

Learning ecology theory as a tool to support student digital competences in higher education

Suzanne Stone, Rob Lowney

Dublin City University, Dublin, Ireland.

Abstract

The need for digitally competent graduates is well established and articulated in the New Skills Agenda for Europe (European Commission, 2016) and the European Digital Education Action Plan 2021-2027 (European Commission, 2021). The Enhancing Digital Teaching and Learning (EDTL) project seeks to enhance graduate digital attributes by providing professional development to academics to embed digital technologies across the curriculum (Flynn et al., 2020). Two key challenges to this work are: a lack of data on the specific digital competences required in the workplace; and a lack of clarity on the contexts in which students develop digital competences. This paper examines these challenges by reflecting on the results of a small-scale research study on the competences required in the workplace in Ireland, through the lens of learning ecology theory. The paper proposes that learning ecology theory can be a useful tool to support student digital competences in Higher Education Institutions (HEIs).

Keywords: *Digital competences; graduate attributes; learning ecologies; formal learning; informal learning.*

1. Introduction

The impetus for developing digitally competent graduates is articulated across a range of policy at European level, and in the context of this study locally in Ireland. The New Skills Agenda for Europe (European Commission, 2016) states that citizens require digital competencies to participate in an economy undergoing digital transformation. The European Digital Education Action Plan 2021-2027 (European Commission, 2021), has a dual focus of “fostering the development of a high-performing digital education ecosystem” and “enhancing digital skills and competences for the digital transformation.” The ‘Next Steps’ report (NFETL, 2021), outlines recommendations for the future of Irish higher education, proposing that “the world of work, for staff and students, is digitally infused and requires a commitment to lifelong learning”

The Enhancing Digital Teaching and Learning (EDTL) project seeks to enhance the digital attributes of graduates by providing professional development to academics to develop digital competence for teaching (IUA, 2021). Providing professional development to academics and their subsequent usage of digital technologies exposes students to such technologies and supports digital competence development (Flynn et al., 2020). At one of the EDTL project sites, two key challenges were identified in relation to developing digitally competent graduates: the lack of data available on the specific digital competences required in the workplace; and a lack of clarity around the various contexts in which students develop digital competences. This paper explores these challenges by firstly reflecting on the data from a small-scale study which explores the digital competences required in the workplace, and secondly reflecting on the usefulness of learning ecology theory as a tool to plan for the digital competence development of students in a higher education institution (HEI).

2. Research on digital competences required in the workplace

2.1. Methodology

The research design was influenced by a University of Nottingham study on digital competences required by graduates in the workplace (Newall, 2020). A mixed methods approach was used to collect data from graduates of Dublin City University, Ireland, and employers linked to the University through career and placement initiatives. Separate surveys were designed for each participant group, focusing on the digital competences required in the workplace. The employer survey was circulated by the Careers Service to employers linked to the university and the graduate survey was disseminated by the Alumni Office to graduates from the previous three years.

The survey structure was mapped onto the Digital Competence Framework for Citizens (DigComp) (Carretero et al, 2017). The framework describes digital competence across five

distinct areas and acts as a reference guide for citizens in developing their competence and for embedding competence development in higher education curricula. The surveys' questions reflected the five areas of digital competences of the DigComp framework: Information & Data Literacy; Communication & Collaboration; Digital Content Creation; Safety; and Problem Solving. Each questionnaire contained a mixture of fixed response Likert style questions and open questions. The Likert questions used a seven-point scale from 'extremely important' to 'not at all important'. Open questions provided an opportunity to comment beyond the influence of pre-formulated answers. Quantitative data were analysed using Microsoft Excel, and frequencies of responses were calculated and presented in tabular form. Qualitative data were analysed using NVivo software, following Braun & Clarke's (2021) thematic analysis framework. In total, 9,000 recent graduates and 600 employers were invited to take part in the surveys. The response rate was low with just 62 graduates and 28 employers completing the surveys. As the surveys were circulated through third party units within the university, it was not considered appropriate to send reminders to invitees to take part. The surveys were circulated in February 2021 at the height of the Covid-19 pandemic, which may also have contributed to the low response rate, given the resulting stresses in the workplace. While the low response rate is a limitation of the study, the data does provide a useful insight into graduate and employer perceptions of digital competences required in the workplace.

2.2. Findings

Competences in two areas of the DigComp framework were perceived by both graduates and employers as most important: Area 1 (Information & Data Management); and Area 2 (Communication & Collaboration). In Area 1, the importance of skills relating to MS Excel emerged as a theme for both employers and graduates. Graduates perceived the level of MS Excel skills required as ranging from basic to advanced. However, employers were unanimous in suggesting an 'excellent' level of MS Excel skills are required.

In Area 2 (Communication & Collaboration) employers and graduates differed in relation to netiquette and managing digital identity, with 50% of graduate respondents compared to 72% of employer respondents viewing such competences as very/extremely important. Unsurprisingly, the qualitative data reflects an increased reliance on competences in collaborative and communication tools reflected in the following comment:

Given the current climate all employees are required to engage on almost all work through digital mediums, VC, emails and other online collaboration tools. We are a multi-site company so this was true in normal times but not to the same extent.
(Employer respondent 1)

Employers and graduates placed approximately equal importance for Area 3 (Content Creation). Creating digital content and using/repurposing digital content were considered

extremely/very important/moderately important by 75% of graduate respondents, with similar figures reported by employers. Understanding copyright and licenses for digital content was perceived as less important by graduates than employers, with 35% of graduates considering these competences very/extremely important compared to 55% of employers. Social media and marketing emerged as a theme from the qualitative data for content creation competences with 13 employers and 19 graduates mentioning social media, and marketing mentioned by 12 employers and 17 graduates. The importance of social media and marketing was not restricted to those in a specific marketing role, suggesting that social media and marketing are skills required across many roles reflected in the following comment:

Comms/marketing is something we increasingly do "horizontally" (meaning every staff member is involved, rather than specific individuals), and social media is very widespread as well, so you want everyone to have good know-how on how to use content, understand copyrights/attribution. (Employer respondent #6)

Employers generally rated competences across all areas of the DigComp Framework as very/extremely important in comparison to graduate respondents. This was particularly significant for Area 4 competencies relating to safety, see figure 1 below.

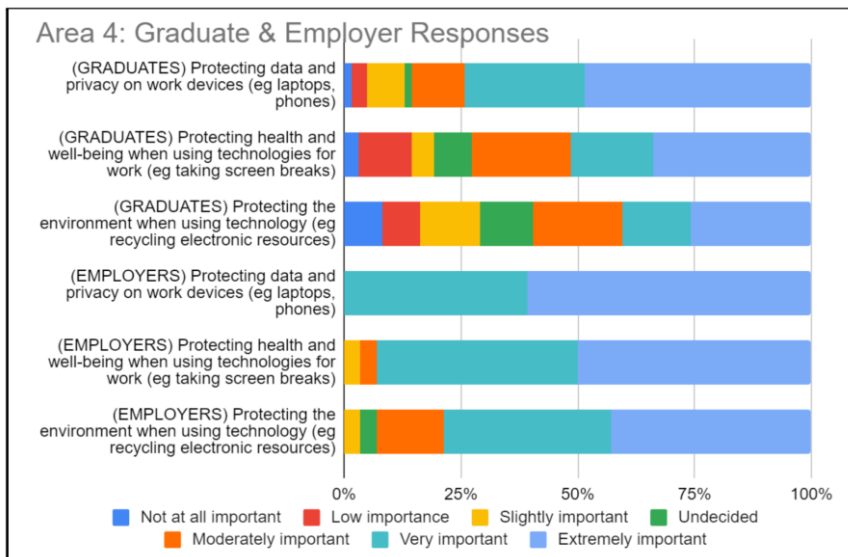


Figure 1. Graduate and Employer responses relation to Area 4 of the DigComp Framework

In respect of Area 5 (Problem Solving), employer respondents considered basic troubleshooting to be more important compared to graduate respondents, with 62% of employer respondents considering such competences as 'very/extremely important' compared to 35% of graduate respondents. Similarly, employers placed more emphasis on

identifying skills development with 65% of employer respondents citing this competence as ‘very/extremely important’ compared to 52% of graduate respondents.

Overall, this study reinforces the importance of digital competences in the workplace and offers insight into the nuances between graduate and employer attitudes to specific digital competences in the workplace. Employers and students agree that Area 1 (Information & Data Management) and Area 2 (Communication & Collaboration) of the DigComp framework are the most important competences in the workplace. However, the different values relating to specific competences in Area 3 (Digital copyright and licensing); Area 4 (safety); and Area 5 (problem solving) suggests that work is required to communicate the importance of such skills to students. In the next section, the authors reflect on the opportunities in higher education to support the development of digitally competent graduates with reference to the findings of this study.

3. Examining the data through a learning ecology lens

Student development is inherently linked to their programme of study—for example, medical students will develop digital competences for medical technologies. However, the development of broad, non-discipline-specific digital competences are not always clearly factored into curricula. In some HEIs, there may be departments or staff focused on student competence or skill development (e.g. University College Cork Skills Centre (2022)), but this differs between HEIs. Outside of structured institutional activities, students may also seek or create their own opportunities to develop digital competences. Using a learning ecology lens to conceptualise the range of contexts in which students can develop competences offers an opportunity for HEIs to plan for student digital competence development.

3.1. Learning ecology theory

Ecology theory arises from the biological sciences, where the term was first coined (Stauffer, 1957). Ecology is generally accepted as how living things interact with each other and with their environment. This theory was later applied in a range of contexts including the social sciences. Jackson’s learning ecologies framework offers a way to visualise the range of opportunities for learning in relation to digital competences in both formal and informal learning contexts. The framework positions these opportunities as learner-led or institution-led.

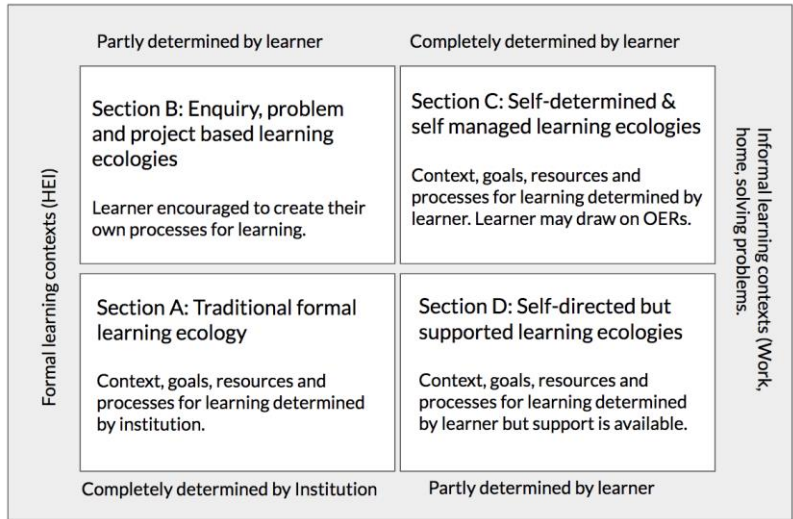


Figure 2. Adapted version of Jackson's (2013) learning ecologies framework

3.2. Reflecting on the research findings through a learning ecologies lens

The left side of the framework considers learners' formal contexts. Section A represents traditional education systems where the learning goals, resources, processes and outputs are determined by the institution through a curriculum and formal assessment. In this ecology, learning is primarily teacher-led and resources, goals and processes for student digital competence development are created by the teacher. For example, an e-portfolio assessment offers students an opportunity to develop skills in digital content creation, which aligns to DigComp Area 3. The research data revealed that employers value competences relating to digital content copyright more highly than graduates and a portfolio assessment could also engage students with digital content copyright.

Section B of the framework represents pedagogic practices that exist within the formal learning space whilst allowing learners to set their own goals and/or seek out their own resources. For example, a teacher could introduce an activity requiring student teams to identify, analyse and design a solution to a real-world problem. A teacher suggests tools and approaches to addressing this real-world problem, but the students have agency in terms of their solution. In this scenario, students have an opportunity to develop competences in digital communications by using messaging or project management tools to interact with teammates. In addition, students can develop competences around digital collaboration, by using shared folders and collaborative documents. These competences align with DigComp Area 2, an area of digital competences identified by both employers and graduates as very important in the research study.

The right side of the framework considers informal contexts. Some of these informal contexts can be within the HEI, e.g. co-curricular/extra-curricular endeavours. Section C of the framework represents contexts where learners may receive advice and guidance for their learning, but this ecology is largely self-directed. For example, the University may develop a digital competences resource bank similar to the All Aboard (2017) initiative. In collating resources, the University offers support and guidance to students around the validity of the resources, whilst allowing student autonomy over their learning by providing a range of resources. A resource bank can support the development of digital problem-solving (Area 5 of DigComp) by encouraging students to select an appropriate resource for their learning. Area 5 is highlighted in the research study as an important set of skills from the employer perspective. Initiatives which offer structured informal learning opportunities for digital competence development can also be provided by the university such as consultation time with experts, (e.g. 'DigiChamps' project at NUI Galway (EDTL, 2020)) or structured learning opportunities (e.g. 'LevUL Up' at University of Limerick (2022)).

Section D of the framework represents entirely independent contexts where learning occurs through self-interest projects. Within a HEI, students may be involved in sports clubs or societies where they can develop digital and other competences. For example, students may develop digital marketing or social media skills to promote their club/society events, which would align to DigComp Area 2 and possibly Area 3, if digital content forms part of this work. Social media and marketing skills are highlighted in the research as a set of skills which are used across a range of roles not just specific to marketing roles. Similarly, in maintaining club/society files and accounts students can develop digital competences around managing information or using spreadsheet tools such as Excel, aligning to DigComp Area 1. Excel skills are highlighted in the research data as important from both graduate and employer perspectives.

4. Conclusion

While this paper is limited in drawing on a very small-scale study relating to digital competences required in the workplace in Ireland, it does offer some insight into graduate and employer perceptions of digital competences required in the workplace. In examining the challenges of digital competence development for students through the lens of learning ecology theory, the paper frames learning ecology theory as a potential tool for HEIs in terms of planning the digital competence development of students. Recognising the variety of learners' ecologies can support HEIs in meeting policy commitments in relation to digitally competent graduates and ensure students are prepared to succeed in the workplace after graduation. Whilst HEIs already have an insight into the formal curriculum, by broadening the view of learning contexts through learning ecology theory, a HEI can also influence

students' competence development in other informal contexts and help students towards being more well-rounded digitally competent graduates.

References

- Braun, V. & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis?, *Qualitative Research in Psychology*, 18:3, 328-352, DOI: 10.1080/14780887.2020.1769238
- Carretero, S.; Vuorikari, R. and Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*, doi:10.2760/38842
- EDTL. (2020). *The DigiChamps Programme at NUI Galway*. Enhancing Digital Teaching & Learning in Irish Universities. <https://edtl.blog/webinar-series/the-digichamps-programme-at-nui-galway/>
- European Commission. (2016). 'A New Skills Agenda for Europe'.<https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52016DC0381>
- European Commission. (2021). *Digital Education Action Plan (2021-2027)*. https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en
- Flynn, S. et al. (2020) 'Enhancing Digital Capacity in Teaching and Learning in Ireland: a national approach', in. 2020 European Learning & Teaching Forum, Utrecht: Europ. Univ. Assoc. <https://eua.eu/resources/publications/912:enhancing-digital-capacity-in-teaching-and-learning-in-ireland-a-national-approach.html>
- IUA: Irish Universities Association. (2021). *Enhancing Digital Teaching and Learning*. <http://www.iua.ie/ourwork/learning-teaching/digital-learning/>
- Jackson, N. (2013). The Concept of Learning Ecologies. In N. Jackson (Ed.), *Lifewide Learning, Education & Personal Development*. www.lifewideebook.co.uk. http://www.lifewideebook.co.uk/uploads/1/0/8/4/10842717/chapter_a5.pdf
- Newall, E. (2020). *Preparing students for the digital workplace*. JISC. <https://digitalcapability.jisc.ac.uk/case-studies/university-nottingham/>
- NFETL. (2021). *Next Steps*. National Forum for the Enhancement of Teaching and Learning in Higher Education. <https://www.teachingandlearning.ie/vital/nextsteps/>
- Stauffer, R. C. (1957). Haeckel, Darwin, and Ecology. *The Quarterly Review of Biology*, 32(2), 138–144.
- University College Cork. (2022). *Digital Skills*. Retrieved 11 February 2022, from <https://www.ucc.ie/en/skillscentre/sessions/digitalskills/>
- University of Limerick. (2022). *LevUL Up: Student Digital Skills Development Programme*. Retrieved 11 February 2022, from <https://www.ul.ie/ctl/students/levul-student-digital-skills-development-programme>