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DEVELOPING A DIGITAL COMPETENCE SELF-ASSESSMENT TOOLKIT FOR NURSING STUDENTS

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Introduction

Digital skills are considered to be the most transferable generic skills as they are applicable to 90% of professions and highly valued in workplaces across the European Union (European Commission, 2011). Recent research reports 95% of all businesses had access to the Internet; 53% of the workforce was using a computer at work of which 44% used a computer connected to the Internet (Eurostat, 2013). Research into trends in future skills-demand shows that the requirement for digital competence is likely to increase in most sectors and professions (European Commission, 2009); indeed, the European Union established Digital Competence as one of the eight key-competences for continuous, life-long learning (European Commission, 2006). As digital skills become ever more ubiquitous the need to quantify the digital competences of technology users is becoming increasingly important. Measuring digital competency involves the establishment of appropriate indicators that can be used as metrics in a format that is generic enough to capture the diversity of capabilities needed when engaging with contemporary digital technologies. This paper sets out the results of the development and testing of a self-assessment toolkit, which measures the digital competence characteristics and attitudes of the participants, first year student nurses in a UK University (n=102).

Method

The toolkit survey follows the Janssen's and Stoyanov's study (2012), which focused on attitudes as well as participant knowledge of digital competence among experts in research, education, training and work. Their study, conducted as an iterative Delphi-type survey that recorded the views of a significant number of 95 experts. This work was part of the wider Digital Competence (DIGCOMP) project commissioned by the Information Society Unit at Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) on behalf of European Union Directorate-General for Education and Culture. As part of the DIGCOMP project an extensive literature review (Ala-Mutka, 2011) and work on the analysis and synthesis of existing digital competence frameworks (Ferrari, 2012) was carried out in order to establish a baseline of the prevailing digital competence and digital literacy theories. The Janssen and Stoyanov study was selected and adapted (as part of an investigation aimed at

informing the revision of the nursing curriculum) to embed digital competencies. The attitudes of student nurses to new technologies are an integral part of the process. Attitudes are generic and allow the individual to reflect and express their own experiences of using digital technologies and, most important, in their own contexts. This approach permits the inclusion of diverse groups of users; reflecting the broad nursing intake.

Thus this study identifies twelve digital competencies and comprises of five statements per classification area. These statements have been selected from a wider variety expressed by the experts on the basis of the highest average scores on the validation stage. Since these statements define the digital competence areas of the framework, they have been used to devise a survey toolkit that requires the participants to self-assess their skills by agreeing or disagreeing with each statement on a six point scale with an additional option of not responding (see Figure 1). The six point scale was used to prevent participants from scoring towards the middle of the scale; this is an inherent tendency when scales of this type are used (Salkind, 2010). The 'acquiescence' effect (Lavrakas, 2008) was also recognised but this can be remedied by statistical data standardisation. The demographics section of the survey also included the investigation of potential trends of digital-competence characteristics of groups and individuals of similar demographical backgrounds.

***8. General knowledge and functional skills**

	Strongly agree	Agree	Agree somewhat	Disagree somewhat	Disagree	Strongly disagree	No response
I am able to use a digital device, which may be one of many types (e.g. Desktop PC, Laptop, Tablet, Smart phone).	○	○	○	○	○	○	○
I possess general computer skills (typing, using computers, getting into a new programme).	○	○	○	○	○	○	○
I understand the difference between hardware and software.	○	○	○	○	○	○	○
I am familiar with the meaning of terms commonly used in user manuals for the operation of hardware and the installation and configuration of software.	○	○	○	○	○	○	○
I know about the existence of various operating systems.	○	○	○	○	○	○	○

Figure 1. General Knowledge

The toolkit survey was piloted by administering it to a group of 102 nursing participants in a UK University. Participant responses have been recorded via the use of 'Survey Monkey' online survey tool and analysed electronically through the use of 'Microsoft Excel 2010' spreadsheet software. Since the literature on parametric statistics cautions against analysis of ordinal data (McCrum-Gardner, 2007) such as those arising from Likert-type items and

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because the purpose of this paper is to present the process and the toolkit rather than the results of the surveyed group, such forms of statistical analyses have been omitted.

Results

To validate the usefulness of the toolkit, examples of the types of results extracted from the data are summarised below. The results are analysed so as to evaluate and 'map' the digital competence characteristics of individuals and groups at two levels. At the top level of the framework a summary of the individual or group performance can be extracted and visualised (see Figure 2).

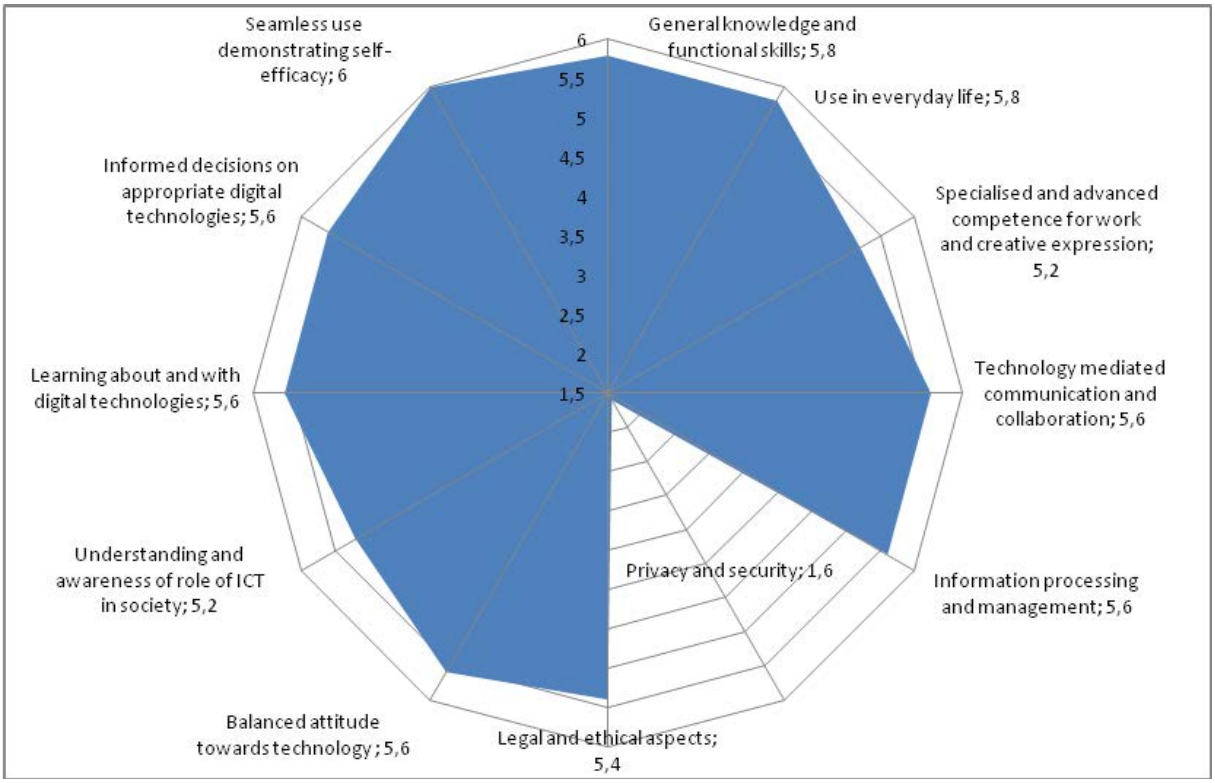

Figure 2. Digital Competence Characteristics Map of an Individual

In Figure 2 the digital competence characteristics of an individual have been mapped against the top level of the framework that included the twelve categories. This individual seems to have a fairly high level of competence in all areas, ranging from an average score of 5.2 up to 6.0, except for 'Privacy and security' - average score 1.6. In terms of the survey grading the results can be interpreted as follows. Taking the average result from the five sub-areas the participant seems to 'agree' and 'strongly agree' with the statements of all the high-level areas with the exception of 'Privacy and security' where, on average, they fall approximately in the middle of 'strongly disagreeing' and 'disagreeing'. Examining the results of the 'Privacy and security' high-level area in more detail the particular areas they feel they lack certain skills or understanding are highlighted (see Figure 3).

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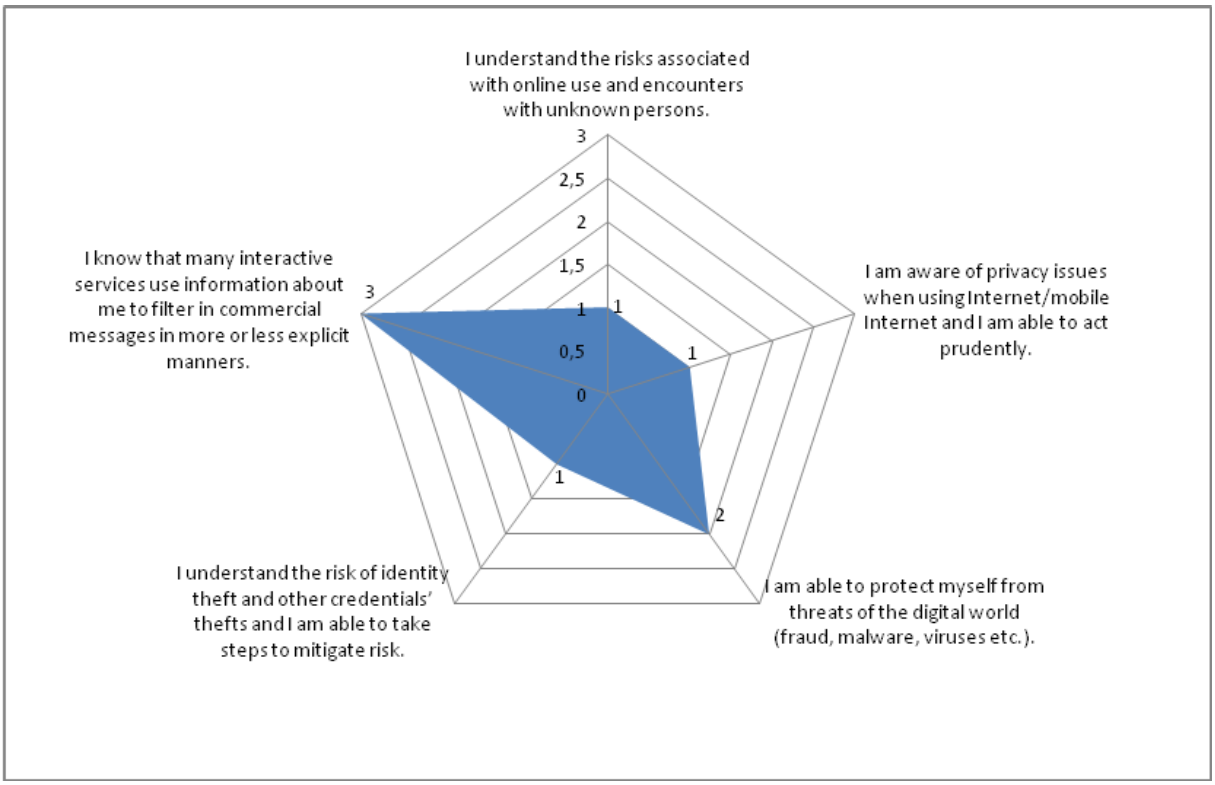

Figure 3. Privacy and Security Characteristics of an Individual

This individual 'strongly disagrees' (score of 1) with the three statements concerning: a) understanding the risks associated with online use and online encounters b) awareness of privacy issues when using the Internet and c) understanding the risks of identity theft and ability to take steps to mitigate risks. They also 'disagree' (score of 2) with the statement of being able to protect themselves from fraud, malware and viruses. They 'rather disagree' (score of 3) with the statement concerning awareness of online services and their monitoring culture for the purposes of targeting marketing messages for commercial gain.

A similar level of analysis is available for groups of participants at both, the top-level and the sub-areas of the framework. The score scalar used for groups is a weighted average according to the agreement/disagreement scale used. An example of what a group mapping looks like can be seen in Figure 4.

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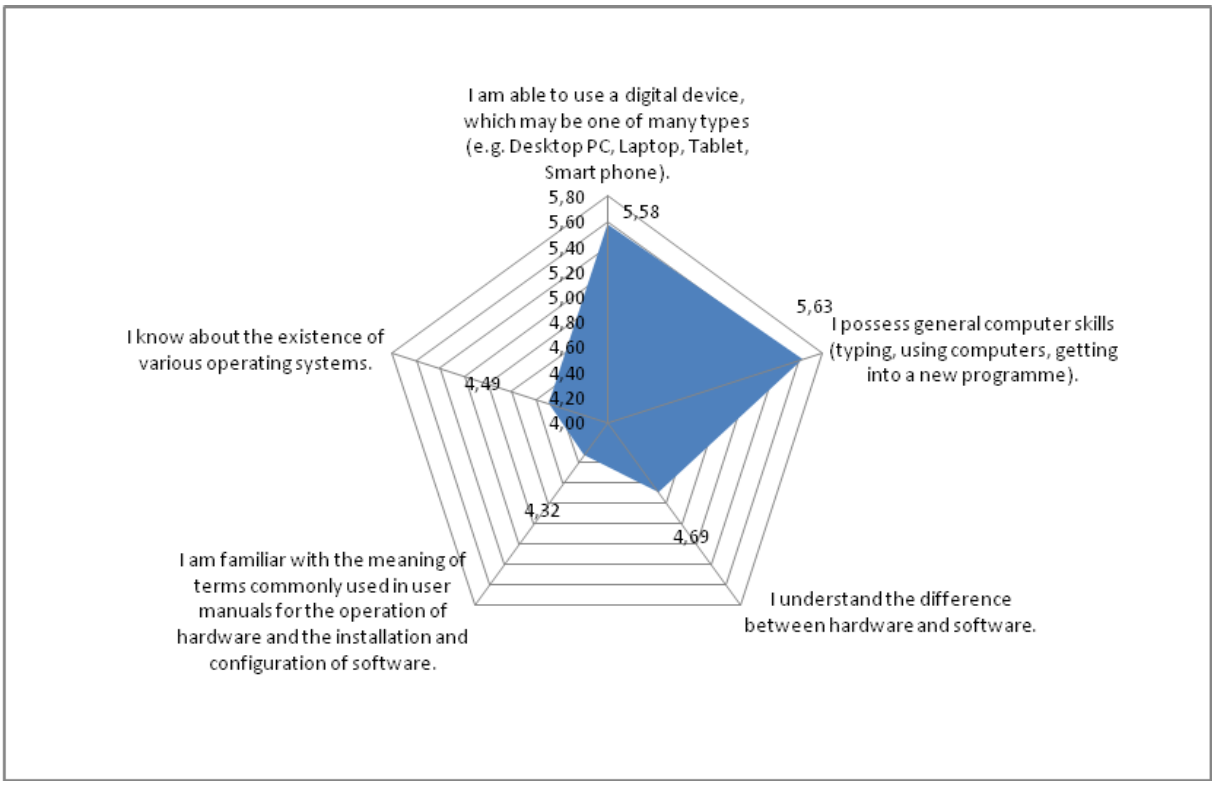

Figure 4. General Knowledge and Functional Skills Characteristics of a Group

The above figure maps the digital competence characteristics for the 'General Knowledge and Functional Skills' top-level area of the framework for the pilot group of 102 participants. The average rating of the answers of this group has been used to calculate the results. Following the same analysis protocol the results can be interpreted in a similar way. For this group of participants the strongest competence area is this of possessing general computing skills with an average rating of 5.63, which on the agreement scale falls between 'agree' and 'strongly agree'; the weakest competence area is this of familiarity with terminology used in manuals for operation of hardware and configuration of software with an average rating of 4.32 which, on the agreement scale, falls between 'rather agree' and 'agree'.

Discussion

Indicative results demonstrate the potentials and limits of the tool and its applicability, and are not intended to give an exhaustive view on the digital competence characteristics of the pilot group. For the purposes of this paper the evaluation of the toolkit is focused on its applicability; it takes into account the characteristics relating to the pilot user group and these intrinsic to the framework.

The pilot user group can be described to some extend as a homogeneous group although the individuality of the participants should not be completely discounted. Their homogeneity arose from the fact that they were all under-graduate students; therefore, they were all educated individuals but not in what could be traditionally described as a 'high-tech' discipline (Nursing). Competency or engagement with basic technologies was not a strict

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prerequisite but acknowledgement of the need to use some types of technology and a willingness to learn were implicitly assumed since the pilot group was in a higher educational setting. The intrinsic positive bias that exists in self-evaluations of this type, a fact previously identified by experts in the field (Beetham, 2013) was acknowledged; it was partly due to the users' over-confidence. It should be noted that amateur users of technology are not familiar with challenging scenarios because these surpass the limits of their competences and skills. The generic nature of the framework also encouraged the acquiescence of positive bias as the survey questions focused more at generic attitudes than at specific skills; thus it allowed for the assessment of a generic digital competence level that was based on the participant's experiences although not without certain drawbacks.

Limitations of the Study

Measurements of this type are not precise; therefore, they may not be repeatable because of the subjective nature of the described attitudes and the fuzziness introduced by the used agreement scale. The participants were asked to self-evaluate by recording their agreement with these generic statements that described attitudes towards technologies; this meant that the interpretation of the meaning of the statements was left to the individual. Therefore, it was heavily depended on the individual's experiences of technology. As a result the meaning of a certain statement and/or its interpretation may have been given according to the participant's own experiences and understanding. For these reasons the results cannot be contrasted and/or compared among individuals but they can be used as an estimate and rough guide of their general competence level.

Conclusions

Overall the toolkit offers quantitative insights into the previously uncharted territory of digital competence. By allowing individuals to express their attitudes towards technology in a loosely prescribed way that encourages them to reflect their own experiences and self-evaluate against a set of criteria that comprehensively describe digital competences; and this offers insights into the student expertise. This approach cannot be used to accurately measure the existence of digital skills nor should it be used as a comparison or grading tool; it can successfully be used, however, to quantitatively evaluate the general level of digital competence of individuals and groups and produce 'maps' of digital competence. At a group level this toolkit works satisfactorily as individual attitudes are brought together to give a holistic view of a group's digital competence characteristics. Such estimations are useful when identification and rough measurements of the digital competence potential are needed, for example when redesigning curricula for the needs of the 21st century nursing professional. Moving forward the project will be further expanded by combining the application of the toolkit with a specific digital skills test that will provide precise and repeatable results through which objectively and explicitly, the existence of specific skills and competencies on particular digital systems will be assessed.

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