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The Academic Skills Model: The value of program mapping to support students' literacies

Nicholas Charlton[1], Christopher Hart[2], Julie Somers[1], Averil Martin[1] and Caryl Bosman[3]

1. Library, Griffith University, Parklands Drive, Gold Coast, QLD, 4222, Australia

2. Library Services, University of the Sunshine Coast, Sippy Downs Drive, Sippy Downs, QLD, 4556, Australia

3. School of Engineering & Built Environment, Griffith University, Parklands Drive, Gold Coast, QLD, 4222, Australia

Email: n.charlton@griffith.edu.au, chart2@usc.edu.au, j.somers@griffith.edu.au, a.martin@griffith.edu.au and c.bosman@griffith.edu.au

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Transferrable skills (literacies) and employability have been a focus within the higher education sector in the 21st century. To assess where (and if) these required literacies are embedded, and how well students are supported in developing the required literacies in a bachelor program at an Australian university, academic, information and digital literacy mapping was conducted across the program through a partnership between library professionals and academics. The mapping in core courses of learning outcomes and assessment items to required literacies was conducted using the Academic Skills Model (ASM) (Charlton & Martin, 2018), which was designed to guide the development of academic, information and digital literacies in students. The literacy mapping found a range of academic and information literacies were scaffolded and supported in first and second-year courses across the program, but support for the development of few digital literacies were evident at any level. Consequently, these findings indicate that there are opportunities to embed more instruction in the digital literacies space. We posit that these results reflect a common assumption at the university level that students will be able to choose and effectively use the technologies needed for their assessment tasks, and hence may reflect an instructional gap that is worth investigating in other programs and universities. More generally, the results illustrate the utility of using the ASM to visualise where literacies are being incorporated throughout a program of study and what gaps exist for further inclusion to develop transferrable skills required for graduate employability.

Key Words: employability, digital literacies, academic literacies, information literacy, curriculum, higher education.

1. Introduction

Employability and transferrable skills have emerged as a significant focus in higher education in recent years because of strong competition in the workforce (Sarkar et al., 2020). This focus has also been driven in part by recent Federal Government policy for Australian universities that has linked performance-based funding to students' post-graduation employment status (Australian Government, 2019). Employability encompasses transferrable generic and discipline-specific

knowledge (Bridgstock, 2009) that aligns to graduate attributes (i.e. those sets of attributes developed through a student's program[1] of study) (Madsen & Bell, 2012). However, while industry accreditation ensures graduates possess the discipline-specific skills to be successful in a particular profession (Bergsmann et al., 2015; Trencher et al., 2018), it is also imperative that universities support graduates develop and learn to transfer literacies, competencies, and knowledge to their future employment (Medland, 2016; Panigrahi et al., 2015). Recognition of this important role of universities in relation to digital literacies comes from the UK's Joint Information Systems Committee (2021, p. 36), which specifically acknowledges the value of "building students' digital skills for the workplace." Thus, the need to ensure quality learning and teaching is two-fold: supporting students' employability and transferrable skills to enhance their future employment prospects, and safeguarding university funding and reputation.

The Academic Skills Model (ASM) is a comprehensive, evidence-based framework developed from the work undertaken by library professionals to embed academic, information and digital literacies to support students. The ASM is connected to assessment, employability skills and academic, information and digital literacies and was introduced at Griffith University to support student learning (Charlton & Martin, 2018). The development of the ASM was informed by scholarly literature and existing academic skills and research skills frameworks (Harper, 2011; Willison & O'Regan, 2013). Academic, information and digital literacy categories were developed from an audit of services offered by library professionals and existing academic skills models (Charlton & Martin, 2018). The model was further developed and refined following feedback from colleagues and pilot testing with academic partners.

The key elements of the final ASM are as follows (Charlton & Martin, 2018). Academic literacy is envisioned as comprising six categories that, grouped together, encapsulate fundamental aspects of academic literacy and how they are demonstrated through various skills. These categories are:

1. reading and evaluating;
2. extracting and noting relevant information;
3. analysing and responding to questions;
4. applying and synthesising information,
5. communicating information, and
6. collaborating in various settings.

In the ASM, information literacy comprises five categories and these are:

1. identifying information need,
2. accessing information,
3. evaluating information,
4. managing information, and
5. ethical scholarship.

Finally, digital literacy in the ASM comprises five categories and these are:

1. accessing and using digital technologies,
2. evaluating digital technologies,
3. managing and storing digital resources,
4. ethically gathering and processing data using digital technologies, and
5. communicating and collaborating using digital technologies.

[1] At this institution the term "program" is cognate with the terms "course" and "degree" used by other higher education institutions.

These key literacies form the basis of embedding support within a range of courses and programs in partnership with academics.

Embedding is considered best practice for student learning support (Maldoni, 2017; Munn et al., 2016), and provides opportunity to share the responsibility between library professionals and academics (Charlton & Martin, 2018). The ASM is grounded in embedding academic, information and digital literacy support as the theoretical approach to literacy mapping, which allows the literacies to be visually mapped for each assessment task in each course. The ASM is intended to be used when an academic requests support in their course to help students develop literacies for a particular assignment. The next step is for staff to identify which learning outcomes are relevant to the assessment task and identify specific literacies required to achieve the outcome. The library advisers then co-develop resources and embed academic, information and digital literacies within courses and programs (Munn et al., 2016; Maldoni, 2017). The support is provided as either face-to-face, online workshops, or e-learning resources in a one off or series depending on the nature of the request and the need identified.

At the time the ASM was developed, it was used by library professionals to inform resource development at the course level. In conducting such work, several challenges confronted library staff: library staff are not always consulted during the course development or course renewal process; library staff engagement and student support tends to be considerably limited in a crowded trimester curriculum; a more strategic focus for support was required as the program level approach was an emerging institutional priority. The emphasis on a program-level planning approach meant the ASM framework could be used to provide a more sustainable and scalable service for the library in partnership with academics using the ASM framework. The impetus for this process was driven by the academic partner, who wanted to determine where the academic, information and digital literacies existed across the program and where library support was already provided in courses.

This article describes how the Academic Skills Model was employed to map a program visually to identify literacy gaps which enabled the library to engage more fully in program planning. In doing so, it adds to the Charlton and Martin (2018) paper, which introduced the ASM, by demonstrating that the ASM has utility beyond the course level – it is also extremely useful for conducting evaluations at the program level. It further identifies a gap in the development of digital literacies across the program investigated, which we posit may be a common issue worth investigating in other programs and in other universities.

2. Literature review

2.1. Transferable skills

In recent years, the importance of transferrable skills, core competencies and literacies for student outcomes has influenced university policies. Although the terminology has distinct characteristics, they are often used interchangeably. Transferrable skills are a diverse range of abilities to be acquired and used when required in various scenarios. Blaxell and Moore (2012) categorise transferrable skills into communicating, collaborating, analysing and organising information, and digital literacy. Core competencies tend to be related to industry and accreditation requirements to ensure graduates possess essential discipline-specific technical skills at graduation (Perera et al., 2017), while employability refers to those competencies required for future employment (Bridgstock, 2009). Literacies are the processes of academia, rather than the outcome (Sarkar et al., 2020), with an emphasis on knowing how to communicate, locate and evaluate information and the discerning use of technology (Durkin & Main, 2002; Lea & Street, 1998; Wingate, 2015). The requirement for graduates to possess digital literacies is increasingly important as they need to navigate evolving technologies with increasing confidence to meet the demands of work and

society (Hack, 2015; JISC, 2021). The academic, information and digital literacies incorporated in the ASM encapsulate transferable skills and support students' acquisition of core competencies. Literacy mapping presents academics with an understanding of how the transferrable skills can be supported and developed.

2.2. Defining the literacies within the Academic Skills Model

Academic, information and digital literacies are nominalised terminologies (Maldoni, 2017; Prensky, 2001; Stark et al., 2018) that incorporate more than study skills. Academic literacies encapsulate reading and writing competently within an academic discipline (Lea & Street, 1998), although a more comprehensive definition includes critical thinking, using academic conventions and academic tone for a variety of genres (McWilliams & Allan, 2014). A more nuanced perspective is that academic literacies are a series of practical abilities that help students understand the academic discourse (McWilliams & Allan, 2014; Wingate, 2015). Similarly, information literacy is more than information acquisition, it requires a mature level of ethical information acquisition and use within an academic and social context (Association of College Libraries, 2015). McWilliams and Allan, (2014), acknowledge database searching and referencing can be considered part of academic literacies, however for the ASM, these are included within information literacy due to the institutional division of roles in the library supporting the different literacies. Digital literacy also ranges beyond identifying, evaluating and selecting appropriate digital technology, it requires a set of digital behaviours, practices and identities be developed and maintained (Joint Information Systems Committee, 2014). The definitions of these literacies underpin the focus of the Academic Skills Model.

2.3. University context

There is a trend in higher education toward program-level approaches to curriculum development (Stark, 2000), assessment implementation (Dijkstra et al., 2010; Van der Vleuten et al., 2012) and literacy development (Nallaya et al., 2018; Prensky, 2001). One example of this trend is the increased inclusion of transferable skills, core competencies and employability skills in capstone courses over the last decade (Drisko, 2014; Martinez-Maldonado et al., 2018). At Griffith University, the trend has been implemented through the evolution of the strategic focus to adopt a program-level planning perspective, with graduate attributes and program learning outcomes underpinning the process. Important support for this strategic process has been provided by the ASM since it incorporates helpful information about the literacies required by programs. The ASM has also offered valuable information to schools, generating increased partnership opportunities between teaching academics and library staff (Griffith University, 2018).

Another important trend in higher education has been for institutional policies on learning and teaching to require the implementation of multi-literacies throughout all degree programs to incorporate transferable skills and enhance graduate employability (Griffith University, 2016). Program learning outcomes (PLOs) are used to demonstrate where the discipline knowledge, skills and their application are benchmarked to the Australian Qualification Framework and support the graduate attributes and employability frameworks to ensure graduates are capable of meeting employment requirements (Griffith University, 2017; Halibas et al., 2020). Although assessment and learning experiences are designed to meet the PLOs and foster employability skills, the acquisition of literacies is not assured. The literacy mapping process identifies where the acquisition of literacies are located throughout the program, thus enabling program directors and teaching academics to develop students' literacies holistically and in a systematic way across a program of study.

2.4. Program planning

While academics tend to prioritise curriculum in their program planning, they also value the development of skills as students' progress through their program (Charlton & Newsham-West, 2022). Consequently, one of the benefits of using a program perspective for the development of transferrable skills in students is to ensure that students develop skills sequentially throughout a program of study (Bearman et al., 2016; Lyvers Peffer & Flood, 2017; Madsen & Bell, 2012). Planning from the program-level perspective additionally provides the opportunity for academic staff to collaborate with literacy skills specialists specifically to organise the curriculum and assessment for a series of courses (Stark, 2000). A key challenge to implementing a program level approach though, is that courses are often planned in isolation and academics are reluctant to make changes to courses where they feel they have ownership (Bearman et al., 2016; Charlton, 2017). As a result, Jessop and Tomas (2017) highlight that due to the siloed nature of courses, the student assessment experience is often inconsistent, leading to fragmented and disconnected learning experiences. However, Lawson (2015) agrees that the curriculum design process should make assessment a key component of planning and that collaboration can reduce the silo effect as it will ensure that the curriculum is transparent for students and allow them to gain a holistic perspective of a program. A holistic program planning approach to curriculum and assessment would thus facilitate sequential development of students' digital, academic and information literacies.

2.5. Assessment task design for literacies development

Assessment tasks provide students with the opportunity to demonstrate what they know and what they can do (Weir, 2020), including in relation to the process skills that students must apply to use the academic, information and digital literacies required for completing each assessment task. In addition, since students place a high value on assessments as they demonstrate their disciplinary understanding and determine passing a course (Carless, 2015; Lizzio & Wilson, 2013), there is thus a fundamental connection between developing literacies and assessing students. Consequently, assessments form a key component of embedding literacies at the program level, and since assessments provide students with opportunities to demonstrate their literacies, understanding how literacies develop throughout each year level would help support the program planning needed to ensure their sequential acquisition.

However, current processes for developing a program curriculum do not always easily support the sequential acquisition of literacies, even though this is a desired outcome. One key goal of this paper, therefore, is to demonstrate that an effective way to improve current processes to achieve the desired outcomes is to map literacies across an entire program using a visual tool which indicates the touch points where students learn transferable skills, meet the program learning outcomes, and acquire employability skills. We also aim to show that mapping with a visual tool such as the ASM has great value by indicating gaps and duplication in literacies instruction. To be effective in achieving these goals though, it is important to note that the process of program mapping with the ASM needs to employ a holistic partnering approach between professional and academic staff, groups and schools (Charlton and Martin (2018). Thus, fostering these partnerships is needed to facilitate the strategic approach to literacies development across a degree program as illustrated in this paper.

3. Methods

3.1. Research methodology: Model

The ASM is a framework that was initially designed to facilitate the development of academic, information and digital literacy in courses with a focus on assessment items (Charlton & Martin, 2018; Griffith University, 2018). It plots a broad set of desired outcomes of students' development

with four levels of proficiency. To demonstrate the ASM's value for *program* level evaluation and development, particularly in relation to the question of whether the program supported the development of key employability skills in a comprehensive and systematic way across an entire program, this research took a case study approach, with the ASM being the tool used to map literacies to the learning outcomes and assessment tasks in a Built Environments program. Although the case was a "convenience sample", there are no reasons to expect that it is atypical of programs of study in Australia. In particular, professional degrees like the one mapped in this research, regularly undergo accreditation certification to ensure that they develop the core-competencies required, and so this program can be expected to be equivalent to similar such programs in universities throughout Australia. Furthermore, this case study may be similar to other programs that expect a high-level of digital literacy in the final year, but do not support their development in the subsequent years. Consequently, while this case study suffers from the same generalisability limitations as case studies do in general, it seems likely that the conclusions from this case study can be expected to be at least somewhat generalisable.

To conduct the mapping exercise, a team of library professionals was formed and trained to identify the level of literacies already included across the four-year program. The team comprised a Librarian, a Learning Adviser, and a Digital Capability Adviser. The mapping was conducted in two phases, where the learning outcomes and assessments were mapped by the corresponding professional role. The second phase was a collaborative review of literacies mapped to ensure intercoder reliability.

3.2. Phase 1: Mapping learning outcomes

Core courses in a Built Environments program were identified (n = 18) and learning outcomes were mapped against the ASM for each core course across the four-year program. Out of the 18 courses mapped, six were from first-year, five were from second-year, four were from third-year, and three were from fourth-year. Phase 1 collated course details, learning outcomes and assessment details, and assessments were analysed for relevance to academic, information and digital literacies. Face-to-face workshops or e-learning resources provided by the library were also recorded. The initial assessment mapping by course was useful for identifying assessment types and likely learning objectives and expedited the second phase of mapping assessment literacies.

3.3. Phase 2: Mapping assessment literacies

Phase 2 identified academic, information and digital literacies, and the level of proficiency required to complete assessments, across the program (see Figure 1). The assessment items were mapped by the corresponding professional role for each core course. The aim of this phase was to identify which literacies were required to complete each assessment item and whether literacy instruction was provided. Up to six assessment items per course were mapped with results recorded in a series of spreadsheets. Data was divided into two categories: Years 1 and 2, and Years 3 and 4. The data were represented in an infographic illustrating the spread of academic, information and digital literacies. Levels of literacy were represented on the vertical axis and courses on the horizontal axis. Each assessment item was represented by a symbol plotted to the relevant literacy category and level expected from that assessment item (see Figure 1). Additional symbols indicated where face-to-face services and e-learning resources were delivered, and their absence indicated opportunities for the library to embed support.

4. Findings

4.1. Programmatic literacies scaffolding

As will be shown in this sub-section, the Phase 1 mapping demonstrated that while some courses possessed clear learning outcomes that supported the development of academic, information and

digital literacy, many of the learning outcomes were only content knowledge specific, rather than focused on transferrable literacies. Furthermore, Phase 2 mapping demonstrated that while students were required to *demonstrate* increasing levels of proficiency in digital literacies by their third and fourth-years of study, the opportunity to *learn and develop* digital literacies occurred infrequently across the first two years of the program compared with academic and information literacies. Details are provided below.

4.1.1. Year 1 and 2 courses

The Phase 2 mapping demonstrated that a range of academic and information literacies were required for assessments in the first two years of the program. This is illustrated in Figures 1 and 2 where academic and information literacies are evident at the scaffolded and supported levels in first and second-year courses across the program. However, few digital literacies were evident at a scaffolded level in year 1 and 2 courses as illustrated in Figure 3.

4.1.2. Year 3 and 4 courses

In third-year and fourth-year courses, academic literacies were also required for assessment tasks at supported, supervised and independent levels of proficiency (see Figure 4), whereas information literacy was predominantly required at supervised and independent levels (see Figure 5).

Regarding digital literacies, based on the findings from our mapping noted above, these were not evident from learning outcomes or assessment tasks in the first and second year. In contrast, the presence of more complex digital literacies was more frequently visible for assessments in third-year and fourth-year courses (see Figure 6). In these instances where digital literacies were required to be demonstrated, students were primarily expected to operate at supported, supervised or independent levels of proficiency. For example, the digital literacy category of, 'Ethically gather and process data using technologies', would require students to access demographic data from the Australian Bureau of Statistics and would require them to critically analyse and use technology to inform proposed strategies and policies to a specific real-world scenario. Additionally, fourth-year students undertake a placement in industry, and their digital literacies are essential to allow them to readily use and engage with employers' software programs and digital platforms performing everyday tasks. Consequently, since the development of digital literacies in first year and second year would be expected to assist students to successfully transition to the increased complexity of digital tools required to be used in the later years of the program, we argued that the lack of explicit development of students' digital literacies in first and second year was a weakness in the program that needed to be addressed.

4.2. Mapping assessment context

To identify opportunities to embed literacies development support, as part of the mapping process, information was collected to provide assessment contexts. The assessment context provided details relating to the assessment located in the course profile, and these aspects included learning objectives, year level, assessment type and description, marking criteria, length of task in words or time, weighting, and whether the assessments were individual or group work. The literacies required were also recorded to indicate relevance from a library support perspective. This categorisation of the type and weighting of assessments provided academics with additional information that could be used to inform possible changes to assessments that would allow the embedding of digital literacy development while having only a small impact on student grades should students struggle with the new and additional skills required of them. The rationale for this approach was

that the impact of possible negative student evaluations of courses and academics' teaching resulting from new and challenging tasks could be minimised on lower-stakes assignments.[2]

4.3. Assessment diversity across the program

The collection of assessment data was useful for identifying the diversity of assessment items, technical skill building and literacy development. A total of 66 assessment tasks across 18 core courses between first and fourth year were identified. Discrepancies were identified in what was presented in the course profile and the courses' assessment details. This increased the number of discrete tasks to 76. There were 48 individual tasks and 18 group assessments. Assessments were predominantly written communication and comprised 27 reports (including laboratory reports), four reflective tasks, and six essays. Oral presentations accounted for 11 tasks. The remaining tasks comprised 12 quizzes, eight exams, three e-portfolio tasks, three practical-based assessments and two discussion-based assessments (see Figure 7).

Further analysis revealed the frequency of assessment tasks implemented in core courses throughout the program. The first-year assessments primarily comprised written tasks, quizzes and exams. Most written tasks for first-year students were reports; essays were only included in second and third-year courses, while written reflections were inconsistently present throughout the program. Additionally, practical problem-solving assessments, e-portfolios and discussion boards were assessed at the beginning and end of the program, but did not appear in the middle years. Thus, students had little opportunity to develop the skills and literacies associated with these assignment types. In general, siloed planning provided few opportunities for students to develop their digital literacies in a systematic manner. Consequently, our mapping revealed that academic, information and digital literacy support was not always coordinated in the most efficient way.

4.4. Opportunities to embed digital literacy

A challenge of assessment mapping was the lack of detail about the digital literacies required for assessments. The requirement of digital literacies at supervised and independent level indicates an assumption that students possessed basic levels of digital literacy on program entry. Our analysis of assessment tasks across the program identified 45 opportunities to include digital literacies based on embedding skills development in using Word, Excel and EndNote software. In addition, nine opportunities to include skills development in using the PebblePad e-portfolio software for reflective and practical assessment tasks were identified. Additional opportunities to include digital literacies in oral presentations using video software to create, edit and present information were identified. Often digital literacies are required to be used, but not explicitly included in assessment criteria. For example, an oral presentation may require an accompanying slideshow, which requires digital literacy to research online, script presentations, insert charts, record, and upload the finished product into the Learning Management System. Consequently, based on our analysis, we believe that there is a need to make digital literacies more explicit in the assessments offered throughout the program to support stronger digital literacies development.

[2] There is anecdotal evidence that some academics are reluctant to make changes to their assessments in case of "retribution" in the form of critical course evaluations by students resulting from a bad student experience.

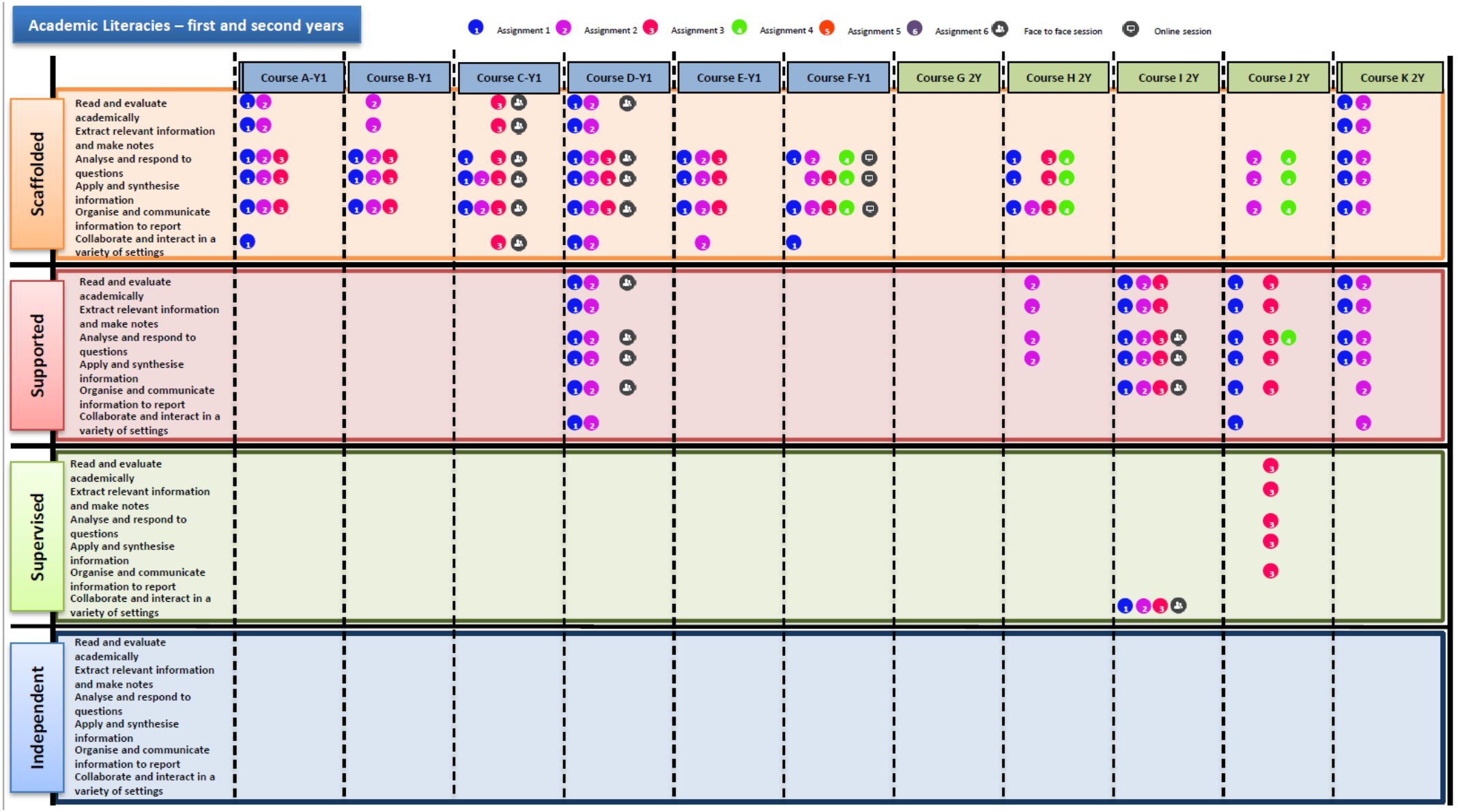

Figure 1. Academic literacies present in assessment tasks in first-year and second-year courses.

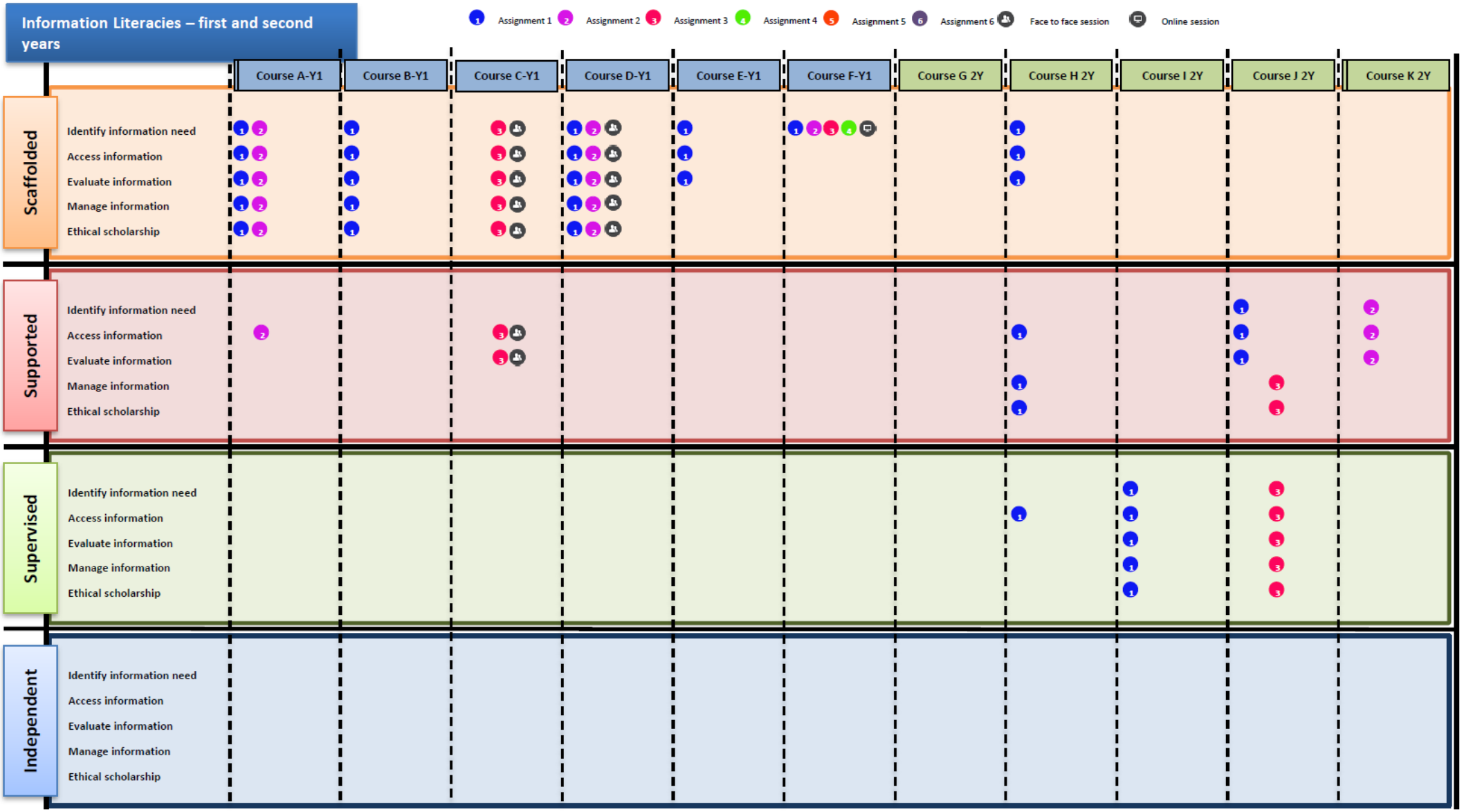

Figure 2. Information literacies present in assessment tasks in first-year and second-year courses.

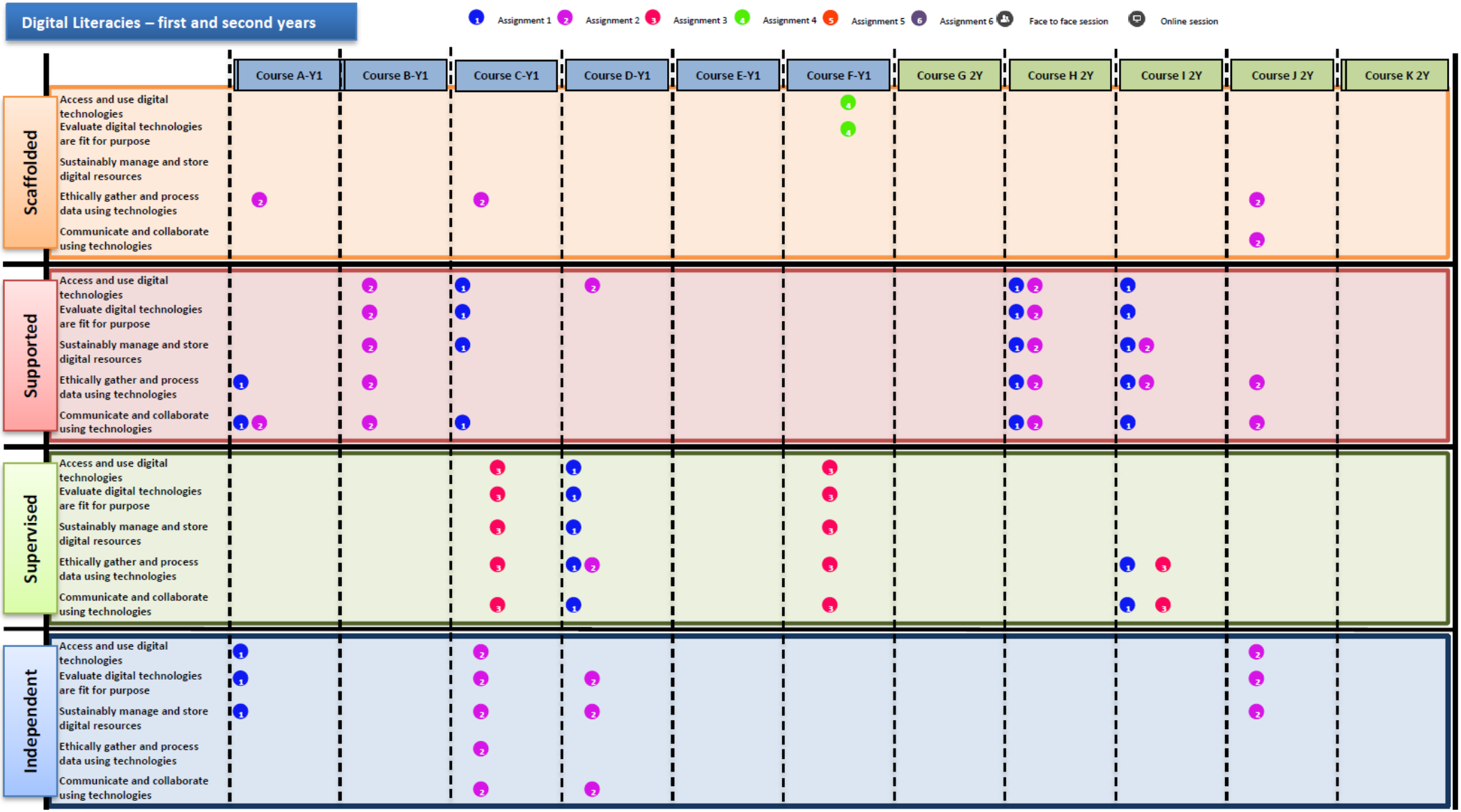

Figure 3. Digital literacies present in assessment tasks in first-year and second-year courses.

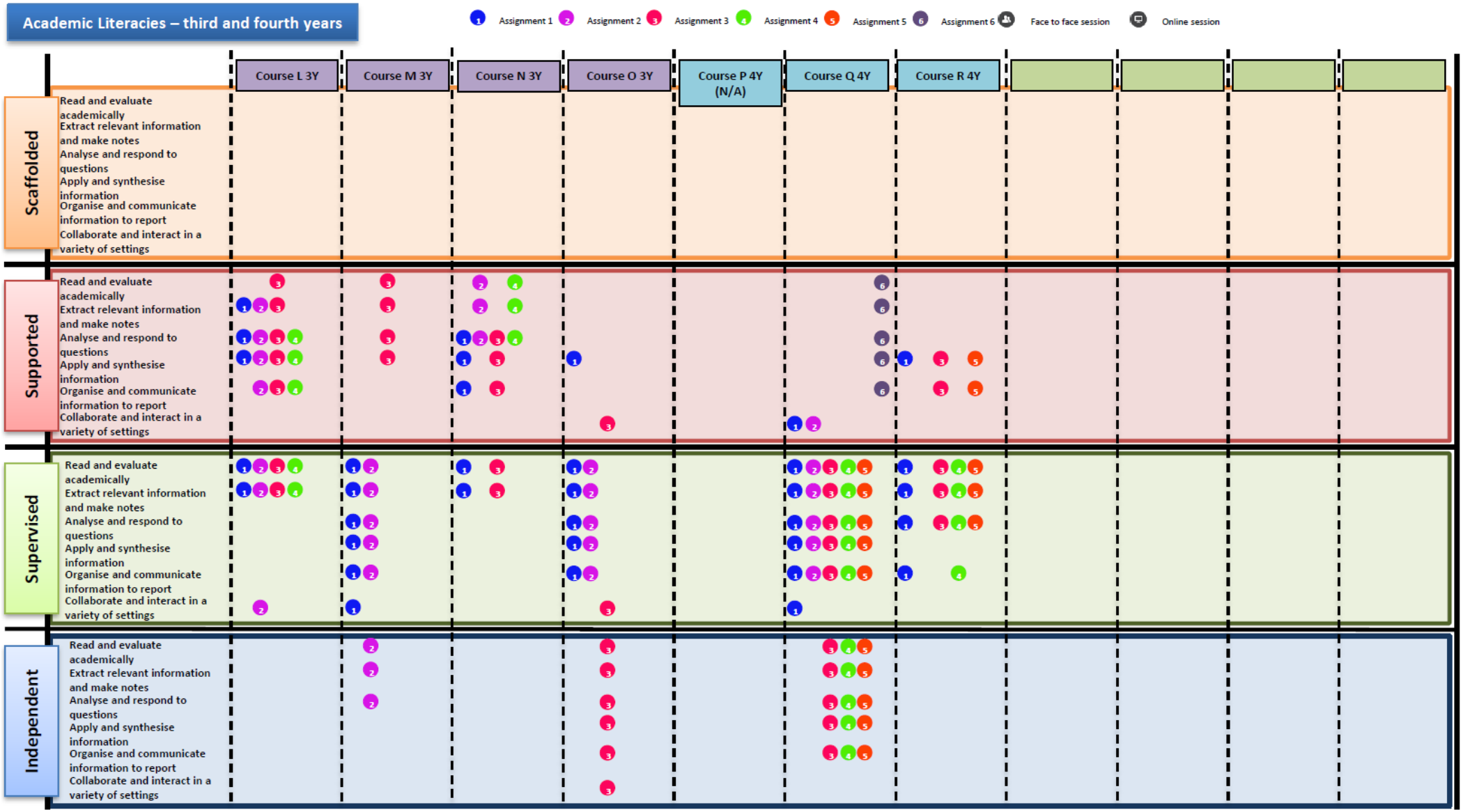

Figure 4. Academic literacies in assessment tasks in third-year and fourth-year courses.

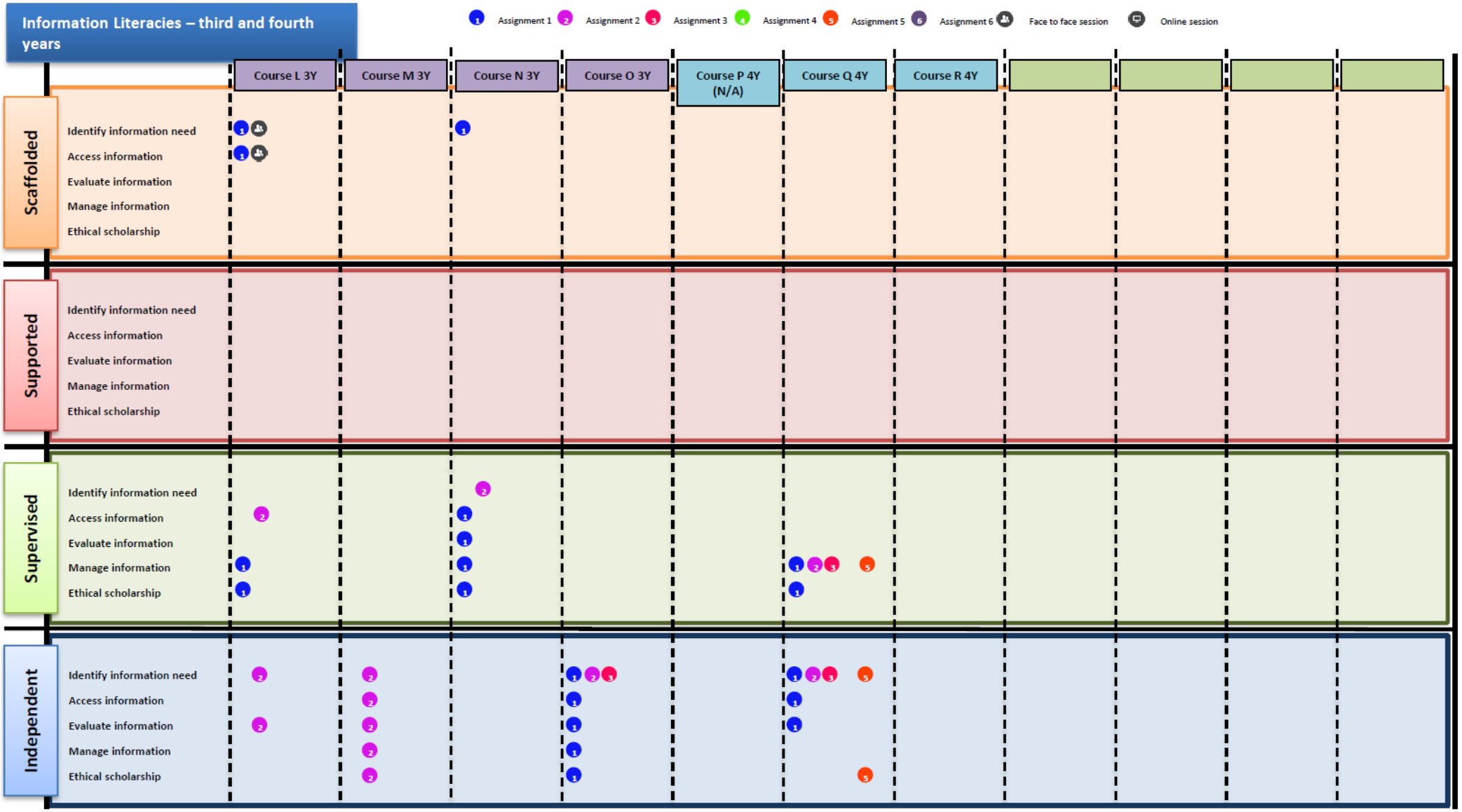

Figure 5. Information literacies in assessment tasks in third-year and fourth-year courses.

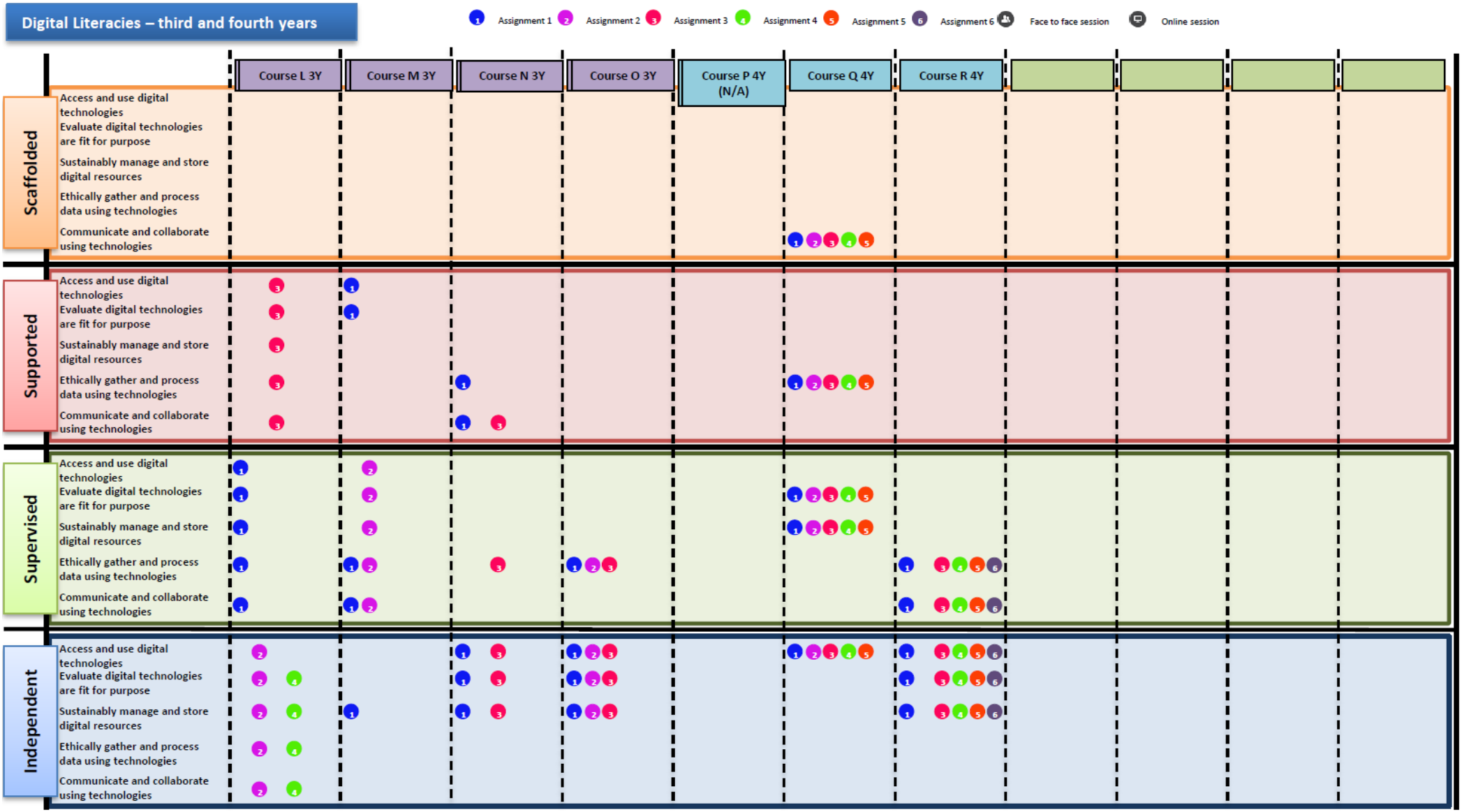

Figure 6. Digital literacies in assessment tasks in third-year and fourth-year courses.

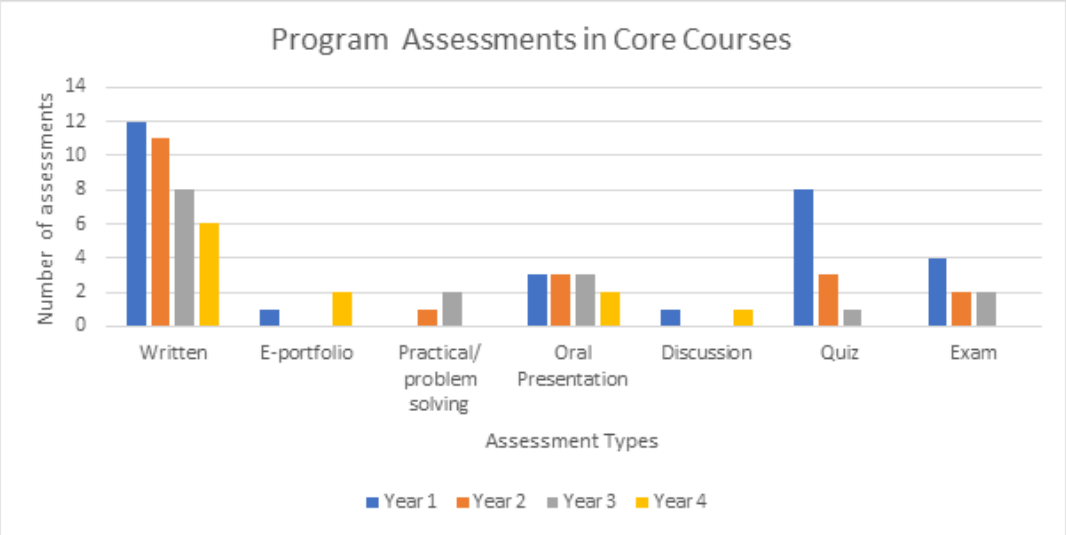

Figure 7. Assessment diversity across the program.

5. Discussion

The key finding of this literacy mapping was that a gap existed between the way digital literacies were utilised compared to academic and information literacies. On the one hand, academic and information literacies appeared fairly consistently across the program so that students moved from scaffolded to supported to supervised to independent levels of competency. On the other hand, while digital literacies are required across the program, they appear less frequently, and instruction is rarely scaffolded into assessments. In addition, the embedded academic and information literacy support that the library provides is more prevalent than digital literacy. In addressing this inconsistency in digital literacy development, we argue that it is important to take a program approach as such an approach to curriculum and assessment planning is critical for ensuring students develop skills holistically and sequentially (Bearman et al., 2016; Lyvers Peffer & Flood, 2017; Madsen & Bell, 2012). Furthermore, Charlton and Newsham-West (2022) reveal that students' skill development is a key consideration by academics when planning across a program. To support the holistic approach, using the ASM to map the presence or absence of literacies across a program has proved invaluable, and in this particular case, was very useful for identifying where digital literacy could be effectively placed in the program to meet assessment requirements.

We argue that it is important to address this gap in the digital literacy development of students as the academic community acknowledges the need for greater digital literacy among students to achieve employment in the digital economy (Cawood et al., 2018; Joint Information Systems Committee, 2021). Recognition of the relevance of digital literacy to students for Griffith University is its inclusion in three Griffith Graduate Attributes (Griffith University, 2016). Once included in university policy, there is an obligation to equip students with the appropriate knowledge and digital literacies. In first-year and second-year courses, our mapping showed digital literacies were implicit in assessments, but not expressly included in learning outcomes. It is possible that more digital literacies were included in assessments, but not indicated by course profiles. However, by third and fourth-year, specialized software training was included in profiles. We thus argue that it would be valuable to explicitly include digital literacy within assessment criteria as doing so could guide digital literacy acquisition for graduates and enhance their employability.

It is perhaps surprising that the development of digital literacy was not more heavily emphasised in the first two years of the reviewed program since academics and library professionals understand "that students enter a rapidly evolving digital-technologies world" when they commence their university studies (Breen et al., 2022, p. 5), and acknowledge students should be equipped

with the knowledge to understand which tools are appropriate for each context and to transfer this to other professional or personal scenarios (Rodríguez-Moreno et al., 2021). One possible explanation for this conundrum is that because the arrival of new digital tools occurs so frequently, it is considered disruptive and emotionally taxing to have to keep mastering new tools (Coron & Gibert, 2020), and so can be hard to manage and a challenge to teach (Joint Information Systems Committee, 2021). Support for this conjecture comes from university responses to the COVID-19 pandemic, which illustrated the technological adjustments required to teach in online spaces and the shortcomings of the technological knowledge of some teaching staff (Cavaleri & Tran, 2021). Consequently, many academics may not be able to keep up with rapidly changing technology and so may not include digital literacies in assessments to avoid having to provide instruction in tools they are not themselves masters of.

The assumption that students are digitally literate may also account for the low inclusion of digital literacy within the curriculum and assessments. Higher education in Australia expects students to negotiate electronic administration systems, learning activities and a communication online based on the perception they are from the digital generation (Coldwell-Neilson, 2018). When students succeed at enrolling or attending online classes it reinforces the idea that they are digitally literate enough to negotiate systems and learn new skills as they go (Coldwell-Neilson, 2018). However, Rodríguez-Moreno et al. (2021) also suggest that students' often use only a limited number of digital tools when they start their degree. This observation is important because the skills and abilities students use for negotiating an online, connected and digital landscape are different to the skills required for learning activities (Breen et al., 2022; Hallam et al., 2018). Hence, Coldwell-Neilson (2018) argues that academics cannot assume students possess the digital literacy skills required for higher education. As this assumption could be widespread, we argue that other academic skills advisers could find the ASM model useful for systematically mapping literacy skills development across programs of study to identify possible gaps or other problems.

Apart from the gap identified above, one of the key benefits from the literacy mapping was that it gave a visual snapshot across the program which provided an opportunity to review assessments, digital literacies, critical issues and gaps across the program. To illustrate the advantage of visual representation, it is useful to describe how it was implemented in the bachelor program. The Program Director used the course maps to identify that digital literacy was required in the third and fourth-year of the program, but did not occur in the first or second-year. The Program Director implemented changes in a first-year studio course and extended that into a second-year course to reinforce the development of digital literacy skills. The presentation in the second-year course assessment was adapted to include video making software and digital skills. The inclusion of some digital literacy in first and second-year helped fill the literacy gap between first and third-year. As this example shows, there are benefits to making a small change to include digital literacies in learning opportunities. The implication for Program Directors is that the Academic Skills Model enables explicit embedding of digital literacies and the visual mapping provides an opportunity to review the program and assessments.

Further evidence that mapping programs using the ASM model is perceived as being valuable comes from the fact that other schools and disciplines across the university have engaged with the ASM mapping. Programs in Business, Information Communication and Technology and another Built Environment program have worked with Library professionals to map programs using the ASM. This has resulted in three schools re-evaluating their program planning and assessment processes. Another school has responded by centralising their development and delivery of academic, information and digital literacy into an online resource. This demonstrates that siloed curriculum planning can be mitigated by employing the ASM and visual mapping process and facilitating embedded, staged student support.

Finally, the above examples illustrate that while the mapping process requires a small amount of training and is time consuming, these challenges are outweighed by the benefits which can be obtained from visualising and understanding academic, information and digital literacies in assessments across the program. And in particular, for library professionals, literacy mapping is a way to strategically engage with academic partners and add value to program planning, embed literacies and support student learning.

6. Limitations and future research

The boundaries of the project determined Library professionals could provide mapping services and advice, but implementation was seen as the responsibility of teaching academics. The response from most academics was to implement the advice, however following-up their experience could have provided insight into teaching or assessment practices or improving the mapping process. A further limitation of the mapping undertaken with the Built Environments program was not measuring student outcomes post-implementation in first and second-year courses. Conducting further research could determine the efficacy of program changes by measuring pre- and post-implementation levels of students' digital literacy or perceived student benefits.

One strong reason for further focus on the development of students' digital literacy is that at our university, and likely at many universities (especially as one consequence of the COVID-19 pandemic), the focus on digital literacy has gained prominence by inclusion of a 'digital first' strategy, and other universities internationally are also embracing technology in this way (Joint Information Systems Committee, 2021). In effect, this means putting as much information and teaching online to enable accessibility. For students to be able to work efficiently and effectively in this online environment, they need the requisite digital literacies. However, our mapping process showed digital literacy is assumed knowledge, which is an issue because there is rapid proliferation of digital tools but only sporadic training in foundational courses. Consequently, research to determine the support that teaching academics may need to provide instruction in digital literacy, tools, and inclusion in assessment could thus be useful to inform professional development. It may also be useful to determine how students transfer digital literacy between courses, programs of study, and personal and professional contexts. Further exploration of how digital literacy is being included in the curriculum and assessment may also provide insights into best practice for digital literacy development and how to transfer this practice between disciplines and programs of study.

7. Conclusion

This paper has provided further evidence to Charlton and Martin (2018) that the ASM can facilitate sequential and staged development of the digital, academic and information literacies that are necessary to support students' transition into employment. Its value in mapping these literacies was shown for a particular bachelor program. The mapping of this program revealed that while the program had focused on transferable core competencies required by industry to ensure accreditation, along with academic and information literacy, digital literacy was assumed. In particular, a gap was found between the assumption that students were digitally literate by the third-year of the program and the lack of digital learning opportunities in the first and second-years of the program. Consequently, the mapping enabled this digital literacy gap to be addressed by library professionals partnering with academics to ensure literacy development occurred across the whole student life-cycle.

It has also been shown in this paper that there is considerable value in using a *systematic* method, such as the ASM, to analyse literacies across programs of study, as it can uncover important details at program, course and assessment level. We argue that this program approach has value because course level planning, which is often the default approach to curriculum development,

tends to be content driven and often occurs in isolation to other courses in the program, thus potentially leading to fragmented and patchy literacy development. Our results also demonstrate that having a visual tool that shows where small changes can be made is invaluable for locating foundational assessments in which support for the development of appropriate digital literacies can be embedded. Finally, the significance of mapping for library professionals was its value in helping them identify, in partnership with teaching academics, where they could most effectively support assessment and employability outcomes for students.

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