

PRIMARY RESEARCH

Enhancing graduate employability through work-integrated learning: A multi-faceted analysis of student competencies, teaching approaches, and the impact of digital literacy

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Keywords

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Abstract

The current study aims to examine the impact of work-integrated learning on graduate employability, including the mediating role of students competencies and teaching strategies and the moderating role of digital literacy on graduate employability. Large pharmaceutical industries in Johannesburg, South Africa, a longitudinal approach used for data collection from managers and leaders in three times and convenient sampling was used to collect participant's data. SmartPLS was used for data analysis in two phases, namely the measurement model and the structural model. The findings show that work-integrated learning improves student's competencies and teaching strategies, which enhance the possibility of graduate employability. However, digital literacy plays a significant moderating role in student's competencies and teaching strategies which increase graduate employability. The present study suggests that evaluation of student's competencies and teaching strategies and emphasizes the significance of digital literacy in employability.

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INTRODUCTION

To be resilient and prepared for the workforce, organizations play a crucial role in the ongoing process of developing employability and future career competencies (Tomczyk, 2024). The skills, knowledge, and personal qualities that increase a person's chances of finding work and succeeding in their chosen fields for the good of the workforce, the economy, the community, and themselves are known as graduate employability (Heerden, 2024). It is a complex idea that includes many elements that allow a person to use their abilities in a range of situations and be effective at work (Adegbite, 2024).

Employers expect graduates to have a variety of skills, including soft skills, general skills, core skills, transferable skills, employability skills, and abilities such as interpersonal interaction, collaboration, solving issues, and self-care

(Jiang, Chen, & Lei, 2023; Hilarowicz, Zielosko, & Myśliwiec, 2023). Employability competencies refer to the knowledge, abilities, and traits that demonstrate a person's capacity for goal-setting, self-awareness, and drive to make use of social and personal resources effectively (Suputra, Basuki, Gunawan, & Baghiz Syafruddin, 2024). According to Suputra et al. (2024) and Tomczyk (2024), work-integrated learning has a major impact on participants' long-term career paths. Student's competencies cover overall career development and graduate employability (Bradley, Board, Archer, & Morgans, 2022; Mehrvarz, Heidari, Farrokhnia, & Noroozi, 2021). This study examines work-integrated learning, engaging real world experiences, and obtaining digital literacy (Hilarowicz et al., 2023). It has been shown that having clear

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life and career pathways, along with essential technology and digital literacy skills, can greatly enhance a graduate's chances of finding employment (Ben Ghrbeia & Alzubi, 2024; Syafitri, Hamid, & Maszudi, 2024). This is employability in the context of an integrated work-based learning approach. Ghrbeia and Alzubi (2024), noted work-integrated learning and digital literacy, employability flexibility, and innovative thinking. The study pointed out gaps in understanding skills that require further investigation, thus creating a more integrated approach to work-embedded learning (Adegbite, 2024; Junaedi, Renaldo, Yovita, Veronica, & Sudarno, 2023). The importance of digital literacy in connection to employability has also been emphasized by Hassan et al. (2022), who stress that graduates can increase their employability by effectively using digital tools and technology. These results demonstrate a robust relationship between graduate employability, digital literacy, and work-integrated learning. However, research examining the combined effects of digital literacy and work-integrated learning is notably limited. The importance of literacy in today's world is widely recognized (Gautam et al., 2022). Literacy can range from having the rudimentary skills necessary to read and write to possess the most advanced information. But in the age of technological progress, such fundamental skills as reading and writing are useless unless they are combined with technology and an awareness of other domains. New or multiple literacies have been highlighted by numerous authors Ben Ghrbeia and Alzubi (2024) and Saad, Mohamad, and Tsong (2021). To live a better and easier life, one must be knowledgeable about business, finance, and many other topics. Digital literacy is also one of these things, as it is one of the most important traits that a person should have throughout their life. The capacity to successfully navigate the technological tools and infrastructures that enable the twenty-first century is known as digital literacy (Ghrbeia & Alzubi, 2024; Syafitri et al., 2024).

Along with the growing need for highly qualified human resources, changes in the workplace are becoming more noticeable (Suputra et al., 2024). The usage of different technologies that facilitate work continuity more effectively and efficiently has led to changes in the workplace (Heerden, 2024). The industrial world's expansion needs to be flexible and linked to hiring workers with dynamic skills who can advance with the business (Adegbite, 2024). Therefore, to increase the quality of human resources, industries particularly the workplace are urged to search for more inventive and efficient job designs (Hilarowicz et al., 2023). Prior studies on creating an integrated curriculum for pharmacy edu-

cation can thoroughly evaluate students' competence and development in their job practices (Andersson, Brink, Young, & Nilsson, 2023; Carter, 2023). Further studies on environmental sustainability also focus on curriculum content that relates to evidence.

Digitally literate graduates are highly sought after because of the substantial changes brought about by Industry 4.0 technologies and workplace digitization. According to research, universities have an obligation to equip students with the fundamental digital literacy skills required to satisfy the evolving needs of the labor market in order to prepare them for the digital age (Syafitri et al., 2024; Tomczyk, 2024). Employability is strongly linked to digital literacy, which refers to a set of abilities that enable individuals to use information and communication technology in the digital age. Additionally, research has demonstrated that digital literacy is essential for improving graduates' preparation for the workforce (Heerden, 2024; Suputra et al., 2024). The current study examines how digital literacy can affect the relationship between work-integrated learning and graduate employability, even though many studies have examined the impact of digital literacy on graduate employability (Suputra et al., 2024; Tomczyk, 2024). Additionally, this study examines how work-integrated learning affects their employability competency, with a particular emphasis on the effects of work-integrated learning.

Research on the integrated work curriculum in relation to vocational learning, however is limited. Indicators of graduate employability success are also examined in this study, including work-integrated learning, student competencies, and instructional methodologies. Thus, the unique issues surrounding the transition of the work-integrated curriculum are the focus of this study. This understanding will aid in increasing awareness and drawing attention from educational institutions and policymakers to the complementary roles that career knowledge and digital literacy play in improving graduates' employability in Johannesburg, South Africa. Therefore, the following are among the study's objectives.

1. Work-integrated learning has direct impact on student's competencies.
2. Work-integrated learning has direct impact on teaching strategies.
3. Student's competencies have mediating relationship among work-integrated learning and graduate employability.
4. Teaching strategies has mediating relationship among work-integrated learning and graduate employability.

5. Digital literacy has moderating relationship on student's competencies and graduate employability.
6. Digital literacy has moderating relationship on teaching strategies and graduate employability.

LITERATURE REVIEW AND RESEARCH HYPOTHESES

Work-Integrated Learning

Work-integrated learning has gained recognition in recent years as a critical educational strategy for preparing graduates to become competent and employable (Suputra et al., 2024). This method includes field experiences, work studies, internships, practicums, sandwich courses, placements, and practicums, among other types of practical experience (Heerden, 2024). Students can acquire important practical skills and information for their future employment through these varied options. Many facets of graduate employability have been intimately linked to Work-Integrated Learning (WIL), which is essential for giving people the skills they need for future employment on a global scale (Adegbite, 2024; Hilarowicz et al., 2023). Numerous factors, such as its influence on enhancing career prospects, promoting the growth of professional networks, motivating proactive initiative, and developing critical leadership skills, have highlighted the positive relationship between WIL and graduate employability (Andersson et al., 2023; Carter, 2023). This demonstrates the diverse ways in which WIL improves graduates' ability to meet the ever-changing needs of the labor market today. Integration of certain formal theories into practical contexts is termed as Work-Integrated Learning (WIL) and is one distinct type of experiential learning. This practical approach helps develop a range of vocational skills such as core, adaptability, analytical, and resource management skills (Andersson et al., 2023; Drysdale & McBeath, 2018; Weston, 2021). Experiential learning is widely accepted in higher education as one effective way to nurture positive social and ethical values while preparing students to be responsible citizens and workers (Suputra et al., 2024). Research shows that, in comparison to conventional classroom-centered teaching approaches, WIL enhances students' professional networks, initiative, leadership abilities, and career goals (Tomczyk, 2024). Additionally, students' confidence and trust in their abilities are greatly increased by work-integrated learning, which bridges the gap between knowledge in theory and practice and is strongly associated with student's competencies and teaching strategies (Hilarowicz et al., 2023; Suputra et al., 2024). Students are capable of being self-sufficient and demonstrating real-world employment skills. The skills and talents that stu-

dents acquire as learning outcomes demonstrate their proficiency in the educational process (Bradley et al., 2022; Mehrvarz et al., 2021). The attainment of competence in the selected field, with competencies established through an integrated work curriculum, will be the student's competency benchmark. When they graduate, students won't be able to figure out the learning competences required by the industry (Tomczyk, 2024). Teachers who implement innovative courses in classrooms may encounter challenges in consistently applying learning strategies. Therefore, teachers' methods for teaching and evaluating students' skill performance ought to be further developed as a novel strategy. Accordingly, the secret to knowledge and useful abilities that can be gained in professional activities is student competency (Bradley et al., 2022). One of the many implications of the research is that work and learning experiences might influence attitudes, values, and abilities (Carter, 2023). The findings of this study can offer helpful direction for creating a more applicable and useful curriculum that will produce graduates who can compete in the global labor market (Suputra et al., 2024). Pharmaceutical industries managers, policy makers, and educational institutions can use effective teaching method as a guide when designing engaging lesson plans (Carter, 2023; Suputra et al., 2024; Tomczyk, 2024). Hence,

H1: work-integrated learning has direct impact on student's competencies.

H2: work-integrated learning has direct impact on teaching strategies.

Mediating Role of Students Competencies

Tomczyk (2024) asserts that individuals with student competency can conduct information searches using digital media, evaluate the information they find online, and simultaneously develop the capacity to interact with others through a range of digital tools and applications, including social media and mobile phones. Accordingly, students' competency is a multifaceted talent that may encompass higher-order cognitive abilities, ethical awareness, and ICT expertise (Suputra et al., 2024). The literature contains a variety of theoretical frameworks that scholars use to assess student's skills (Hilarowicz et al., 2023). Employability includes a variety of abilities, such as soft and generic skills, that are necessary for students to find work once their schooling is over. According to Song (2018), students can better concentrate and focus on developing their employability skills when they have the knowledge and skills to handle the complexities of life and the job. Although the direct correlation between

student's competencies and graduate employability has only been empirically demonstrated in a small number of studies, it is known that there may be a relationship between the two. Incorporating digital technologies requires redefining competences. Competencies are typically described as a collection of actions that allow someone to perform activities and functions (Mehrvarz et al., 2021). By generating company value, they are viewed as facilitators of benefit realization (Bradley et al., 2022). A better adaptation to the demands of the workplace should be guaranteed by the competences system (Hilarowicz et al., 2023). To increase students' familiarity with the working environment, the integrated work curriculum places more emphasis on practical content than theory (Suputra et al., 2024). There are positive outcomes associated with the practical competency-based curriculum when learning is implemented in vocational institutions. Even though teachers have not fully incorporated their expertise with the innovative curriculum, additional study is being conducted to adopt the competency-based curriculum concept in industries (Tomczyk, 2024). There is clear support for schools implementing a work-based curriculum. To freely engage with students, teachers take the lead in implementing a competency-based curriculum with tremendous zeal (Bradley et al., 2022). Through internships and fieldwork, students can apply what they have learned both inside and outside the classroom.

Additionally, it makes it possible to identify abilities and skills. The nature and objectives of the competency systems utilized in the digital labor market is different from those of the current ones since technology generates the need for new roles (Weston, 2021). Drysdale and McBeath (2018) must consider a variety of factors while creating competency models, including the industry, the type of personnel, the level of automation in their work, and the technologies they use. A distinct set of skills is needed for fully automated work compared to partially or not at all automated job. Several essential digital competences are mentioned in the relevant literature. It is challenging to make a single, shared suggestion (Andersson et al., 2023). They can be divided into two categories. Information and data literacy, teamwork and communication, digital content production, security, and problem-solving are typically included in the digital competency cluster (Carter, 2023). Because technology is developing so quickly, businesses are always in need of the newest talents. However, one should consider the variations within industries and the division of labor based on the level of automation (Hilarowicz et al., 2023). Considering the, the current study investigates the potential impact

of student's competencies on the link between graduate employability and work-integrated learning (Adegbite, 2024). Therefore, it is suggested that

H3: Student's competencies has mediating relationship among work-integrated learning and graduate employability.

Mediating Role of Teaching Strategies

Students' problem-solving and interpersonal skills can also be enhanced by teaching methods that encourage active, group, and problem-based learning (Suputra et al., 2024). To create tactics that enhance the learning process and have a big impact on students' performance in the classroom, innovative learning is required. The purpose of learning techniques is to make the learning process simpler for pupils to comprehend. Students can better plan their actions and comprehend the material's context with the aid of learning strategies (Heerden, 2024). To accomplish the intended learning objectives and results, the learning process employs defined phases. To determine which learning tactics are more appropriate or whether they require revision, teachers might assess their students' learning processes (Adegbite, 2024). Learning strategies must consider the diversity of students. Understanding different learning methods, starting comprehension level, and cultural background are a few facets of student character diversity (Hilarowicz et al., 2023). To address the various requirements of students, several approaches can be developed, making learning more efficient and inclusive. More thorough approaches to learning evaluation enable constructive criticism and assess the evidence of completed theoretical and practical learning outcomes (Carter, 2023). Others also refer to work integrated learning (WIL) as experiential learning, work-based learning, and cooperative education. WIL encompasses a variety of activities, such as industry projects, role plays, field trials, simulations, and traditional work experience/work placement (Andersson et al., 2023; Weston, 2021).

Students get the chance to engage with industry and strengthen their developing professional identities through the integration of job skills and course knowledge (Song, 2018). Students that have WIL integrated into their programs not only have an easier time making the transition from student to professional, but they also immediately benefit from increased networking and industry connections, which lead to employment possibilities (Hassan et al., 2022). However, in the tertiary level, it is infamously challenging to capture individual WIL experiences and capacities (Carter, 2023). Other names for work integrated learning

(WIL) include collaborative education, vocational education, and learning through experience. Industry projects, role plays, field trials, simulations, and conventional work experience/work placement are just a few of the many activities that fall under the umbrella of WIL (Andersson et al., 2023). By combining occupational skills and course knowledge, students could interact with industry and fortify their evolving professional identities (Ghrbeia & Alzubi, 2024). When WIL is incorporated into their programs, students not only find it easier to transition from student to professional, but they also have access to more industry connections and networking opportunities right away, which can lead to job opportunities (Heerden, 2024). However, capturing individual WIL experiences and capacities is notoriously difficult at the tertiary level (Syafitri et al., 2024). Although the indirect relationship between teaching tactics and graduate employability has only been empirically demonstrated in a small number of research, it is known that there may be a relationship between the two. Considering the above, the current study investigates the potential impact of instructional methodologies on the link between graduate employability and work-integrated learning (Hilarowicz et al., 2023). Therefore, it is suggested that the following hypothesis is proposed.

H4: Teaching strategies has mediating relationship among work-integrated learning and graduate employability.

Moderating Role of Digital Literacy

A wide range of essential abilities required to successfully negotiate the intricacies of the digital world are collectively referred to as digital literacy (Saad et al., 2021). These include the capacity to access, assess, analyze, apply, and synthesize data using digital devices with proficiency. It also involves effective use of ICT to locate, capture, evaluate, use, and create digital information in an effective and efficient manner. These broad competencies include the ability to interact with others, logical reasoning, information management, working collaboratively and content creation (Gautam et al., 2022). There are significant changes in the labor sector happening around the world. This includes the emergence of new jobs, new types of work and the repositioning of existing jobs, all of which demand a greater digital literacy for people to adapt in a transforming job market (Hassan et al., 2022). Current research suggests that digital career competencies consist of a spectrum of cultivable skills that are applicable in multiple job settings. Employers appreciate these skills and are actively looking for talent as graduates update to the current professional landscape where a hybrid work

model with a blend of traditional and modern office spaces is commonplace (Junaedi et al., 2023). In today's knowledge-based economy, it is critical to understand and engage with technology to be successful across various disciplines and sectors. Digital literacy is the ability to use technology proficiently, and involves possessing, relevant knowledge, competencies, and skills to navigate, converse, and create on digital tools and platforms (Saad et al., 2021; Tirado-Morueta, Aguaded-Gómez, & Hernando-Gómez, 2018).

Gaining and improving digital literacy can greatly enhance a person's employability and job prospects while pursuing higher education, according to empirical research (Ghrbeia & Alzubi, 2024; Syafitri et al., 2024). Effective use a variety of digital tools and technologies, critically evaluating the abundance of online information, and use digital platforms for productive communication and teamwork, one must have a solid understanding of digital literacy. Understanding and using digital literacy has grown in significance in today's workplace, regardless of industry or job function, claim.

As previously stated, digital literacy has been found to be an essential component of graduate employability, especially in the current digital era. It is unclear, though, if digital literacy can increase the impact of work-integrated learning on the employability of graduates (Adegbite, 2024; Ben Ghrbeia & Alzubi, 2024; Ghrbeia & Alzubi, 2024). Furthermore, no research has been done on this subject in a pharmaceutical production facility in Johannesburg, South Africa. Thus, the following hypothesis is proposed.

H5: Digital literacy has moderating relationship on student's competencies and graduate employability.

H6: Digital literacy has moderating relationship on teaching strategies and graduate employability.

METHOD AND MATERIAL

Design, Population, and Sample

A large pharmaceutical production facility in Johannesburg, South Africa, served as the site of this study. The study concentrated on teaching methodologies, student competencies, and students who had participated in Work-Integrated Learning (WIL). The study only included managers and leaders who had taken part in WIL; those who hadn't were not. All participants were informed of the objectives of the study, and data were collected three times between April and December 2024. They gave their approval to take part in the study, and their involvement was entirely voluntary.

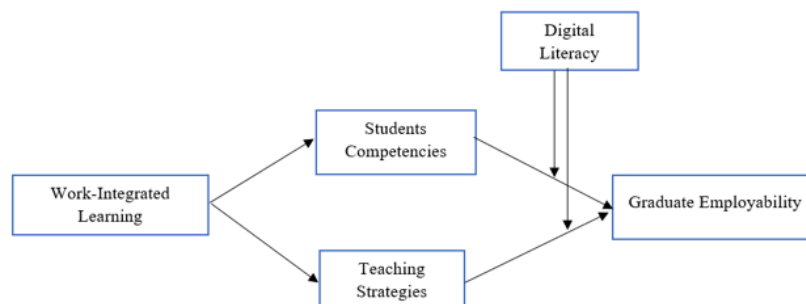


FIGURE 1. Conceptual model

A practical sampling strategy was used to administer a structured questionnaire on-site to collect data. This strategy was adopted to encourage managers' and leaders' participation and allow them greater flexibility in responding. Longitudi-

nal data were collected over three separate periods from 235 managers and leaders at a large pharmaceutical production facility in Johannesburg, South Africa.

TABLE 1. Demographic profile

Category	Frequency	Percentage
Gender	235	100.0%
Male	165	70.2%
Female	70	29.7%
Age	235	100.0%
20-30 Years	66	28.0%
30-40 Years	110	46.8%
More than 40 Years	59	25.1%

The sample determination approach based on Barclay and Smith Jr (1995), requires 10 times the highest number of indicators. In this case, work-integrated learning with 10 items, is the highest. Hence, a total of 235 samples would fully test the hypotheses, and the model would only need a minimum of 100 samples. The proposed model was tested with a non-parametric multivariate approach as the model's relationships among constructs were computed with ordinary least squares and a path modelling technique integrated into the SEM framework following the Hair, Sharma, Sarstedt, Ringle, and Lienggaard (2024) procedure. The choice of this approach for the investigation was due to the unique capability of fully modelling direct, indirect (mediation and moderation), and total effects of latent variables with observed indicators in a single model. This approach enables researchers to investigate intricate relationships and deeply analyze the mechanisms operating within the studied setting.

Measurement Scale

A simplified five-point Likert scale with five items and a range of 1 to 5 (strongly disagree-strongly agree) was used to measure work-integrated learning by Heerden (2024). Sam-

ple items include "Reflected on the organization of caring in my current workplace" and "Used the administrative system required in the current workplace". Student's competencies were measured 6-item scale by Suputra et al. (2024). Sample items are "Material Understanding" and "communication skills". A simplified five-point Likert scale with 9-items and a range of 1 to 5 (Strongly disagree-strongly agree) was used to measure teaching strategies by Suputra et al. (2024). Sample items include "Group Discussion" and "Interactive Training". Digital literacy was measured seven-item scale. Sample items include " Respondents are used to making purchases or sales through electronic commerce" and "Respondents are accustomed to financial risks, which influence savings and investment decisions". Lastly, graduate employability as measured eight-item scale by Heerden (2024). Sample items include " Ability to prioritize and deal with multiple problems" and "Ability to observe the current situation and identifying problems."

RESULTS

Measurement Model Evaluation

Before being considered appropriate for testing the hypothesis, the proposed approach (item-construct) must satisfy cer-

tain basic requirements and limitations. Hair et al. (2024) state that items used in constructing the measures must have a loading factor of at least 0.5, demonstrating that they are consistent with the construct being evaluated. The items that do not meet this loading limit are eliminated from the evaluation model because they could not correctly represent the intended construct. This procedure guarantees that the

hypothesis to be tested model is reliable and dependable. This study used a composite reliability and outer loading to assess the constructs' internal consistency as well as reliability. For both criteria, values less than 0.70 are deemed inappropriate for the structural model. According to the measurement model's results, both measures' values were over 0.70, satisfying the reliability criterion (see Table 2).

TABLE 2. Measurement Validity, Reliability and AVE

Constructs	Items	Loadings	Composite Reliability	Cronbach Alpha	AVE
Work-Integrated Learning	WIL1	0.795	0.920	0.892	0.698
	WIL2	0.882			
	WIL3	0.892			
	WIL4	0.792			
	WIL5	0.813			
Students Competencies	SC1	0.726	0.898	0.863	0.596
	SC2	0.779			
	SC3	0.806			
	SC4	0.828			
	SC5	0.775			
	SC6	0.710			
Teaching Strategies	TS1	0.812	0.938	0.926	0.629
	TS2	0.793			
	TS3	0.744			
	TS4	0.783			
	TS5	0.787			
	TS6	0.811			
	TS7	0.831			
	TS8	0.716			
	TS9	0.854			
Digital Literacy	DL1	0.706	0.887	0.849	0.532
	DL2	0.788			
	DL3	0.841			
	DL4	0.758			
	DL5	0.811			
	DL6	0.776			
	DL7	0.780			
Graduate Employability	GE1	0.769	0.911	0.888	0.564
	GE2	0.830			
	GE3	0.806			
	GE4	0.739			
	GE5	0.795			
	GE6	0.779			
	GE7	0.760			
	GE8	0.714			

The differences between the indicators were assessed by the discriminant and convergence validity tests, which were also performed. The Fornell-Larcker criterion, hetero-trait mono-trait ratio, and Average Variance Extracted (AVE) were applied (refer to Tables 2). Hair et al. (2024) proposed

that an HTMT value less than 0.90 is appropriate for establishing discriminant validity, however Fornell and Larcker (1981) state that an AVE of 0.5 and above is acceptable for convergent validity (see Table). These criteria were met by the measurement model, as shown in Tables 2-4.

TABLE 3. Discriminant Validity

	DL	GE	SC	TS	WIL
Digital Literacy	0.780				
Graduate Employability	0.703	0.751			
Students Competencies	0.734	0.725	0.772		
Teaching Strategies	0.659	0.719	0.619	0.797	
Work-Integrated Learning	0.708	0.738	0.668	0.733	0.836

TABLE 4. HTMT

	DL	GE	SC	TS	WIL
Digital Literacy					
Graduate Employability	0.884				
Students Competencies	0.873	0.824			
Teaching Strategies	0.730	0.784	0.687		
Work-Integrated Learning	0.811	0.897	0.752	0.857	

Evaluation of Structural Model

As indicated in Table 5, the structural model evaluated the hypothetical framework by evaluating the link between each construct using *t*-values, *p*-values, and standard deviations. The independent construct (graduate employability), the moderator (digital literacy), the mediator (student competencies and teaching strategies), and the dependent construct (work-integrated learning) all had statistically significant association coefficients. When the *p*-value is less than 0.05, the results show that hypothesis 1 and 2 are considered significant (Hair et al., 2024). The study shows that work-integrated learning has significant impact on student's com-

petencies ($\beta = 0.668, p = 0.000$). The study shows that work-integrated learning has significant and negative impact on teaching strategies ($\beta = -0.797, p = 0.000$). Student's competencies have mediating impact between work-integrated learning and graduate employability ($\beta = 0.168, p = 0.000$). Teaching Strategies has mediating impact between work-integrated learning and graduate employability ($\beta = 0.246, p = 0.000$). Digital literacy has moderating impact on students competencies and graduate employability ($\beta = 0.274, p = 0.002$). Digital literacy has moderating impact on teaching strategies and graduate employability ($\beta = 0.093, p = 0.007$).

TABLE 5. Evaluation of direct and indirect relationship

Relationships	Path coefficient (β)	<i>T</i> Statistics	<i>p</i> Values
H1: WIL -> SC	0.668	18.976	0.000
H2: WIL -> TS	-0.797	24.741	0.000
H3: WIL -> SC -> GE	0.168	5.766	0.000
H4: WIL -> TS -> GE	0.246	4.234	0.000
H5: DL* SC -> GE	0.274	3.156	0.002
H6: DL* TS -> GE	0.093	2.702	0.007

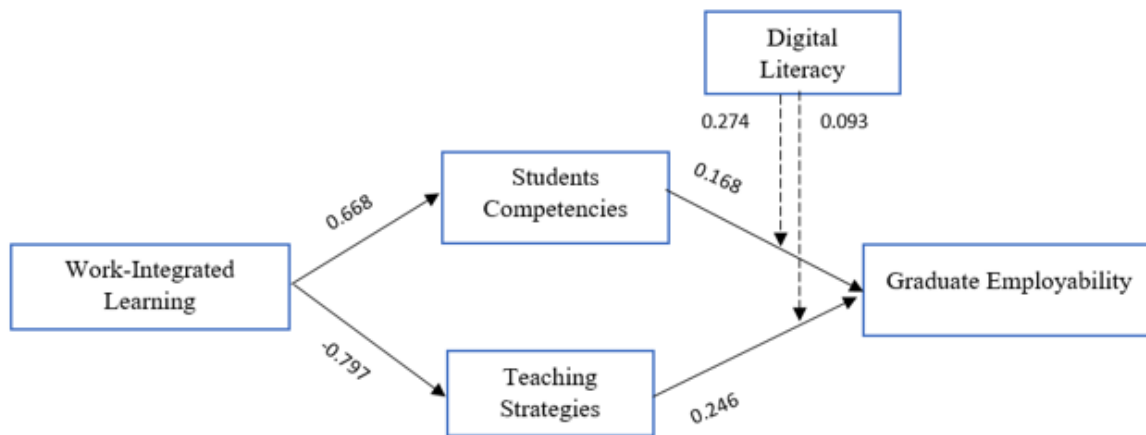


FIGURE 2. Evaluation of Structural model

DISCUSSION

By investigating the impact of work-integrated learning on the employability of managers and leaders from a large pharmaceutical manufacturing facility in Johannesburg, South Africa, this study aims to fill a significant vacuum in the existing literature. It also emphasizes the significance of digital literacy as a moderator and the mediating function of student capabilities and instructional practices between work-integrated learning and graduate employability. In engaging managers and leaders from a large pharmaceutical manufacturing facility based in Johannesburg, South Africa, the study reveals the understudied benefits of work-integrated learning. This builds on earlier studies and demonstrates that work-integrated learning improves graduates' employability by transferring desirable competencies through hands-on learning experiences in actual organizational settings (Adegbite, 2024; Heerden, 2024; Jiang et al., 2023). According to research, work-integrated learning and both soft and general abilities are essential for improving managers and leaders graduate employability (Carter, 2023; Hilarowicz et al., 2023; Suputra et al., 2024). Pupils who actively participate in work-integrated learning often exhibit competence as well as increased self-assurance, efficacy, and useful real-world experience all of which are essential resources in training them for future career options. The findings of Ghrbeia and Alzubi (2024) and Syafitri et al. (2024) about the vital significance of digital literacy in the contemporary workplace are further supported by recent study. It highlights how important digital literacy is as a core skill for graduates joining the workforce in the twenty-first century. This is especially relevant in large pharmaceutical manufacturing, where workers are adopting the advances of the fourth industrial revolution and becoming more dig-

itally literate. A recent study by Tomczyk (2024) found that graduates' employability and work-integrated learning are much improved when digital literacy is combined with other soft skills like communication and critical thinking. This research emphasizes how important a broad skill set is in equipping graduates to successfully negotiate the ever-changing job market and build long-lasting careers. Graduates must be proficient in fourth-industrial revolutionary capabilities and have digital literacy to actively contribute to the economic and societal growth of Johannesburg, South Africa.

Work-integrated learning and graduate employability are significantly mediated by student competencies. An innovative curriculum serves as a starting point for teachers to assist students in achieving the instructional goals in meeting the digital era learning objectives. Problem-solving techniques can be applied to materials and practices with a sufficient level of skill. Tomczyk (2024), which emphasizes innovative pedagogy-based curriculum changes to cultivate digital capabilities in managers and leaders, supports the conclusions of these studies. The potential competency and leadership skills of prospective managers and leaders within pharmaceutical manufacturing significantly affect the effectiveness of learning digitization. Teaching strategies positively and significantly impact work-integrated learning and graduate employability. Instructional strategies are very important in the learning outcome concerning pharmaceutical manufacturing as indicated by Ben Ghrbeia and Alzubi (2024); Heerden (2024). Research supports the significance of instructional methods that align with active learning components. Newly graduated managers and leaders participate in integrated learning to understand the methodologies of pharmaceutical production. Students can benefit from a pro-

professional learning experience that is both independent and collaborative. The development of contextual knowledge in the workplace setting demonstrates flexibility in WIL-based learning methodologies. Additionally, empirical research on the precise effects of digital literacy on graduate employability and its incorporation into curricula at higher education institutions is lacking (Jiang et al., 2023; Junaedi et al., 2023). Considering this, further study is required to comprehend how digital literacy might improve graduate employability and how educational programs can successfully integrate it. This implies that other important confounding variables, including age and gender, may be very important in determining this association in Johannesburg, South Africa setting, especially in higher education institutions. Therefore, further research is necessary to fully understand these determinants and their impact on graduate employability.

CONCLUSION AND IMPLICATIONS

The findings of this study show that graduate employability is significantly impacted using instructional approaches in combination with work-integrated learning. The main conclusion of the study is that student competencies and instructional strategies play a significant mediating role in the relationship between work-integrated learning and graduate employability. These results have significant ramifications for pharmaceutical production theory and practice. From a theoretical and practical perspective, the findings of this study are crucial. First, it confirms the good association between graduate employability and work-integrated learning. This clarifies the major influence of work-integrated learning on managers and leader's chances and validates previously accepted notions. Furthermore, this research offers empirical backing for previous conclusions that highlight the vital role that digital literacy skills play in improving students' employability in higher education. It highlights how developing digital literacy abilities enhances students' overall competency development and increases their employability, particularly in the context of work-integrated learning. By providing a comprehensive understanding of how digital literacy skills might improve the possibilities and skill development that result from work-integrated learning, this study illustrates the many benefits of this approach for participants' future professional success. Furthermore, it should be noted that a major area of interest for this study is how student abilities and instructional tactics can enhance experiential learning opportunities and increase the employability of graduates. However, the research's conclusions

demonstrated that there wasn't enough evidence to support this assertion. This suggests that further research is necessary to completely understand the complexities of how teaching methods and student competencies affect graduates' employability. Therefore, future research should expand the sample size and consider additional variables, as well as incorporate qualitative approaches, to gain a deeper understanding of the dynamics within the pharmaceutical industry. The research's data comes from surveys administered to executives and managers of a pharmaceutical manufacturing plant in Johannesburg, South Africa. The study's findings demonstrate that work-integrated learning significantly enhances students' competencies and teaching strategies, increasing the likelihood that graduates would be employable. The study also emphasizes how important digital literacy skills are in creating this relationship, highlighting the need to incorporate digital literacy into work-integrated learning programs. However, the study also demonstrates that student competencies and instructional strategies act as a mediating factor in the relationship between work-integrated learning and graduate employability.

Limitations and Future Directions

The shortcomings of the study should be addressed and built upon in future research. First, the study focuses only on managers and executives from a large pharmaceutical production facility in Johannesburg, South Africa. The findings may not be broadly applicable to managers and leaders in other fields since just one professional domain is considered. To ensure the generalizability of the results, future research should try to include managers and leaders from a range of academic disciplines, including the sciences, vocational education, and other fields of study. However, this study's findings cannot be extrapolated to other regions or the broader pharmaceutical manufacturing industry due to its small sample size and geographical focus. To improve the findings' generalizability, it is also suggested that the outcomes of this study be contrasted with those of other investigations. Lastly, it's critical to remember that this study solely employs quantitative data, which may not adequately convey a comprehensive picture of the issues. To improve the phenomenon's potency and applicability, future studies could benefit from looking at it from the viewpoints of gender and age. Additionally, the use of multiple methodological approaches, such as triangulation and mixed methods, could further enhance the robustness of the research.

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