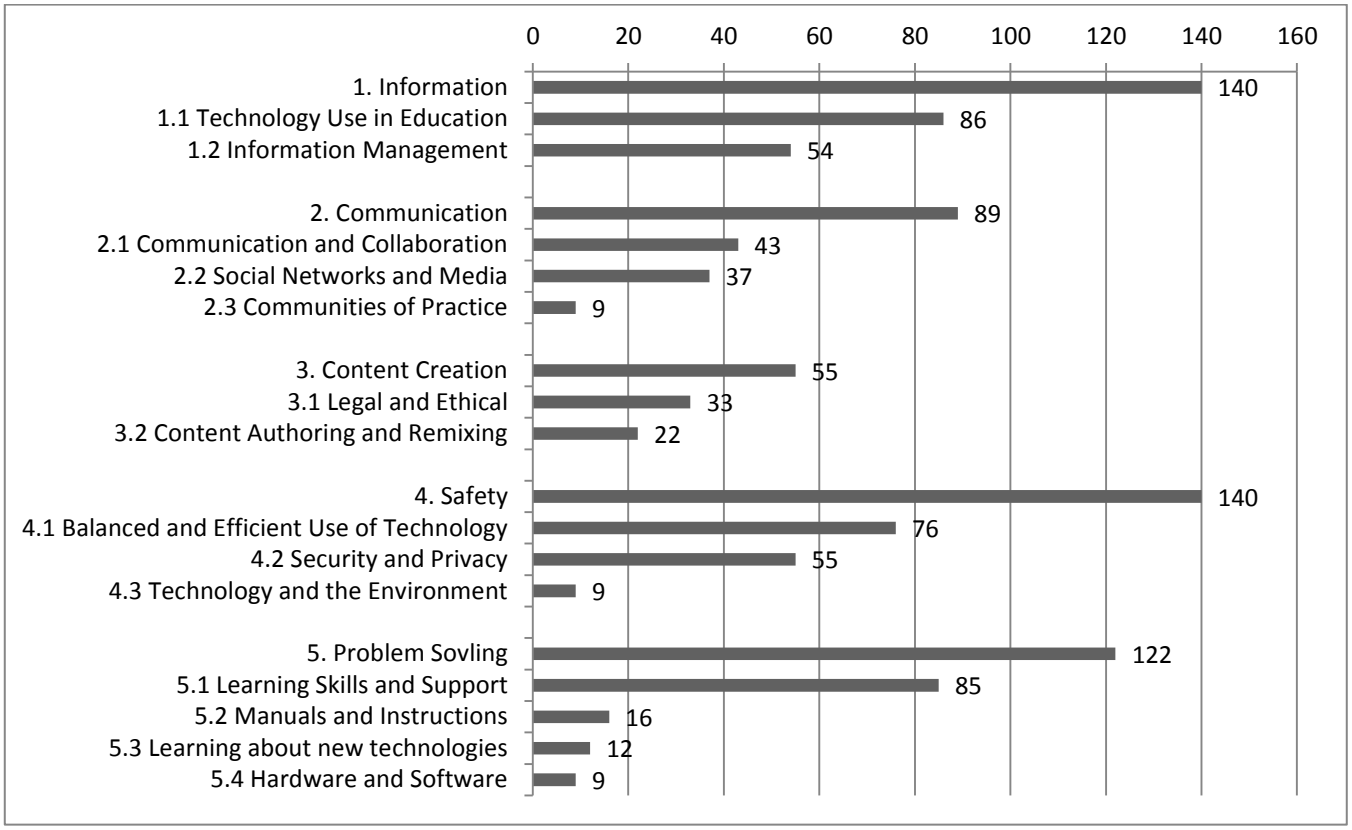

Figure 1. Interview Themes Mapped onto the DIGCOMP Framework Areas (Final Version)

Students were mainly preoccupied with the use of technology for academic study and for their personal lives. Examples of engagement with digital information through the library, the use of the World Wide Web, the Virtual Learning Environment and the creative use of technology to compile assignments and presentations were pervasive. In their personal lives they used technology mostly to communicate with their friends and family via a mixture of phone calls, messaging services and social networks. The majority of the participants seemed aware of the 'dangers' of technology use and in particular of the Internet but did not always know how to protect themselves. Students seemed to be technologically fairly capable and engaged but this was primarily with a relatively small set of specific platforms and technology (e.g. mobile phones and social networks). This type of

user is difficult to engage as their experiences (and consequently their skills) are limited and narrow and they often do not recognise they lack necessary digital skills; on the contrary, they consider themselves as reasonably (and sometimes very) technologically competent.

Most academics stated they were engaging with technology on a regular basis as they used it for work and leisure. They were particularly concerned with the continuous influx of work-related information on their private devices (such as smart phones or tablets). They felt that digital technologies offering enhanced access encourage the culture of considering a person as 'always on' and 'always available'. However, this increased their stress levels and the feeling of restlessness (May, 2013). They also felt that, although technology-use in education could enhance the student experience, device ownership was not universal and some students did not own smart technologies; some students were completely disengaged from technologies and involving them in the use of technology might prove really difficult. One academic reported that when experimenting with interactive whiteboards and tablet technologies to deliver group work in the classroom, it was discovered that some students were less likely to engage with technologies; however, exposure to technology was beneficial and allocating a device to a small group of students rather than to each individual student spurred their motive for engagement.

Administrative professionals seemed to be using technologies as a matter of routine in their day-to-day lives, to carry out their work and for personal use. Reported experiences were similar to those of the academics and to some extent to those reported by the students that had shared use of a number of institutional systems. Their attitudes towards technology were positive as confidence was being increased and eventually they started carrying out complicated technology tasks as part of their workload. They welcomed the policy and protocol for technological system processes and they perceived these as advantageous; exactly the opposite assumption was reported by the academics who described the same processes as restrictive and bureaucratic. A senior administrator argued that advanced technological skills, such as drawing in specialist design software, could be gained 'on the job' and on-demand as these were required by the business workflow.

5. Conclusion

Given that digital technologies are increasingly used in healthcare provision (National Institute for Health and Care Excellence (NICE), 2014) further work is required to define the digital competence characteristics pertinent to the healthcare profession. The DIGCOMP framework competence areas and competences can be used as a guide to characterise the digital competence profiles of groups and individuals (Evangelinos and Holley, 2014). The interviews identified significant themes that could be explored in more detail to further define the skills, views, practices and attitudes of the participants. Initial findings showed that students tended to conflate their social usage into assumptions about work usage, and misdiagnose their actual competence. Academics were cautious about too much 'work-based' technology filtering through to their personal devices while administrative staff welcomed the more structured approach of technological protocols. The research data indicated that the characteristics of digital competence tended to be highly personalised and depended upon the individual's experiences although group characteristics were also identified. Further work is now needed to refine the model for its next iteration.

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