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# Digital Acumen as a Workforce Capability: A Systematic Review of Digital Learning Activities in Accounting Education

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**Abstract:**

Digital acumen has emerged as a critical workforce capability required for effective participation in digitally transformed professional environments, placing increasing pressure on higher education institutions to develop graduates with workforce-relevant digital capabilities. Despite the growing integration of digital technologies, limited clarity exists on how digital learning activities (DLAs) contribute to the development of higher-order skills such as digital acumen. This study reports on a systematic review of current literature examining DLAs used to support digital acumen development in undergraduate education, using accounting as a disciplinary case for exploring pedagogical alignment and digital capability development in digitally mediated higher education contexts. A total of 41 peer-reviewed studies published between 2019 and 2024 were thematically analysed. Findings indicate that while a wide range of DLAs is employed, most focus on generic digital tools rather than discipline-specific applications. Limited attention is given to pedagogical designs that support the development of specialised, higher-order digital capabilities required in increasingly digital professional environments. This reveals a misalignment between curriculum intentions, teaching practices, and ever-changing digital capability demands placed on graduates entering contemporary workplaces. This study contributes to business, management, and accounting education scholarship by increasing understanding of how DLAs can be designed to better support higher-order digital capability development, graduate readiness, and workforce-relevant digital competencies.

**Keywords:**

Digital Acumen, Digital Learning Activities, Digital Capability Development, Higher Education, Graduate Readiness, Workforce Competencies, Accounting Education

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## Introduction

Rapid technological advancement continues to reshape both higher education and the professional workplace, transforming how knowledge is produced, accessed, shared, and applied (Nuris et al., 2019). As a result, graduates increasingly require digital capabilities that support employability in digitally transformed organisations. The acceleration of the Fourth Industrial Revolution (4IR), compounded by the impact of the COVID-19 pandemic, has propelled higher education into a predominantly digital environment, making online and technology-enhanced teaching and learning the new norm (Hasbolah et al., 2020). As a result, universities now bear increasing responsibility for equipping both educators and students with the competencies required to navigate rapid technological changes, support digital transformation initiatives, and remain aligned with emerging workforce expectations and digital trends (Astuti et al., 2021).

However, research indicates a persistent gap between students' everyday familiarity with technology and their ability to use digital tools meaningfully for academic purposes. Astuti et al. (2021) note that although Generation Z students are proficient users of mobile devices, this does not necessarily translate into the skills required for deep learning or knowledge construction through digital platforms. Their work underscores the distinction between social-media-driven digital engagement and educationally productive use of digital tools, highlighting the need for intentionally designed and pedagogically structured digital learning approaches in higher education.

Digital literacy extends well beyond basic computer operations. It encompasses the ability to locate, interpret, analyse, and ethically use information from electronic sources to meet specific needs (Ayu & Pustikaningsih, 2021). However, within higher education, it is more widely acknowledged that digital literacy alone is not enough to support meaningful learning and must be accompanied by higher-order capabilities that allow critical engagement, problem-solving, and knowledge construction in digitally mediated environments. Proficiency with technology is therefore essential for maintaining graduate employability and organisational competitiveness in an increasingly digital professional landscape (Lestari & Styaningrum, 2023).

Although digital technologies offer significant advantages, their widespread adoption has also introduced new challenges and disruptions across professional and educational contexts. Traditional professions, including accounting, are undergoing a profound digital transformation as automation, digital platforms, and artificial intelligence reshape routine tasks (Suhardjo et al., 2023). Digital technologies have reshaped how professionals work, enabling greater flexibility when and where tasks are performed. These developments also influence student expectations, with many preferring learning environments that provide autonomy, online access, and technology-supported interaction. Such environments also

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reduce reliance on an educator's physical presence, supporting more independent and flexible modes of learning (Hidayat et al., 2023).

These developments emphasise the need for structured and intentional integration of digital technologies in teaching and learning. Such concepts can be conceptualised as DLAs, defined as purposefully designed tasks that incorporate digital learning to support learning outcomes. They can be systematically embedded within curricula to cultivate digital acumen and workforce-relevant digital capabilities. Nuris et al. (2019) argue that educators must purposefully integrate such technologies to create interactive, blended learning experiences that combine face-to-face instruction with online and offline DLAs.

Beyond its educational significance, digital acumen has become an important workforce capability. Employers increasingly expect graduates to apply digital technologies, exercise professional judgement, and adapt to digitally transformed workplaces. Higher education institutions are therefore expected not only to provide disciplinary knowledge but also to develop workforce-relevant digital capabilities that enhance graduate employability and organisational readiness. The relevance of digital acumen is particularly pronounced within specific institutional and professional contexts. In the South African context, where universities are required to demonstrate alignment between accounting curricula and the South African Institute of Chartered Accountants (SAICA) CA of the Future competency framework (SAICA, 2023), the development of digital acumen becomes both a pedagogical and regulatory imperative. As South African higher education institutions navigate persistent challenges such as uneven digital infrastructure, varying levels of student digital preparedness, and widening technological skills gaps, the need for curriculum design that explicitly integrates digital professional competencies has become increasingly urgent (Makazhe, 2025). These challenges reflect broader issues faced by higher education systems internationally in aligning teaching and learning practices with evolving digital demands and the workforce requirements of digital transformation. Strengthening digital acumen is therefore a pedagogical imperative within higher education, while simultaneously functioning as a regulatory and accreditation requirement within the South African accounting education landscape and supporting the development of digitally capable graduates for contemporary professional environments.

This study examines how DLAs support the development of digital acumen in higher education, using undergraduate accounting education as a disciplinary case to explore issues of pedagogical alignment, curriculum design, graduate preparedness, and workforce-relevant digital capability development. In doing so, the study considers the role of higher education in preparing graduates for digitally transformed professional environments.

Despite the growing interest in digital learning, existing literature remains fragmented and centred largely on the use of generic digital tools rather than the pedagogical design of activities that support higher-

order digital capabilities. As a result, little is known about whether the DLAs currently used in undergraduate education can cultivate the types of digital acumen required in contemporary professional and organisational contexts, and whether they adequately prepare graduates for digitally transformed workplaces.

This highlights a clear gap in the literature, as few studies have systematically synthesised how DLAs are conceptualised and aligned with the development of higher-order digital competencies. This gap provides a clear rationale for a systematic review of DLAs, with a focus on their pedagogical alignment and their role in supporting digital acumen development in higher education and the cultivation of workforce-relevant digital capabilities.

Although this review is situated within undergraduate accounting education, the central issue examined, namely, the pedagogical alignment of DLAs with curriculum intentions and digital capability development, has broader relevance across disciplinary contexts in higher education where institutions are increasingly expected to prepare graduates for digitally transformed workplaces and evolving professional environments.

Through a systematic review of the literature, this study examines how DLAs are conceptualised and implemented to support the development of digital acumen within undergraduate curricula, using accounting education as a disciplinary case in higher education. This study contributes to scholarship on digital learning, digital capability development, and higher education transformation by providing a structured synthesis of DLAs and highlighting the importance of their pedagogical alignment in supporting higher-order digital capability development and graduate readiness in technology-enhanced higher education.

## Conceptualising digital acumen and DLAs in higher education

The rapidly evolving digital transformation of higher education has intensified the need to build more advanced forms of digital capacity among students. While digital literacy is traditionally associated with the ability to access, evaluate and use digital information, recent scholarship emphasizes that foundational skills alone are not sufficient to meet the demands of the contemporary learning environment (Farias-Gaytan et al., 2023).

In turn, the concept of digital competence has gained momentum as a broader construct that includes knowledge, skill, and attitudes needed to effectively engage with digital technologies in learning and within the professional environment (Pelaez-Sanchez et al., 2024). New research has indicated that higher education needs to move beyond competence towards more advanced capabilities that support critical thinking, problem-solving, and adaptability, and effective participation in increasingly digital workplaces (Farias-Gaytan et al., 2023; Pelaez-Sanchez et al., 2024). This development demonstrates

a significant shift in perspective from using technology for practical purposes to engaging in digital engagement that is more cognitive and epistemically demanding.

Digital acumen can therefore be understood as a higher-order extension of digital competence, incorporating critical judgement, data-informed decision-making, and the ability to apply digital tools in authentic contexts.

Within the SAICA CA of the Future competency framework, digital acumen comprises seven competency areas: computational thinking, data knowledge and strategy, data analytics, automation, new developments and protocols, cyber security, and user competencies (SAICA, 2023). Collectively, these competency areas reflect the ability to use and apply digital technologies to support professional judgement, decision-making, and value creation in digitally transformed environments. Within professional competency frameworks, digital acumen is viewed as a multidimensional capability that enables professionals to navigate digitally mediated environments, exercise digital judgement, interpret and use data effectively, and create value through the strategic application of technology (SAICA, 2023).

In this study, the SAICA framework serves as a conceptual reference point for understanding digital acumen and for interpreting the potential contribution of DLAs to digital capability development. The development of these capabilities is closely related to the design of DLAs. Within a technology-enhanced learning (TEL) perspective, effective integration of digital technologies requires alignment between pedagogical design, learning activities, and the intended outcomes, rather than merely focusing on the use of various tools (Jantakun et al., 2025).

Using a constructivist and constructive alignment lens, learning occurs through active engagement, where teaching activities and assessments are aligned with intended learning outcomes (Biggs, 1996), therefore DLAs play an important role in supporting higher-order learning and digital capability development when specifically designed and aligned with curriculum intentions.

Collectively, these perspectives provide the conceptual framework underpinning this study. Digital acumen represents the intended higher-order capability outcome, while technology-enhanced learning provides the pedagogical context within which DLAs are implemented. Constructivism and constructive alignment explain how carefully designed learning activities can support active knowledge construction and the development of higher-order digital capabilities. Together, these perspectives inform the interpretation of how DLAs contribute to digital acumen development and graduate readiness within undergraduate accounting education.

This study adopts this conceptual framework to investigate how DLAs are aligned with the development of higher-order digital capabilities in higher education, with particular attention to digital acumen, graduate readiness, and participation in digitally transformed professional environments.

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### Research question:

**This study is guided by the following research question:**

What types of DLAs have been examined in undergraduate education, and to what extent are these activities pedagogically aligned with the development of digital acumen and workforce-relevant digital capabilities?

## Methods

A systematic review methodology was adopted to enable a structured and transparent examination of how DLAs are used and conceptualised within higher education teaching and learning contexts. The review process followed clearly defined and transparent procedures to enhance the transparency, credibility and reproducibility of the findings and to provide a robust evidence base regarding digital capability development in higher education.

### Database selection

Google Scholar was selected as the primary database for this review as research on digital learning in accounting education is published across a wide range of interdisciplinary journals, many of which are not consistently indexed in specific academic databases such as Scopus or Web of Science. Google Scholar aggregates peer-reviewed journal articles, conference proceedings, and discipline-specific publications from multiple sources, ensuring broader coverage of accounting education research. Given that research relating to digital learning activities spans multiple disciplines, including accounting, education, educational technology, higher education, and information systems, a database with broad interdisciplinary coverage was considered appropriate for addressing the research question.

Given the diversity of outlets in which DLAs are reported, Google Scholar offered a comprehensive and inclusive platform for identifying studies relevant to the research question. The focus of the review was to map the range of DLAs reported in undergraduate accounting education rather than to evaluate research from a particular disciplinary perspective, making broad coverage preferable to discipline-specific indexing.

Its wide indexing also reduces the risk of omitting pertinent articles published in education, accounting, technology-enhanced learning, digital transformation and interdisciplinary journals. Although the use of a single database may result in the omission of some studies, Google Scholar's extensive coverage was considered suitable for capturing a comprehensive body of literature relevant to the review objectives. To enhance the quality and relevance of the evidence base, only peer-reviewed journal articles meeting the predefined inclusion criteria were included in the final analysis.

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## Search string development

The search strings were developed directly from the core concepts embedded in the research question, namely: (1) DLAs, (2) accounting education, and (3) undergraduate students. To ensure systematic and transparent retrieval of studies, the keywords were refined through an iterative process in which synonyms, related terms, and commonly used phrases in higher education and accounting education literature were identified from the initial scoping of articles.

Three final search strings were used: “accounting learning activities”, “digital learning accounting”, and “computer learning accounting”. These strings reflect common terminology used in the literature to describe digital tools, computer-based instruction, and technology-supported learning activities in accounting programmes.

The search strings were intentionally kept narrow to ensure alignment with the review’s focus on accounting education and to identify studies situated explicitly within accounting teaching and learning contexts. As the purpose of the review was not to provide a comprehensive review of digital learning across all disciplines, but rather to examine DLAs within accounting education as a disciplinary case, accounting-specific search terminology was considered appropriate.

Each search string was entered separately into Google Scholar, and all resulting article titles were compiled for screening. The three search strings yielded a total of 101 records, capturing a broad range of DLA-related studies in accounting education reported across diverse publication outlets. This approach prioritised disciplinary relevance and conceptual alignment with the research question rather than breadth of retrieval across multiple disciplines.

Table 1 presents the search strings used, and the number of records retrieved from each search.

| **Words in the title** | **Number of results** |
|---|---|
| Accounting learning activities | 15 articles |
| Digital learning accounting | 52 articles |
| Computer learning accounting | 34 articles |
| | **101 articles** |

Table 1: Search string with keywords

## Inclusion/exclusion criteria

To ensure that only studies directly relevant to the research question were included, a clear set of inclusion and exclusion criteria was applied during the screening process. These criteria were

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developed to maintain conceptual focus, methodological consistency, and relevance to undergraduate accounting education.

## Inclusion criteria

**Articles were included if they met all the following criteria:**

**1.** The study focused on accounting education and explicitly referred to accounting students.

This ensured that included studies were situated within an accounting-specific pedagogical context, rather than general business or education settings that may not reflect the digital competencies required of accounting graduates.

**2.** The study examined learning activities intended to develop digital acumen or related digital capabilities in accounting students, including capabilities relevant to contemporary professional practice and digitally mediated work environments.

Because the purpose of this review is to map DLAs contributing to digital acumen, the criterion ensures conceptual alignment between the research question and the selected studies.

**3.** The article was available in English or had an accessible English version.

This allowed for accurate interpretation and thematic analysis while maintaining consistency across the reviewed literature.

**4.** The article was published in a peer-reviewed academic journal article.

Peer-reviewed sources were prioritised to ensure the methodological rigour and scholarly credibility of the included studies.

**5.** The study was published between 2019 and 2024.

This time frame was selected to capture recent developments in digital learning technologies and to ensure that the review reflects the contemporary digital learning environment in accounting education.

## Exclusion criteria

**The following were excluded:**

**1.** Studies in which accounting students were not specifically mentioned.

Generalised digital-education research, while valuable, may not reflect the disciplinary requirements of accounting and could dilute the specificity of the review.

**2.** Studies that did not examine learning activities aimed at developing digital skills or digital acumen.

This ensured conceptual focus on DLAs rather than broader discussions of digital literacy or technology use.

**3.** Non-journal publications such as books, theses, dissertations, and media articles.

These sources often lack peer-reviewed methodological scrutiny and may not meet the standards required for a systematic review.

**4.** Articles outside the 2019-2024 timeframe or those not published in English

This excluded older foundational work that falls outside the reviewers' temporal scope and any non-English texts that could not be reliably analysed.

The screening process was conducted in stages, including title screening followed by abstract and full-text review to ensure that all included studies met the defined criteria.

Applying these criteria resulted in the exclusion of articles that lacked disciplinary relevance, conceptual alignment, or methodological credibility, and ensured that the final dataset accurately represented a focused and relevant body of literature on DLAs used to develop digital acumen and workforce-relevant digital capabilities in undergraduate accounting education.

## Results

The search and screening procedure yielded 41 journal articles that met all inclusion criteria and were analysed to address the research question. A qualitative synthesis of these studies revealed clear patterns in the types of DLAs used in undergraduate accounting education, the benefits associated with their implementation, and the barriers that hinder their effectiveness in supporting digital capability development and graduate preparedness.

Through manual thematic analysis, three overarching themes emerged: (1) types of DLAs, (2) benefits of incorporating DLAs in accounting education, and (3) barriers to the successful implementation of DLAs. These themes provide a structured basis for reporting the findings of the review and offer insight into how digital learning practices may contribute to higher-order digital capability development in higher education.

### Article screening results

The screening process followed four sequential steps to ensure that only relevant studies were included in the final review. Firstly, the three search strings were entered into Google Scholar, producing a total of 101 records. In the second step, duplicate entries were removed, resulting in 96 unique records. The third step involved title and abstract screening, during which articles not published in English, dissertations, and items falling outside the designated 2019-2024 timeframe were excluded, leaving 80

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articles for full-text review. This period was selected to capture recent shifts in digitally mediated teaching and learning practices in higher education. In the fourth step, the full texts of these articles were assessed, and 39 were excluded because they did not examine learning activities designed to develop digital acumen in accounting education. Ultimately, 41 articles met all the inclusion criteria and were retained for detailed qualitative analysis.

Table 2 summarises the article screening process and application of the inclusion and exclusion criteria.

| **Step** | **Details** | **Records** |
|---|---|---|
| **Step 1** | Compiling records from Google Scholar | |
| | String 1 | 15 |
| | String 2 | 52 |
| | String 3 | 34 |
| | Total | 101 |
| **Step 2** | Removing duplicates | |
| | Less: Duplicates | (5) |
| **Total unique records** | | **96** |
| **Step 3** | Titles and abstract screening | |
| | Less: | |
| | Not in English | (11) |
| | Dissertations | (4) |
| | Included in error (2016 article) | (1) |
| **Total records for full text review** | | **80** |
| **Step 4** | Full text screening | |
| | Less: | |
| | No relevant learning activities researched | 39 |
| **Total records included in the final analysis** | | **41** |

Table 2: Article screening process.

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## Qualitative analysis – emerging themes

Manual thematic analysis was undertaken on 41 articles that met all the inclusion criteria. Following Braun and Clarke (2006)'s widely accepted approach, the analysis involved an iterative process of familiarisation with the data, generating initial codes, organising these codes into categories, reviewing category coherence, and refining the final themes. To support transparency and consistency, an Excel spreadsheet was used to document key information extracted from each article, including the specific DLAs examined, reported benefits, and the barriers identified. Similar codes were grouped together, and patterns were compared across studies to ensure that the resulting themes accurately reflected recurring findings in the literature.

This process yielded three overarching themes: (1) types of DLAs used in undergraduate accounting education, (2) the benefits associated with incorporating DLAs, and (3) barriers that hinder the successful implementation of DLAs. These themes provide the structure for the presentation of the results in the sections that follow and highlight factors influencing digital capability development within technology-enhanced learning environments.

### Theme 1 – types of DLAs

A review of the 41 included studies revealed eight distinct categories of DLAs used to support digital acumen development in undergraduate accounting education. These categories comprise learning management systems (LMS)-based activities, accounting simulation software, Microsoft Office-based activities, digital communication tools, digital games, digital books, digital meeting platforms, and online learning resources.

Table 3 presents the frequency with which each DLA type appeared across the reviewed articles, indicating that LMS-based activities (n=13) and accounting simulation software (n=7) were the most frequently researched, while online resources and meeting platforms appeared less often.

Although these DLAs span a diverse range of technologies, the majority represent generic digital tools rather than discipline-specific applications designed explicitly to support accounting practice. For instance, Microsoft Office-based activities, digital communication tools, and digital books primarily support general digital literacy rather than higher-order accounting digital skills. Only a relatively small portion of DLAs, such as accounting simulation software and certain LMS-integrated accounting modules, demonstrated closer alignment with the development of professional digital capabilities and workforce-relevant competencies for accounting practice.

Table 3 provides further details on each category, along with examples of representative studies examining these DLAs, for readers who may wish to explore their pedagogical application in greater depth.

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| DLA Name | DLA Description | Freq | Example of Articles reviewed |
|---|---|---|---|
| Learning Management System-based activities | Structured digital platforms that support course delivery, communication, assessment, and learner autonomy in both synchronous and asynchronous formats. (Bradley, 2021). | 13 | (Shamsudin et al., 2023) |
| Accounting simulation software | Interactive tools that replicate real-world accounting scenarios, allowing students to apply theoretical knowledge, develop algorithmic thinking, and engage in experiential learning through spreadsheet modelling and business simulations (Gaviria et al., 2024). | 7 | (Kurniawan & Darmayanti, 2022) |
| Microsoft suite-based activities | The use of Microsoft Word, Excel, and PowerPoint in educational settings to support document creation, data analysis, and multimedia presentations (Bawa et al., 2021). | 5 | (Kelly et al., 2023) |
| Use of Digital communication tools | A structured integration of platforms such as social media and messaging apps that facilitate interaction between students and educators (Taylor et al., 2021). | 4 | (Shamsudin et al., 2023) |
| Digital Gaming | An interactive learning approach using educational games (Gui et al., 2023). | 4 | (HajiMoradkhani et al., 2023) |
| Use of digital books | The adoption of e-books and digital libraries (Lee et al., 2023). | 4 | (Azis et al., 2023) |

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| | | | |
|---|---|---|---|
| Use of digital meeting platforms | The use of synchronous video conferencing tools like Zoom (Vorina et al., 2022). | 3 | (Shamsudin et al., 2023) |
| Use of online resources | The integration of web-based learning content and tools, such as tutorials, video lectures, and interactive quizzes (Rueda et al., 2024) | 3 | (Shamsudin et al., 2023) |

Table 3: Types of digital learning activities (DLAs) used in undergraduate accounting education

### Alignment of DLAs with the dimensions of digital acumen

Given the study's focus on the pedagogical alignment of DLAs with digital acumen, the DLA categories identified in the review were conceptually mapped against the seven digital acumen competency areas contained in SAICA's CA of the Future competency framework. The purpose of this mapping is to provide a structured interpretation of the extent to which the DLAs identified in the literature support the development of higher-order digital capabilities.

Table 4 presents the conceptual mapping of the DLA categories identified in Table 3 against the seven digital acumen competency areas contained in SAICA's CA of the Future competency framework.

| DLA Category | Relevant Digital Acumen Competency Areas |
|---|---|
| Learning Management System-based activities | User competencies |
| Accounting simulation software | Computational thinking; Data analytics; User competencies |
| Microsoft Office-based activities | Data knowledge and strategy; User competencies |
| Digital communication tools | User competencies |
| Digital gaming | Computational thinking; User competencies |
| Digital books | User competencies |
| Digital meeting platforms | User competencies |
| Online resources | Data knowledge and strategy; User competencies |

Table 4: Conceptual alignment of DLA categories with the digital acumen competency areas in SAICA's CA of the Future competency framework.

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Table 4 indicates that the DLAs identified in the reviewed literature predominantly support the development of user competencies, with some contribution to data knowledge and strategy and computational thinking. In contrast, few DLAs demonstrated clear alignment with automation, cyber security, and new developments and protocols, while only a limited number supported more advanced data analytics competencies. These findings suggest that although DLAs contribute to foundational digital capability development, they do not consistently address the full range of digital acumen competencies outlined in SAICA's CA of the Future framework. Consequently, the pedagogical alignment between current DLA practices and professional digital competency expectations appears uneven.

To enhance the discipline-specific relevance of DLAs, undergraduate accounting programmes could integrate more authentic and contextually relevant digital tools that reflect professional practice and the digital transformation of accounting work environments. These applications underpin core professional activities, including electronic audit file preparation, automated analytical procedures, transaction processing, enterprise-wide reporting, and data-driven managerial decision-making. The integration of these DLAs would enable students to develop higher-order digital capabilities, including digital judgement, analytical reasoning, and technology-enabled problem-solving that aligns directly with the competencies required in modern accounting and auditing environments and strengthens graduate readiness for digitally enabled workplaces. This integration also narrows the gap between academic digitally mediated learning activities and the digital ecosystems encountered in professional practice, supporting the development of workforce-relevant digital capability.

### Theme 2 - Benefits of incorporating DLAs in teaching and learning

The review identified several benefits associated with the use of DLAs in undergraduate accounting education. A consistent theme across the studies was the role of DLAs in promoting independent and self-directed learning. Digital platforms encourage students to manage their own learning, develop self-regulation skills, and engage more actively with course material (Hasbolah et al., 2020; Hidayat et al., 2023; Nuris et al., 2019; Shamsudin et al., 2023). These tools also enhance accessibility by enabling flexibility, on-demand access to learning resources, allowing students to revisit content, and tailoring learning to their individual needs (Restuningdiah & Puspitasari, 2021; Shamsudin et al., 2023). Figure 1 synthesises the benefits of DLAs reported across the literature, highlighting their pedagogical, practical, and economic value as well as their contribution to digital capability development.

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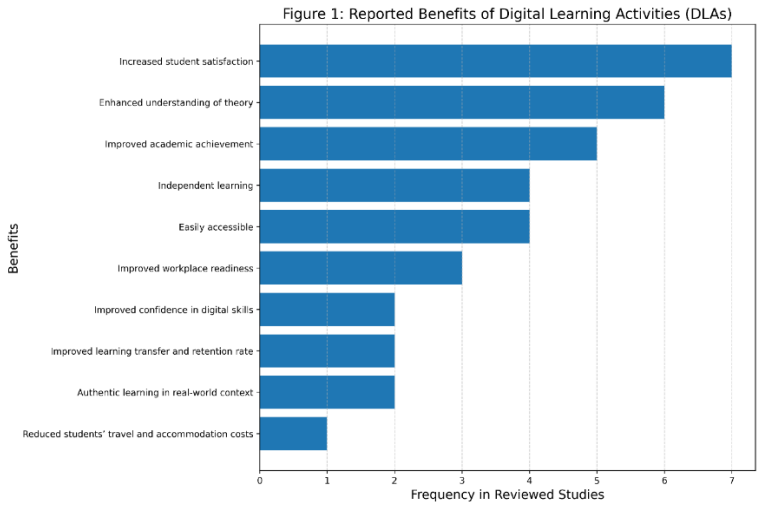


Figure 1: Benefits of incorporating DLAs in teaching and learning

Another frequently reported benefit was increased student engagement and satisfaction. DLAs such as digital books, interactive modules, and multimedia learning tools were found to make learning more engaging and enjoyable, which in turn fostered positive learning attitudes (Azis et al., 2023; Rossana et al., 2019). In addition, DLAs supported improved understanding of accounting concepts by providing authentic learning experiences, instant feedback, and opportunities for practical applications, for example, through accounting software or interactive e-modules (Gunawan et al., 2023; Haris & Widiastuti, 2021b; Kelly et al., 2023). These approaches strengthened conceptual clarity and supported meaningful learning and enhanced students' ability to apply knowledge in digitally mediated professional contexts.

DLAs were also reported to improve academic performance, learning transfer, accuracy, and work speed, particularly when students engaged with technology-based tools that mirrored real-world accounting tasks (Azis et al., 2023; Haris & Widiastuti, 2021a). Several studies highlighted the workplace-readiness benefits of DLAs, noting that the students gained essential digital skills relevant to professional accounting environments and demonstrated stronger self-learning capabilities during workplace tasks (Hasbolah et al., 2020; Imjai et al., 2024; Nuris et al., 2019). These findings suggest that well-designed DLAs can contribute to the development of workforce-relevant digital capabilities that support graduate employability and adaptation to digitally transformed workplaces.

Finally, DLAs contributed to cost savings for students by reducing travel and accommodation costs associated with face-to-face attendance, and by offering e-textbooks that served as cost-effective alternatives to printed materials for short-term learning needs (Means et al., 2009; Shamsudin et al., 2023). Overall, the reviewed studies highlighted that DLAs offer pedagogical, practical, and economic

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benefits that support learning and digital capability development in accounting education, and preparation for participation in increasingly digital professional environments.

### Theme 3 Barriers to the success of DLAs in teaching and learning

The reviewed studies identified several barriers that hindered the effective use of DLAs in undergraduate accounting education. A prominent barrier relates to educators' digital competencies and attitudes towards technology-enhanced learning. Many lecturers, particularly those considered digital migrants, reported difficulties in adapting to digital tools and online learning environments, which affected the extent to which DLAs were incorporated into their teaching (Hasbolah et al., 2020; Hidayat et al., 2023) Figure 2 illustrates the key barriers identified in the reviewed literature that hinder the successful implementation of DLAs in undergraduate accounting education. Limited educator confidence also influences the successful implementation of more complex tools, such as Microsoft Excel and computer-assisted instruction, particularly in large classes where individual support was challenging (Abanyam & Terkuma, 2021; Kelly et al., 2023). These findings suggest that educator digital capability remains a critical enabler of successful curriculum transformation and digital capability development.

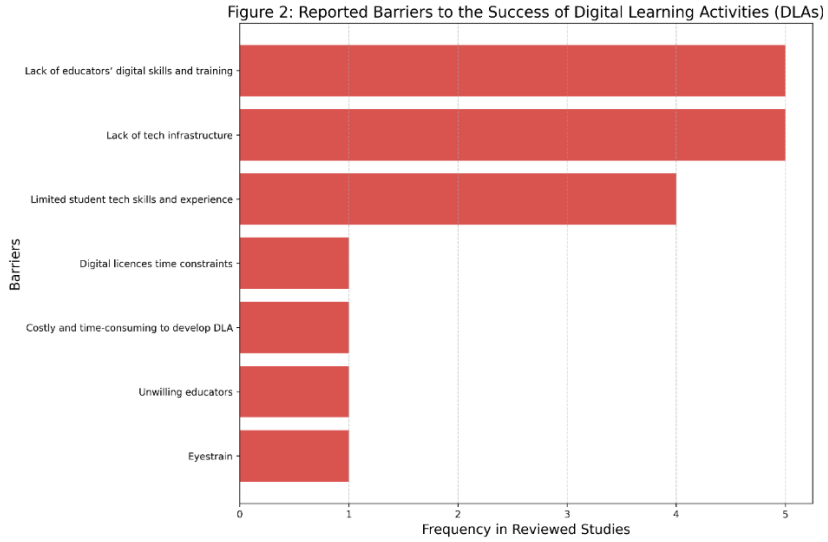


Figure 2: Barriers to the success of DLAs in teaching and learning

Resource constraints were also repeatedly highlighted. Insufficient access to computers, limited internet connectivity, and inadequate digital infrastructure hindered students' ability to participate and engage effectively in DLAs (Hasbolah et al., 2020; Lenggogeni et al., 2022; Nuris et al., 2019). These challenges were particularly pronounced in contexts where students lacked basic computer literacy skills, resulting in slower progress and reduced engagement with digital learning materials (Hidayat et al., 2023; Widijaya & Melissa, 2022). The need for institutional support, such as the provision of ICT facilities,

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lecturer training, and maintenance staff, was consistently highlighted as critical to overcoming these infrastructure barriers (Hasbolah et al., 2020; Hidayat et al., 2023; Nuris et al., 2019).

The findings therefore emphasize the importance of institutional investment and strategic support in enabling meaningful digital transformation within higher education.

Student-related barriers also emerged as a significant theme. Difficulties navigating digital environments, feelings of isolation in online learning settings, and communication challenges negatively affected student engagement and participation (Shamsudin et al., 2023). Additionally, despite the availability of digital materials, many students expressed a preference for printed textbooks, which they felt improved note-taking, concentration, and retention, while reducing eyestrain (Baker, 2022). Some DLAs, such as Excel-based learning activities, were perceived as demanding due to students' limited typing skills and unfamiliarity with spreadsheet software, contributing to cognitive overload when introduced without sufficient scaffolding (Kelly et al., 2023). These findings suggest that student digital readiness should be considered an important factor in the design and implementation of digitally mediated learning initiatives.

Collectively, these barriers show that the successful use of DLAs depends not only on access to digital tools but also on the readiness and alignment of educators, students, and institutional systems to support effective technology-enhanced learning. The findings suggest that the success of DLAs is closely linked to pedagogical design, digital capability development, and institutional support structures, rather than the availability of technology alone. This highlights the importance of pedagogically aligned implementation of DLAs to ensure that they contribute meaningfully to the development of higher-order digital capabilities in higher education. The findings further suggest that digital capability development should be viewed as an institutional and strategic priority, requiring coordinated investment in infrastructure, staff development and curriculum innovation.

## Discussion and recommendations for future research

The findings of this review highlight important issues related to the design and pedagogical use of DLAs within undergraduate curricula, and can be interpreted through the lens of digital literacy theory and technology-enhanced learning (TEL) frameworks, which distinguish between surface-level digital engagement and deeper forms of epistemically productive digital practices (Kirkwood & Price, 2014; Mulaudzi, 2019). TEL scholarship emphasizes that meaningful digital learning requires intentional design that enhances knowledge construction, problem-solving, and the application of digital tools in authentic discipline contexts (Khupe et al., 2026). From a digital pedagogy perspective, this implies aligning DLAs with epistemic practice that supports higher-order thinking and disciplinary meaning-making. Within this theoretical lens, the results of this review show that although undergraduate accounting programmes have increasingly incorporated DLAs, many of these activities primarily develop

operational or procedural digital skills. Widely used tools, such as LMS, digital books, communication platforms, and Microsoft Office-based tasks, facilitate content access and basic digital literacy but seldom cultivate higher-order capabilities such as digital reasoning, data interpretation, and technology-enabled judgment which are increasingly expected of graduates entering digitally transformed professional environments.

This distinction becomes significant when viewed in relation to SAICA's CA of the Future competency framework, which conceptualizes digital acumen as a multidimensional enabling competency requiring proficiency in analytical reasoning, digital judgement, data analytics, and the integration of emerging technologies into professional decision-making (SAICA, 2023). The findings of this review suggest that the current design of DLAs is not yet systematically aligned with the dimensions of digital acumen. The DLAs identified in the reviewed studies rarely target these higher-order competencies. While certain DLAs, such as accounting simulation software, computer-assisted instruction, and advanced Excel-based tasks, demonstrated clear potential to build discipline-specific digital skills (Gaviria et al., 2024; Kelly et al., 2023), they were comparatively underrepresented in the literature. From a curriculum perspective, this underrepresentation limits the capacity of DLAs to function as a vehicle for developing digitally literate graduates. This reveals a misalignment between current DLA use in undergraduate accounting programmes and the technological competencies increasingly required in accounting practice and digitally enabled workplaces more broadly.

This gap is further amplified in the South African higher education context, where persistent digital inequalities shape students' learning experiences. Several studies highlighted constraints such as limited connectivity, insufficient access to devices, and varying levels of digital preparedness among students (Mabidi, 2024; Makazhe, 2025; Mateko et al., 2025). Such disparities not only limit students' ability to participate fully in DLAs but also influence educators' choices regarding which DLAs they can feasibly integrate. More importantly, these structural constraints also affect the pedagogical depth at which DLAs can be implemented, often reinforcing lower-level, access-oriented use of technology rather than transformative learning designs. Even when digital tools are available, their effectiveness depends heavily on students' prior exposure to technology, digital confidence, and the institutional support structures in place. Consequently, the pedagogical potential of DLAs is often constrained by broader structural challenges, underscoring the need for intentional infrastructure investment and educator training to enable equitable development of digital acumen across diverse student cohorts. These findings suggest that institutional capability and strategic investment are critical enablers of successful digital transformation within higher education.

Despite these barriers, the reviewed literature demonstrates that DLAs offer meaningful pedagogical benefits. They support learner autonomy, promote active learning, enhance engagement, and strengthen conceptual understanding through interactive and authentic learning experiences (Gunawan

et al., 2023; Hasbolah et al., 2020; Hidayat et al., 2023). DLAs can also improve workplace readiness by exposing students to digital tools that mirror those used in professional environments (Imjai et al., 2024). However, these benefits tend to be associated more with general digital literacy than with specific, profession-aligned competencies emphasised by SAICA. This indicates that while DLAs contribute to foundational digital capability, students' potential to learn higher-order digital acumen remains underdeveloped due to limited pedagogical alignment. This suggests that while DLAs have strong developmental potential, they are not yet being systematically leveraged to enhance digital acumen in accounting education. Therefore, DLAs should be viewed not only as instructional tools but also as mechanisms for developing workforce-relevant digital capabilities that support graduate employability and professional adaptability.

Overall, the findings indicate that current DLA integration in undergraduate accounting education is characterised by widespread adoption but limited strategic alignment. The DLAs most implemented do not consistently target the multidimensional nature of digital acumen, resulting in a gap between what is taught and the technological competencies required for future accountants. From a pedagogical standpoint, this highlights a predominance of technology use for content delivery rather than for enabling transformative, discipline-specific learning. This synthesis provides the conceptual foundation for the recommendations that follow. From an institutional perspective, this highlights the need for curriculum strategies that intentionally align digital learning practices with graduate capability development and emerging workforce requirements.

These findings have important implications for the accounting profession and its regulatory environment. The identified gaps highlight the need for stronger collaboration between universities, accounting firms, and professional regulators to ensure that digital competence is developed in a manner consistent with workplace expectations. Accounting firms stand to benefit from graduates with more advanced digital readiness, while audit training programmes would be strengthened through early exposure to analytical tools, audit software, and technology-based assurance procedures. Furthermore, higher education institutions undergoing SAICA accreditation cycles will increasingly need to demonstrate explicit integration of digital acumen outcomes within their modules. This reinforces the need for constructive alignment between curriculum design, DLAs and professional competency frameworks. Strengthening these linkages will support the goals of accreditation, audit quality, and the long-term sustainability of the profession. The findings may also be relevant to other professionally accredited disciplines seeking to align curriculum design with rapidly evolving digital competency expectations.

Viewed through a higher education lens, the findings underscore the importance of intentionally designed DLAs that are pedagogically aligned with curriculum intentions rather than driven solely by technological or professional imperatives. Such alignment is crucial to advance digital pedagogy, where the focus shifts from tool to the purposeful integration of DLAs that support disciplinary knowledge

construction and digital acumen development. Such alignment is essential for supporting institutional digital transformation and the development of digitally capable graduates.

The next subsections outline recommendations directly informed by the findings of the review and are intended to strengthen the alignment between DLAs, accounting pedagogy, and SAICA's digital acumen expectations. These recommendations are also positioned to contribute to broader conversations on digital pedagogy in higher education by demonstrating how DLAs can be more strategically designed to support epistemically rich and professionally relevant learning and the development of workforce-relevant digital capabilities.

**Recommendation 1 –** Further detailed research on each of the seven elements of digital acumen identified by the SAICA.

The review reveals a scarcity of DLAs specifically designed to develop the seven components of digital acumen identified by SAICA (SAICA, 2023). Given the centrality of digital acumen to SAICA's professional competency framework, future research should examine how specific DLAs can be mapped to each component, the extent to which they effectively develop these competencies, and how they can be systematically embedded into undergraduate accounting curricula. Such work would contribute to the pedagogical design of DLAs by enabling intentional alignment between learning activities, digital acumen dimensions, and intended learning outcomes. Such research would provide high-value insight for both SAICA and accounting educators and strengthen curriculum endorsement processes while supporting the development of workforce-relevant digital capabilities aligned with evolving professional expectations.

**Recommendation 2 –** Research on how student characteristics affect DLA learning outcomes.

The findings highlight the need for deeper investigation into how individual student characteristics shape engagement with and outcomes from DLAs. Although DLAs improve academic performance and engagement (Ma & Ruannakarn, 2024), learners' experiences vary based on factors such as digital confidence, language proficiency, socioeconomic background, and preferred learning styles. These variations are essential from the perspective of digital pedagogy as they affect how effectively students interact with DLAs deemed epistemically demanding. Research that explicitly examines these variations would support the design of more inclusive, equitable, and effective digital learning environments for diverse student cohorts, thereby enhancing digital capability development across increasingly diverse graduate populations.

**Recommendation 3 –** Comparative research on DLA characteristics to identify high-impact practices.

There is limited comparative research assessing which DLAs or DLA characteristics most effectively enhance student learning outcomes. Innovative approaches, such as digital role-playing games

augmented by generative AI, have shown promise in enhancing engagement and realism in accounting learning (Xiong & Bao, 2025). Comparing such emerging DLAs with more traditional tools would allow researchers to identify specific features (i.e., interactivity, feedback, authenticity, adaptability) that produce the strongest learning gains. Moreover, this would support a shift in digital pedagogy from tool-focused adoption to feature-based approaches. Such insights would guide educators in selecting DLAs aligned with contemporary pedagogical, technological, and professional demands, while supporting the development of higher-order capabilities required in digitally transformed workplaces.

**Recommendation 4 –** More rigorous empirical research on purported benefits of DLAs

Although DLAs are widely praised for their benefits, many claims are supported by limited or short-term evidence. More rigorous empirical studies, incorporating controlled comparisons, longitudinal research designs, and mixed-methods analyses, are needed to examine the long-term impact of DLAs on students' academic performance, digital acumen, and workplace readiness. To assess the extent to which DLAs enhance persistent, higher-order learning as compared to fleeting engagement increases, such research is essential. As shown in studies comparing traditional and online learning tools (Hasbolah et al., 2020), DLAs can enhance engagement and access to feedback, but further research is required to determine which features drive these improvements and how they translate into sustained learning outcomes and the development of digital acumen over time, and graduate readiness for increasingly digital professional environments.

**Recommendation 5 –** Conduct similar studies in other fields or disciplines.

DLAs are widely used across higher education, and comparative studies from other fields could provide valuable insight for accounting educators. Research comparing technical and non-technical disciplines, for example, highlights how DLA effectiveness varies by disciplinary orientation and student expectation (Reddy & Chary, 2025). Extending systematic reviews to other fields may uncover cross-disciplinary best practices and inform more effective DLA design and implementation within accounting education. The conceptualisation of DLAs within digital pedagogy would be strengthened by such multidisciplinary insights, which would additionally promote the transfer of high-impact approaches beyond higher education contexts and contribute to a broader understanding of digital capability development across professional and organisational settings.

## Contribution of the study

This study makes several important contributions to higher education and accounting education literature, both theoretically and contextually. Theoretically, the review clarifies the distinction between surface-level digital literacy and the higher-order, discipline-specific digital competencies required in accounting practice, demonstrating that many existing DLAs do not sufficiently support the development

of digital acumen as conceptualised within professional frameworks. By highlighting the importance of linking DLAs with discipline-specific, epistemically rich learning processes, the study contributes to the field of digital pedagogy research and advances understanding of how higher education can support digital capability development in preparation for contemporary professional environments. By synthesising evidence from 41 studies, the review provides a structured categorisation of DLAs used in undergraduate accounting education and highlights their varying levels of alignment with the multidimensional competency expectations outlined in SAICA's CA of the Future framework. Recognising how diverse DLA types can be positioned along a continuum from functional use to transformative, learning-oriented design is strengthened by this categorisation. This advances scholarly understanding of how digital pedagogies intersect with professional competencies required in the accounting domain and contributes to the development of workforce-relevant digital capabilities.

Contextually, the study contributes to the South African higher education landscape by highlighting systematic barriers that shape the implementation and impact of DLAs and influence institutions' ability to develop digitally capable graduates. The review emphasises the influence of infrastructure disparities, uneven digital readiness, and institutional resource constraints on students' opportunities to engage meaningfully with digital learning. These constraints are essential from the perspective of digital pedagogy as they influence not only the accessibility of DLAs but also the scope and quality of learning that can potentially be achieved. These insights are particularly relevant for the South African accounting departments seeking SAICA accreditation, as they underscore the need for intentional curriculum design that explicitly supports the development of digital acumen in diverse and resource-constrained contexts while responding to the digital competency expectations of contemporary workplaces.

Methodologically, this review provides a consolidated evidence base that accounting educators can draw on when selecting and designing DLAs for their modules to enhance digital capability development and graduate preparedness. Most importantly, the study highlights the pedagogical alignment of DLAs with intended learning outcomes and the development of digital proficiency, extending beyond tool identification towards the development of higher-order digital capabilities relevant to professional practice. By identifying unexplored areas, particularly DLAs that develop higher-order competencies, the study also outlines a research agenda to guide future empirical work in digital accounting education. Collectively, these contributions strengthen the conceptual and practical foundation for integrating DLAs into accounting curricula in ways that better prepare students for the technological demands of the profession, support graduate readiness in digitally transformed workplaces, and contribute to broader debates on effective digital pedagogy and digital capability development in higher education.

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## Limitations

While this review provides valuable insight into the use of DLAs in undergraduate accounting education, several limitations should be acknowledged. Firstly, the inclusion criteria restricted the review to studies that explicitly referenced accounting students, which may have excluded relevant findings from broader digital pedagogy research or multidisciplinary studies where insights would potentially apply to accounting contexts. This restricts the extent to which the findings can be positioned within larger discussions about digital pedagogy, digital capability development, and higher education. Secondly, the review focused specifically on DLAs aimed at developing digital skills or digital acumen, thereby excluding conceptual or theoretical articles that may have offered additional depth to the understanding of digital competence development and its pedagogical underpinnings.

Thirdly, the review included only peer-reviewed journal articles published in English between 2019-2024. This excluded earlier foundational studies, non-English research that may reflect diverse educational contexts, and grey literature such as theses or institutional reports. As a result, the review may not fully capture the global landscape of DLA innovation or the full range of pedagogical approaches to developing digital acumen. Fourthly, because Google Scholar was used as the sole database, some studies indexed in discipline-specific databases such as Scopus and Web of Science may have been omitted. Future systematic reviews could incorporate multiple databases to strengthen coverage, cross-validation of searches, and the comprehensiveness of the evidence base. Although Google Scholar offers wide coverage, its search functionality limits precision, and the absence of advanced Boolean features may have affected the retrieval of certain studies and the comprehensiveness of the evidence base. In addition, the use of three accounting-specific search strings may have excluded studies employing alternative terminology to describe digital learning activities.

Finally, the review synthesised findings from diverse educational settings, technological environments, and institutional contexts, which may limit the generalisability of conclusions. Differences in infrastructure, student preparedness, and educator digital competence across regions may influence the effectiveness of DLAs in ways that were not fully captured in this synthesis. When considering the pedagogical alignment and scalability of DLAs across various higher education institutions, these contextual variables are especially important. These limitations provide important opportunities for future studies to expand and deepen the understanding of digital acumen development in accounting education, graduate digital capability development, and to strengthen the integration of DLAs within broader digital pedagogy frameworks.

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## Conclusion

This study contributes to the scholarship of teaching and learning in higher education by examining how DLAs are aligned with the development of digital acumen within undergraduate curricula. It further confirms DLAs as fundamental tools of digital pedagogy, where their significance is determined by their ability to enable higher-order, discipline-specific learning and digital capability development, in addition to access and engagement.

This systematic review synthesised findings from 41 peer-reviewed journal articles published between 2019-2024 to provide a comprehensive understanding of DLAs used in undergraduate accounting education and their role in supporting digital capability development. The review highlights that while a diverse range of DLAs, such as digital games, online resources, accounting simulation software, digital meeting platforms, digital books, communication tools, end-user software, and learning management systems, are being implemented across institutions, these activities vary significantly in their capacity to support digital acumen development. Many DLAs offer meaningful pedagogical benefits, including enhanced student engagement, improved conceptual understanding, increased learner autonomy, and enriched opportunities for workplace-aligned learning. However, the findings also reveal that the majority of DLAs used in practice cultivate only foundational levels of digital literacy rather than the higher-order, discipline-specific technological competencies expected of the future accounting professionals and increasingly required in digitally transformed workplaces. This emphasises the importance of using DLAs in digital pedagogy in an approach that is more epistemically aligned than functional

The study identifies persistent barriers that hinder the effective use of DLAs, including limited digital infrastructure, constraints in educator digital abilities, uneven student preparedness, and challenges relating to motivation, cognitive load, and learning preferences. These constraints are particularly salient within the South African higher education context, where digital inequality and resource disparities continue to shape learning experiences. As a result, the successful implementation of DLAs depends not only on the availability of digital tools but also on the extent to which institutions invest in training, infrastructure, and curriculum design that deliberately aligns with digital acumen development and graduate digital capability development. This demonstrates the systemic nature of digital pedagogy, where institutional, pedagogical, and student-level components must all be in sync for DLA integration to be effective and to support meaningful digital transformation within higher education.

The findings of this review have practical implications for accounting educators and curriculum designers, and higher education leaders responsible for digital transformation initiatives. Incorporating DLAs in intentional and pedagogically grounded ways can support the development of higher-order competencies, promote active learning, and strengthen alignment with SAICA's CA of the Future

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Competency framework, and enhance graduate readiness for increasingly digital professional environments. However, the study underscores the importance of selecting DLAs based on their potential to develop profession-aligned skills rather than their convenience or popularity. Educators should also consider student diversity and contextual factors when designing digital learning environments to ensure that all students have equitable opportunities to develop essential digital capabilities. This approach aligns with principles of inclusive digital pedagogy and constructive curriculum alignment.

This review contributes to the broader literature by identifying gaps in current research and proposing a future research agenda that emphasises deeper investigation into the characteristics, effectiveness, and disciplinary relevance of DLAs. Future studies should focus on evaluating the long-term impact of DLAs on academic performance, employability, digital acumen, and professional readiness; investigating how student characteristics shape learning outcomes; and exploring how DLA practices in other disciplines may inform accounting education. Such research would help build a stronger evidence base to guide the design of digital learning environments that are more pedagogically effective and align with complex competency development, graduate preparedness, and workforce-relevant digital capability development.

By consolidating six years of research and analysing patterns in DLA usage, effectiveness, and challenges, this review provides a foundation for strengthening digital pedagogy in undergraduate accounting programmes. As technological changes continue to reshape accounting practice, intentional and evidence-based integration of DLAs will be essential for developing graduates who possess the digital acumen, critical thinking, and professional judgement required to navigate the complexities of the digital age and contribute effectively within digitally transformed professional environments. In conclusion, the study argues that rather than solely serving as technological instruments, DLAs are valuable because of their purposeful pedagogical design and their connection to disciplinary knowledge development, and their potential to support higher-order digital capability development and graduate readiness in an increasingly digital world.

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## Declaration of Conflicting Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

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### Ethics Statement

Although this study synthesised previously published literature and therefore did not require ethics approval, institutional ethical clearance was nevertheless obtained.

### Data Availability Statement

No new data were generated or analysed in this study. All data supporting the findings of this research are available within the published literature cited in this article.

### AI Use Disclosure Statement

The authors declare that generative artificial intelligence tools were used in a limited and transparent manner during the preparation of this manuscript. An AI language model and Grammarly were used to assist with language editing, clarity, grammar, and stylistic refinement.

These tools were not used to generate original scholarly content, data, analyses, interpretations, or conclusions. All substantive ideas, arguments, interpretations, and academic judgments are the author's own, and the author takes full responsibility for the integrity, accuracy, and originality of the manuscript.

### Author Contribution

Conceptualization, Soldat and Weyers; Methodology, Soldat and Weyers; Validation, Soldat and Weyers; Formal Analysis, Soldat and Weyers; Investigation, Soldat and Weyers; Resources, Soldat and Weyers; Data Curation, Soldat and Weyers; Writing – Original Draft Preparation, Soldat and Weyers; Writing – Review & Editing, Soldat and Weyers; Supervision, Soldat and Weyers; Project Administration, Soldat and Weyers; Funding Acquisition, Not applicable.

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