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Social Learning Strategies Influencing Cognitive Assessment for Cyber Ethical Behaviour Among TVET Students

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ABSTRACT

The development of the industry revolution (IR 4.0)) challenges Technical Vocational Education and Training (TVET) institutions to increase their knowledge of cyber ethics to increase the employability and mobility of TVET graduates. Awareness of cyber ethics needs to be emphasized in the environment of TVET institutions to improve the understanding and sensitivity of TVET youth through assessing threats to the interests, rights, and safety of others. However, the current curriculum structure of TVET institutions only emphasizes technical skills rather than improving students' cognitive and digital processes. Therefore, this study aims to identify social learning strategies that integrate exposure to cyber ethics within TVET institutions through informal learning methods guided by Social Learning Theory (SLT). A systematic review (SR) was conducted using the Web of Science (WoS), Scopus, IEEE Xplore, and ACM research databases, focusing on peer-reviewed articles published between 2019 and 2024. This review identified 27 relevant studies using PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Our analysis identified 14 social learning strategies across 27 research papers through deductive analysis, based on three sources of Social Learning Theory (SLT): vicarious experience, verbal persuasion, and, through inductive analysis, an additional source of engagement. Three strategies are highlighted for their appropriateness, simplicity, and impact: digital games, lecturer reminders, and motivation impact of achievement certification. These findings can assist TVET institutions in developing informal learning strategies to better equip graduates with cyber ethical knowledge for protecting themselves and others from cyber threats.

Keywords: *Cyber ethics, cognitive process, social learning theory (SLT), TVET, PRISMA.*

INTRODUCTION

Nowadays, cyberspace offers significant benefits to youth, particularly for academic purposes and social communication. However, uncontrolled use of this space has exposed them to negative elements, making them both potential perpetrators and victims of cyber threats arising from violations of ethical digital conduct. In early 2020, there was an incident of privacy violation involving a group of youths in south Delhi who created a chat group on Instagram with the title "Bois Locker Room" to share pictures of women (mostly minors) for discussions

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objectifying women and graphic sexual language (Jana et al., 2022). In the United States, 64% of youth have been victims of cyberbullying by receiving malicious, frightening, and threatening messages online (GilPress, 2023). In Malaysia, Johari et al. (2019) revealed that out of ten teenagers are exposed to unethical content in cyberspace, particularly through social media. Youth behaviour on these platforms is often driven by a desire for social recognition, sometimes leading to unethical actions such as identity misrepresentation or disseminating misleading information (Hidayat et al., 2024). Most youth have not yet adopted adequate privacy protection practices (Muhammad Adnan et al., 2022). This concern is further underscored by data from the Malaysian Communications and Multimedia Commission (2022), which reported that individuals aged 18 to 24 are the most active internet users, spending between 5 to 8 hours online daily, with some exceeding 18 hours per day. Such high exposure increases their vulnerability to consuming and engaging in unethical cyber behaviours.

Cyber ethical behaviour among TVET youth deserves serious attention, as it directly affects their readiness for the digital workforce. This is because today's employers prioritize competencies such as English proficiency, strong work ethics, and interpersonal skills when hiring graduates (MOE, 2021). A strong work ethic now extends beyond behaviour in the physical workplace, including conduct within digital environments. However, recent findings raise concern about students' preparedness in digital environment. Muniandy et al. (2017) revealed that higher education students in Malaysia exhibit generally unsatisfactory cybersecurity behaviours across critical areas such as password usage, phishing, social engineering, online scams, and malware protection. While this study broadly addresses higher education students, the implications are particularly significant for TVET students, who are expected to possess practical digital skills. Industry experts have also expressed concerns regarding the digital competencies of TVET graduates. According to a report on challenges TVET faces in Malaysia, many new graduates lack essential technological skills, including basic computer and data management abilities (Amin et al., 2023). This deficiency hampers their employability and raises critical questions about their understanding and adherence to cyber ethics in professional settings.

Increasing evidence suggests that cognitive assessment of individual security behaviour in cyberspace through threat and coping appraisals (Adhikari & Panda, 2018; Aurigemma & Mattson, 2018; Mousavi et al., 2020). Cognitive assessment helps individuals develop a style of thinking and acting that is ethical and polite and has a high level of self-efficacy, which is required to control behaviour positively. However, when the cognitive process in the cyber ethical behaviour of students is at a low level, activities such as thinking, remembering, understanding, analysing, synthesizing, evaluating, and solving problems lead to mistakes in behaviour decisions. In cyberspace's complex and interactive environment, such cognitive deficits can make individuals vulnerable to engaging in or falling victim to cybercrime. This is especially concerning for TVET students, as many TVET programs still emphasize technical training while neglecting essential cognitive and digital competencies for ethical decision-making and safe online behaviour (MTVET, 2024). Therefore, reviewing and improving the existing learning process is essential to better equip TVET students with cognitive skills for addressing cyber threats. This enhancement aims to ensure that students adhere to ethical values and take responsibility for their own and others' safety as online

users, particularly among youth who require improved digital literacy and cyber ethics awareness (Dzulpadzli Shaarin et al., 2025; Wahab et al., 2023).

In educational institutions, there are two types of learning processes: formal learning, which follows a planned curriculum structure, and informal learning, which occurs outside this formal curriculum (Siti Najihah, 2015). Since the current curriculum does not emphasize cyber ethics, it can be addressed through informal methods. According to Siti Najihah (2015), informal learning is a flexible approach that adapts to current situations, is not tied to a specific syllabus, and encourages openness and creativity. This approach allows for periodic refinement of reinforcement measures against cyber threats, helping to address the ever-evolving challenges of cyber threats.

Albert Bandura introduced the Social Learning Theory (SLT) framework in 1977, which posits that individuals learn through personal experience and by observing others and the outcomes of their actions. Various creative and innovative social learning strategies can be employed in Technical and Vocational Education and Training (TVET) institutions to enhance cognitive assessment and boost students' self-confidence in making behavioural decisions in cyberspace. However, in cybersecurity education, social learning strategies are underexplored from the student perspective compared to employee and public contexts. This study aims to identify social learning strategies that can influence students' cognitive assessment processes based on SLT, addressing the need for informal learning support in TVET institutions. We pose the research question: "How can SLT strategies be utilized in TVET environments to influence students' cognitive processes regarding cyber-ethical behaviour?" A rigorous systematic review using the PRISMA approach was conducted to determine suitable social learning strategies for developing cognitive processes among TVET students.

This paper is structured into five sections. The first section provides an overview of the issues, study background, problem statement, and study aim. The second section covers TVET institutions, cyber ethical behaviour, and social learning theory, followed by the methodology. The fourth section presents and discusses the results, while the final section provides the conclusion.

LITERATURE REVIEW

TVET Institution

Technical and Vocational Education and Training (TVET) in Malaysia is a continuous effort to develop highly skilled human capital through education and training. After high school, youth can pursue TVET education at Community Colleges, Polytechnics, Vocational Colleges, and Skills Training Institutions such as Industrial Training Institutions (ILP), the National Youth Skills Institute (IKBN), and GiatMara, among others. The programs offered cover fields such as engineering, technology, trade, and services, focusing on bridging the skills mismatch between current job requirements and future job needs (JPPKK, 2022). TVET programs primarily offer certificate and diploma-level qualifications. In 2019, the TVET Single Quality Guarantee was introduced, allowing TVET graduates to pursue higher qualifications within the Malaysian Qualifications Framework (MQF). TVET students can continue their degree studies at Polytechnics and the Malaysia Technical University Network (MTUN). However, they must meet specific conditions set by the Senate of each Higher Education Institution

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(IPT). There are 1,345 TVET institutions in Malaysia, comprising 669 public institutions, 652 private institutions, and 24 state government institutions (MTVET, 2024). Figure 1 presents the ministries involved in the provision of TVET in Malaysia.

The development of Industry Revolution 4.0 (IR 4.0) challenges TVET institutions to enhance both soft skills and social values, not only in real-world settings but also in the cyber environment, to boost the employability and mobility of TVET graduates. With the advancement of cyber technology, it is crucial to integrate cyber ethics into the soft skills and social values of TVET youth to ensure ethical and responsible behaviour in cyberspace. According to cognitive theory, individual behaviour is shaped by one's perception and understanding of a situation, which relates to the goals to be achieved (Wandani et al., 2023). Thus, equipping TVET youth with online knowledge, skills, and understanding of their rights and responsibilities is essential for promoting human rights, democracy, and the rule of law in the cyber world.

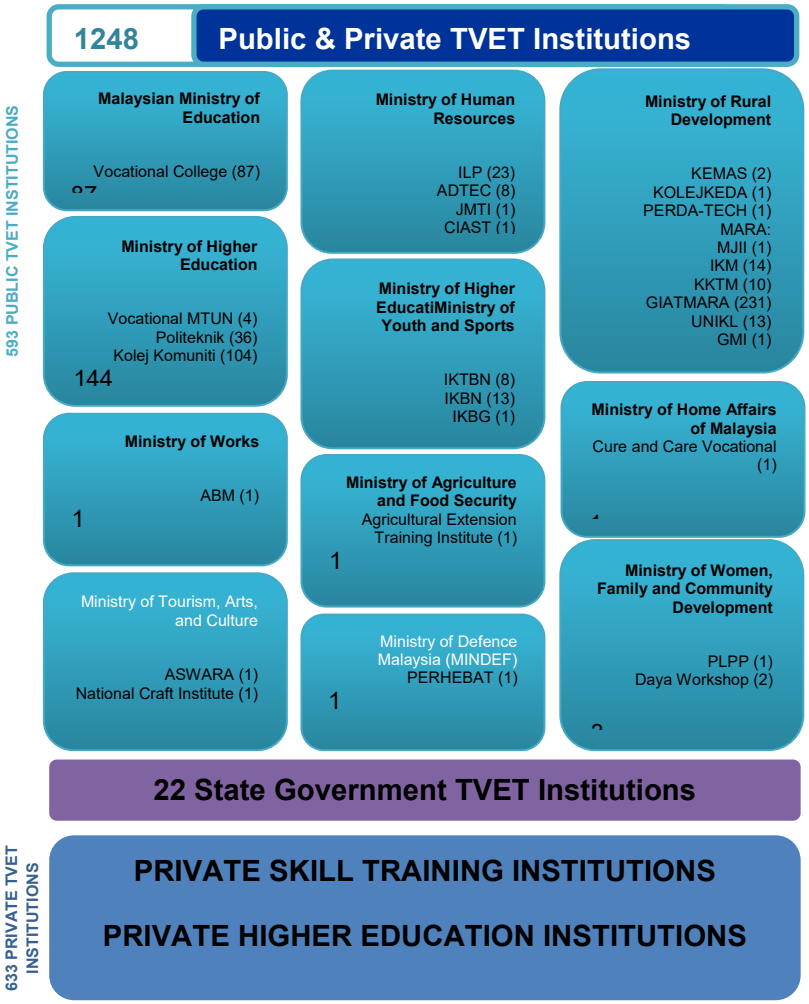

Figure 1: Ministries that offer TVET (Data as of January 1, 2020) (JPPKK, 2020)

Cyber Ethical Behaviour

Ethics refers to the moral principles that guide human behaviour (Harris, 2022). In the context of cyber technology, such as the internet, cyber ethics involves principles restricting behaviours that could negatively impact others. According to Xiang & Hasbullah (2023), cyber ethics encompasses moral aspects of cyber humanity. The value of cyber humanity serves as a foundation for evaluating actions towards oneself and others, helping to rationalize attitudes and behaviours (Kilicer et al., 2017). Key characteristics of cyber humanitarian values include respect, honesty, responsibility, peace, tolerance, and actions aligned with basic human values. Thus, cyber ethical behaviour is defined as making decisions based on these values to foster healthy relationships, protect others' rights, and ensure well-being and safety in cyberspace. Studies on cyber ethical behaviour, such as those addressing cyberbullying (Touloupis & Athanasiades, 2022) and social media interactions (Kilicer et al., 2017), illustrate the application of these cyber humanitarian values.

The rapid expansion of the internet has created challenges for maintaining cyber humanitarian values (Xiang & Hasbullah, 2023), yet user awareness of cyber ethics remains moderate, particularly among the younger generation (Shahidah Hamzah et al., 2021). Dishonesty has become a critical academic issue, especially among students (Azhar Abd Aziz, 2020). Common cyber ethics violations among students include unauthorized access (Yaokumah, 2020), plagiarism (Awasthi, 2019), invading others' privacy (e.g., reading emails or WhatsApp messages) (Thompson et al., 2017), spreading inaccurate content (Hamzah et al., 2020), and cyberbullying (Shaikh et al., 2021). Addressing cyber ethical behaviour is crucial in TVET institutions because studies show that engineering or technical students often exhibit lower levels of ethics than their peers in social sciences and other fields (Hassan et al., 2022). The abundance of information sources in cyberspace, such as videos, audio, and infographics, presents opportunities for unethical behaviour. Therefore, emphasizing cyber ethics within TVET institutions is essential to enhance students' understanding of their rights, responsibilities, and the safety of others in cyberspace.

Social Learning Theory (SLT)

Social Learning Theory (SLT) provides a flexible, informal learning framework that is applicable across various fields, making it highly relevant for the cognitive development of students (Hina et al., 2019; Horsburgh & Ippolito, 2018; Li et al., 2023; Shillair et al., 2015; Tu et al., 2015). While other theories, such as General Deterrence Theory (GDT), Theory of Planned Behaviour (TPB), Big Five Personality, and Self-Determination Theory, focus on factors like fear of punishment, motivation, or individual personality, they are less suitable for this study. SLT, in contrast, emphasizes the importance of learning through observation and social influence in shaping behaviour. Unlike these other theories, SLT is specifically concerned with informal learning environments and individuals' cognitive processes during learning (Warkentin et al., 2011). Bandura's SLT identifies three types of observational learning: i) direct models, involving real individuals who demonstrate behaviours; ii) symbolic models, involving real or fictional characters in books, movies, television, or online media; and iii) oral teaching models, which include descriptions and explanations of behaviour (Cherry, 2022).

Bandura (1977) asserted that the learning process is continuous and that learning outcomes can be influenced by various sources: vicarious experiences (observing others' successes or failures), verbal persuasion (encouragement or discouragement from others), performance accomplishments (personal successes or failures), and emotional arousal (feelings of confidence or doubt). According to Bandura, vicarious experience involves learning through observing the actions and results of others rather than through direct personal experience (Bandura, 1977). Schunk (1991) notes that seeing a peer successfully tackle a challenging task can enhance the observer's self-efficacy, increasing the likelihood of engaging in the same behaviour. Vicarious experience is particularly valuable when direct experience is limited or impractical. For instance, exposure to simulated scenarios involving responses to security threats can help individuals internalize these experiences, affecting how they assess and react to similar threats in the future. Verbal persuasion, conversely, involves feedback or instructions that support an individual's ability to perform a task (Bandura, 1977). In this study, verbal persuasion is a crucial reminder and significantly influences students' confidence and ability to adopt protective behaviours against potential threats.

Achievement plays a crucial role in building confidence and strengthening an individual's belief in their ability to perform well in similar future situations. According to Akbari & Sahibzada (2020), successful performance enhances personal effectiveness and increases self-confidence. Conversely, repeated failures can negatively impact an individual's self-efficacy. This implies that students' success in demonstrating cyber-ethical behaviour within educational institutions is essential for developing a strong sense of self-efficacy. Sustaining high performance in these areas can significantly influence their behaviour and effectiveness in addressing similar ethical challenges in their future careers. Sources of emotional arousal involve how feelings and emotions affect learning and behaviour (Bandura, 1977).

Social learning strategies are highly relevant in the context of TVET because they align with vocational education's hands-on, collaborative, and competency-based nature. TVET learners benefit from observing, imitating, and interacting with peers, instructors, and workplace models through core principles of Social Learning Theory. These strategies help reinforce technical skills, soft skills, ethical awareness, and professional behaviour through real-world scenarios and peer engagement (Hassan & Ogbuanya, 2017). Given that TVET aims to prepare students for industry demands, incorporating social learning encourages active participation, shared responsibility, and practical problem-solving skills. These competencies are central to effective learning and reflect the core requirements of today's dynamic skills ecosystem in the digital era, where adaptability, collaboration, and ethical digital behaviour are essential for workplace success (Banga & Velde, 2019). Today, various creative social learning strategies are being employed to support informal learning in educational institutions, further enhancing students' readiness for the evolving demands of the digital workforce. Based on the discussion above and guided by sources such as vicarious experiences, verbal persuasion, and performance accomplishments, this study aimed to identify social learning strategies that support the cognitive development of cyber-ethical behaviour among TVET youth. Emotional arousal was not treated as a direct source of information, as it is influenced by other social learning factors, especially vicarious

experiences, which regulate emotions (Nordin et al., 2020) and trigger emotional arousal (Omar, 2018).

METHODOLOGY

A systematic review (SR) addressed the research question: 'How can the *SLT* strategies be utilized in the TVET environment to affect students' cognitive processes regarding cyber ethical behaviour?' According to Mohamed et al. (2020), a systematic review differs from traditional studies because specific research questions guide it and employ a methodology to minimize selection, publication, and data extraction biases. We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure the review process was rigorous and valid. These guidelines help to explain the criteria for selecting articles. Several relevant studies were systematically reviewed to address the research question and the study's aim.

Identification of Database and Search Strings

The systematic review (SR) search strategy employs four research databases in this study. Utilizing multiple databases is crucial as it helps address the limitations of individual databases (Xiao & Watson, 2019) and reduces the risk of retrieval bias (Durach et al., 2017). The databases used for searching research articles include Web of Science (WoS), Scopus, IEEE Xplore, and ACM. These four databases are among the 14 identified as highly effective for systematic searches in computer science, according to Gusenbauer & Haddaway (2020). Initially, keywords and related terms were determined using thesauruses, dictionaries, encyclopaedias, and previous studies. The search terms included "("social learning" OR "informal learning") AND ("strateg*" OR "factor" OR "antecedent") AND ("cognitive") AND ("youth" OR "student*" OR "teen*" OR "adolescen*" OR "young") AND ("behav*" OR "perform*" OR "engage*" OR "achieve*")" and were used across Scopus, WoS, IEEE Xplore, and ACM databases. In the first stage of the SR process, this approach successfully retrieved 874 papers from the databases.

Screening

The primary criterion for inclusion was peer-reviewed articles deemed empirical or primary sources, which provided the most practical information, including conference papers and journal articles. The review was limited to papers published in English due to the researcher's language constraints. The study covered five years, from 2019 to 2024, focusing on literature within this timeframe to identify current social learning strategies. The research addressed computer science and education, specifically examining social learning strategies for youth. There were no restrictions on the study setting or design to ensure a comprehensive search. A total of 652 publications were excluded after the screening phase, and seven duplicate papers were removed during this process.

Eligibility

The search and screening results at each stage are illustrated in the PRISMA flowchart presented in Table 1. We reviewed 215 unique titles and abstracts, of which 26 original research papers met the eligibility criteria, specifically those addressing social learning strategies for youth.

Table 1: The selection criteria for searching

Criterion	***Inclusion***	***Exclusion***
Literature type	Journal (Article)	Systematic reviews, Reviews, Meta-analyses, Meta-syntheses, Book series, Books, and Chapters
Language	English	Non-English
Timeline	2019 – 2024	< 2019
Subject area	Computer Science and Education Educational Research	Besides Computer Science and Education, Educational Research

Data Abstraction and Analysis

We conducted a qualitative synthesis through a deductive thematic analysis, with the initial themes based on the three sources of Social Learning Theory (SLT) information previously discussed. We extracted results from 26 studies and organized the strategies according to the SLT sources: vicarious experience, verbal persuasion, and performance accomplishment. Strategies that did not align with these SLT sources were analysed inductively and thematically and presented as engagement information sources with supporting quotes in the results section. After the initial coding by the first researcher, a review was conducted with the second researcher. Although the steps outlined appear sequential, the analysis and pattern-finding process is iterative and recursive rather than linear. No software programs were used to assist in the analysis. Our analysis framework allows for the possibility that a single study might present strategies under multiple SLT information sources. The main steps of the systematic review are detailed in the following subsections, with an explanation of the process illustrated in Figure 2.

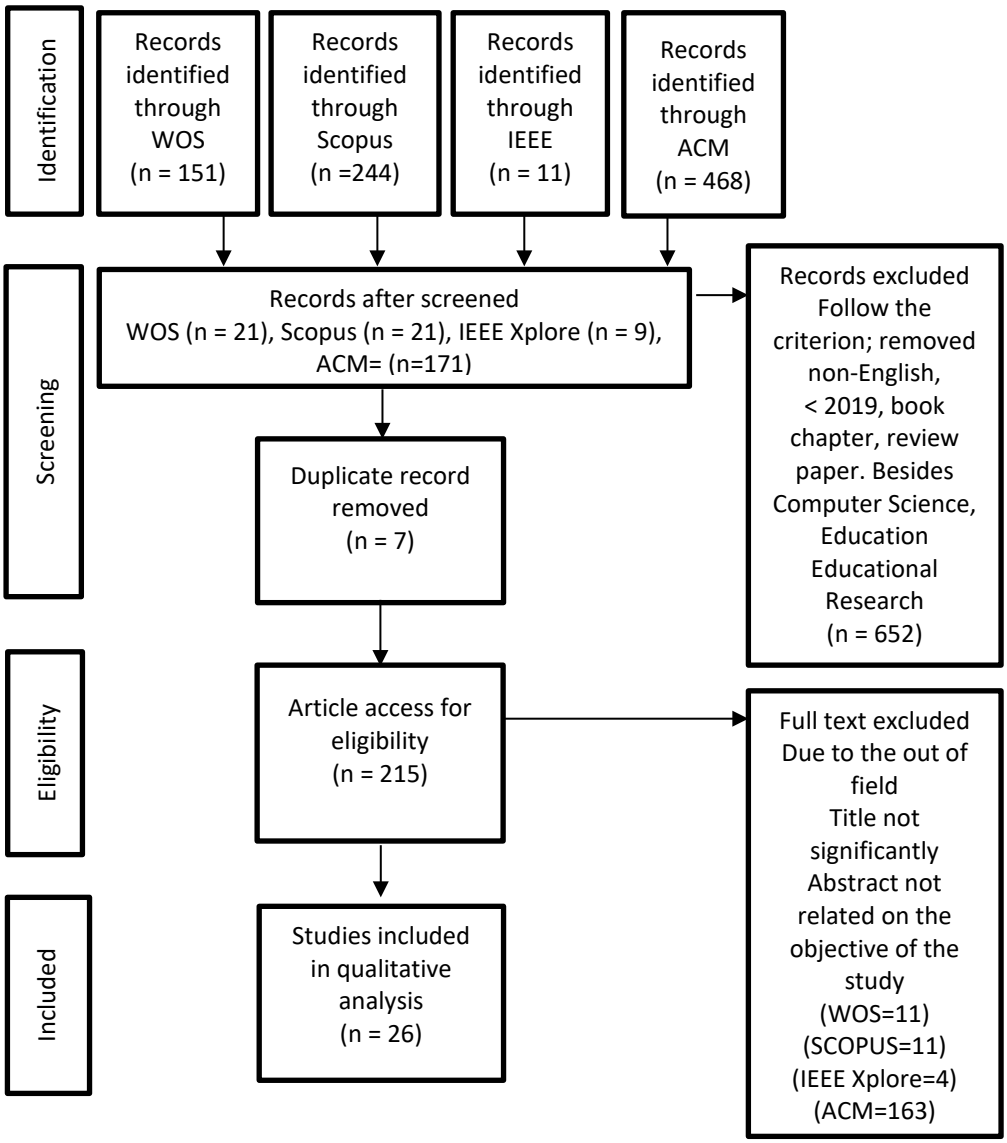

Figure 2*:* Complete steps of the PRISMA workflow were carried out in this study

RESULTS AND DISCUSSION

The study identifies 14 social learning strategies mapped to four distinct sources: three from Social Learning Theory (vicarious experience, verbal persuasion, and performance accomplishment) and one emerging through inductive analysis (engagement). This additional source of engagement is particularly significant, as Chen et al. (2019) and Galamiton et al. (2024) demonstrate its crucial role in enhancing cognitive processes and fostering collaborative learning environments. The emergence of engagement as a separate source suggests a potential evolution in social learning theory when applied to contemporary educational contexts, particularly in digital and technology-enhanced learning environments.

A critical analysis of vicarious experience reveals its prominence in six key strategies: digital games, virtual reality, learning space provision, digital media, flipped learning, and simulation-based learning. This distribution suggests a strong relationship between observational learning and technology-enhanced education. These strategies facilitate learning through direct observation and simulated experiences, with digital platforms providing scalable and consistent learning opportunities. However, the effectiveness of these strategies appears to depend heavily on the quality of implementation and the technological infrastructure available.

Engagement emerges as the most widely distributed source, present in eight strategies, including persuasive communication, verbal encouragement, online critique, interactive e-books, digital achievement, collaborative learning, social media, and dialogue-based approaches. This broad distribution indicates the fundamental importance of feedback and encouragement in social learning processes. The study particularly emphasizes the role of multiple stakeholders - peers, parents, and educators in providing this verbal support, suggesting a need for coordinated approaches in educational settings.

The analysis reveals digital games/gamification as an impactful strategy, demonstrating effectiveness across multiple learning outcomes, from STEM education to language acquisition. However, this finding should be considered critically as the strategy's success may be partially attributed to its novelty and current technological trends rather than inherent pedagogical superiority. Collaborative learning and dialogue-based approaches, ranking second and third respectively, show more traditional pedagogical strengths in fostering engagement and knowledge construction through social interaction. Studies by González et al. (2019) and Welikala (2019) provide robust evidence for their effectiveness in promoting both academic achievement and social skill development. Furthermore, integrating videos and gamification applications into the learning process has effectively boosted student engagement and deepened learning through interactive and enjoyable experiences (Teo et al., 2024). The summary of findings is tabulated in Table 2.

Table 2: Social learning strategies

Strategy	Indicator	Finding	Social Learning Source of Information			
			Vicarious Experience	Verbal Persuasive	Performance Accomplishment	Engagement
1. Digital games / Gamification						
(Janakiraman et al., 2021)	Experience the outcomes of your own choices as well as those of others during the game	Through observing and experiencing the outcomes of their own and others' choices in the game, students learn about the impact of various behaviours on the environment	/			
(Faas et al., 2019)	Experience direct interactions with others and their feedback	Playing online enhances students' understanding and skills in STEM learning through direct interaction and by paying attention to the contributions and feedback of others	/			
(Chan & Lo, 2021)	Shows better performance and understanding	Students demonstrate improved performance and understanding of English language course content when gamification strategies are implemented effectively			/	
(Long et al., 2020)	Increase engagement and create opportunities for achieving better performance.	The findings indicate that the benefits of socio-cognitive conflict within groups are enhanced when inter-group gamification is designed using social learning or competitive strategies.			/	/
(Suteeca & Nitlarp, 2023)	Promoting engagement, collaboration, and drive among learners	The findings demonstrate that gamification can be an effective instructional method in work-integrated learning (WIL) for promoting engagement, collaboration, and drive among learners.				/
(Chan & Lo, 2021)	Increased student engagement and participation	Incorporating gamification elements enhances student engagement and participation in distance learning activities.				/

(William, 2021)	Improved engagement and learning outcomes	By incorporating gamification into STEM learning, the Go-Light Game fosters the development of thinking skills and offers a dynamic platform for students to apply their knowledge, resulting in improved engagement and learning outcomes	/		/	
(Fernández Galeote et al., 2023)	Enhances engagement through interactive and motivating elements.	Game-based learning often boosts engagement with interactive and motivating features, facilitating a deeper understanding of complex subjects such as climate change.				/
2. Virtual reality/ Virtual education						
(Jayaraj & Reeve, 2024)	• Leveraging deep experience	Using the XR Immersion strategy to enhance teaching and learning by leveraging immersive, interactive experiences and visual details to deepen understanding	/			
	• Influence students' engagement	Virtual tourism courses positively impact student engagement and motivation, encouraging active participation.			/	
3. Provision of learning space						
(Chang-Tik & Song, 2023)	• Engage in hands-on activities • Learn from the experiences of peers and experts.	The informal learning environment, by offering spaces for science students, provides ample opportunities for hands-on activities and allows students to observe and learn from the experiences of peers and experts	/			/
4. Persuasive communication among peers						
(Kosaka & Nakawa, 2024)	Persuasive communication leads to changes in attitudes and behaviours.	Narrating the life stories of former students can offer qualitative evidence on how persuasive communication influences changes in attitudes and behaviours, which in turn impact their career paths or ongoing interest in science and mathematics.		/		

5. Verbal encouragement from parents							
(Shehzad et al., 2024)	Verbal encouragement and motivational communication of parents	Parents' verbal encouragement and motivational communication are crucial in shaping their children's attitudes and boosting their confidence in programming abilities.		/			
6. Online critique / Community interactions							
(Guo et al., 2023)	Constructive and well-characterized feedback	Constructive and well-characterized feedback, the creation stage of artefacts, and the nature of community interactions all play significant roles in determining how creators engage with online critiques.		/			
7. Interactive e-book							
(Sung et al., 2019)	Improve performance	Providing interactive feedback through e-books can create opportunities for achievement, enhancing learning outcomes and student self-efficacy.				/	
8. Digital achievement							
(Groening & Binnewies, 2019)	Demonstrate the level of student motivation and enhance performance	Social learning strategies involving digital achievements result in higher student motivation than those without. Digital achievements offer tangible markers of success, reinforcing student accomplishments and enhancing performance.				/	
9. Collaborative Learning							
(González et al., 2019)	Encourage active participation	Increase engagement by fostering active participation, peer interaction, and collaborative problem-solving					/
(Nisiotis & Kleanthous, 2019)	Achieve more effective engagement	Learning through a Multi-User Virtual Environment enhances collaboration and strengthens student engagement.					/

(Docherty, 2020)	Improving performance achievement	Collaborative learning enhances performance achievement by leveraging group dynamics, knowledge sharing, and collective problem-solving.		/	
10. Social Media					
(Al-Shaikhli et al., 2019)	Increasing engagement and learning outcomes	By aligning social media tools with students' cultural backgrounds, educators can boost engagement, enhance collaboration, and improve overall learning outcomes		/	/
11. Digital Media					
(Tazhenova et al., 2024)	Leading to more engaging and effective informal learning activities	Digital media provides interactive, adaptable, and easily accessible learning experiences that cater to individual interests and learning styles, resulting in more engaging and effective informal learning activities.	/		/
12. Flipped Learning					
(Mei et al., 2019)	Enhances engagement through interactive and flexible learning experiences	By integrating online and in-person learning activities, seamless flipped learning enhances engagement through interactive and flexible learning experiences.	/		/
13. Dialogue-based approach					
(Welikala, 2019)	Enhances engagement through personalization and real-time interaction.	This system boosts engagement by offering personalized experiences and real-time interaction by utilizing interactive dialogues and adaptive feedback.			/
(Ruan et al., 2019)	Students actively involved in their learning process	The dialogue-based approach keeps students actively involved in their learning process, while adaptivity helps maintain motivation and effectively supports the acquisition of factual knowledge.			/

(Petousi et al., 2021)	Increasing student involvement and motivation	Bots can be powerful tools for promoting historical empathy and facilitating meaningful dialogues, thereby increasing student involvement and motivation.			/
14. Simulation-based learning					
(Asakura et al., 2022)	Provides a sufficiently deep experience	Simulation-based education, which offers an in-depth learning experience based on the experiences of others, plays a crucial role in preparing social work students for professional practice.	/		

The findings of this study underscore the significant potential of social learning strategies to facilitate vicarious experiences, verbal persuasion, performance accomplishments, and student engagement, thereby enhancing the cognitive development of cyber-ethical behaviour among youth. However, for these strategies to be optimally effective within the TVET context, several contextual factors must be considered. Specifically, TVET students may respond differently to ethical scenarios depending on their emotional states, which are often shaped by vicarious experiences (Ratu et al., 2024; Sulaiman et al., 2024). In this regard, digital games focused on cyber ethics emerge as a promising pedagogical approach, providing immersive experiences that simulate real-world scenarios involving cyber behaviours and potential cyber threats. Digital games have proven effective as sources of vicarious experience for self-directed learning in STEM fields (Faas et al. 2019) and in fostering pro-environmental attitudes and behaviours through sustainability education (Janakiraman et al. 2021). While simulation-based approaches share similarities with vicarious experience, they were not selected for this study due to overlapping features with digital games, which are generally more user-friendly, easier to implement, and more engaging for students. Furthermore, complex simulations often require advanced facilitation and high-end technology (Mohd Syahrizad 2016), which may not align well with the specific learning environments and diverse backgrounds of TVET students, who frequently encounter challenges such as limited digital access, varied academic preparedness, and socio-economic disparities (Nicola Norton, 2021; Yeap et al., 2021).

A balanced approach that combines digital strategies with traditional methods, such as face-to-face discussions, instructor-led reflections, and peer mentoring, will likely be more effective in supporting holistic ethical development. Previous studies have shown that social learning strategies involving persuasive communication among peers, verbal encouragement from parents, and online critique interactions positively impact knowledge reinforcement in mathematics and science (Kosaka & Nakawa, 2024), enhance youth self-efficacy in computer programming (Shehzad et al., 2024), and foster youth engagement in creative skills development (Guo et al., 2023). These findings demonstrate that verbal persuasion from close individuals remains a relevant traditional learning mechanism that effectively stimulates students' cognitive processes. Accordingly, this study employs social learning strategies through reminders from lecturers as a source of verbal persuasion. The influence of lecturers has been identified as a key factor in shaping youth's values, attitudes, and behaviours in higher education institutions (Hanapi et al., 2021; Shahruddin et al., 2018). Therefore, lecturer reminders are especially crucial in this study's context, as lecturers have the opportunity and authority to engage with students closely, guiding their cognitive processes to understand the effects, risks, and implications of cyber ethical violations.

Research indicates that recognizing and celebrating vocational achievements through awards and formal acknowledgments is a powerful motivator, enhancing students' sense of accomplishment and promoting sustained engagement and positive behaviour within educational settings (Bliven, 2021; Chloe, 2021). Recognition-based incentives such as digital badges and certificates have been shown to improve student engagement, increase metacognitive awareness, and reinforce long-term retention of ethical values (Groening & Binnewies, 2019; Khaleghi et al., 2021). Furthermore, tangible rewards like printed certificates have proven effective in maintaining academic performance and encouraging positive behavioural change (Ostermaier 2017; Wan Mohd 2020; Warini et al. 2023; Zulkifly Md Alwayi et al. 2021). As such, the social learning strategy involving achievement certificates

is designed to support cognitive development and motivation among TVET students and to serve as a catalyst for sustaining ethical behaviour in their future professional roles.

The Relationship Between Social Learning Strategies, Cognitive Assessment, And Their Implications for TVET Youth Cyber Ethical Behaviour

Adapting these strategies to fit the contextual realities of TVET institutions is essential to ensure their practical applicability and long-term impact. The following sections examine how selected social learning strategies can be leveraged to enhance cognitive development and ethical conduct among TVET youth.

Cyber Ethical Digital Games

Social learning strategies through cyber ethics digital games provide simulated environments that allow students to experience ethical situations vicariously (vicarious experiences), which are important in their cognitive development. Game-based approaches have shown significant potential in students' cognitive development in areas such as entrepreneurship (Fox et al., 2018), where students actively engage in critical thinking, problem solving, and strategic decision-making while facing simulated business challenges, financial risks, and ethical dilemmas in a virtual environment. In fire safety skills training (Kwok et al., 2022; Metallinou, 2022), cognitive processes occur when trainees are required to identify potential hazards, assess risks, and make quick decisions in high-pressure situations. The use of simulations and digital games in this training stimulates observation skills, visual and auditory information processing, and decision-making based on real-world scenarios.

This shows that digital games serve as interactive learning tools that increase student interest and engagement and function as effective cognitive assessment instruments in evaluating students' ability to identify cyber risks and threats. Students can develop and demonstrate higher-order cognitive skills such as ethical reasoning, problem-solving, and self-regulation by simulating real-world dilemmas in digital environments. These skills are essential for navigating ethical issues in cyberspace (Jocelyn et al., 2021; Krath et al., 2021). This approach supports the development of critical thinking, self-awareness, and ethical values and helps students respond more effectively to the demands of the digital world. Moreover, young people, especially those in the TVET context, tend to prefer learning experiences that are interactive, engaging, and delivered in a relaxed and supportive environment, which enhances both their motivation and cognitive development (Manditereza & Chamboko-Mpotaringa, 2024).

Reminder from the Lecturer

Reminders from lecturer function as a form of verbal persuasion, one of the key components in Social Learning Theory (Bandura, 1986), and play an important role in reinforcing ethical expectations and guiding student behaviour. Verbal persuasion involves encouragement or warnings from credible and respected individuals, which can strengthen a learner's belief in their capacity to act ethically, even in complex or ambiguous digital environments. As credible authority figures, lecturers are strategically positioned to influence students' attitudes and beliefs about ethical conduct, particularly through timely and consistent reinforcement of cyber ethics values during teaching and learning activities. These reminders do more than guide behaviour, they trigger cognitive processing, prompting students to reflect on the risks and consequences of unethical actions. This process activates both threat appraisal

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(awareness of cyber risks) and coping appraisal (confidence in handling those risks), supporting self-regulation, moral reasoning, and ethical decision-making. In the TVET context, where students prepare for technical careers and digital citizenship, such strategies ensure that professional skills are rooted in strong moral foundations (Kosaka & Nakawa, 2024; Sulaiman et al., 2024). Ultimately, these efforts promote reflective and responsible behaviour in digital environments.

Motivation Impact of Achievement Certificates

Achievement certificates function as extrinsic motivational tools that recognize and reward students' efforts, reinforcing desired learning behaviours related to cyber ethics. In Social Learning Theory, these certificates align with the component of *performance accomplishments*, which emphasizes the importance of successful task completion in building self-efficacy and motivating ethical behaviour (Bandura, 1986). When students receive certificates acknowledging their achievements especially those linked to ethical decision-making in digital environments, they are more likely to internalize these behaviours and repeat them in future scenarios. This form of motivation supports cognitive development by encouraging students to reflect on the ethical dimensions of their digital actions and to strive for consistent, responsible behaviour. In the TVET context, where practical and ethical competencies are equally emphasized, the use of achievement certificates validates students' technical and cognitive skills. It reinforces their commitment to ethical digital conduct. Therefore, integrating motivational elements like certificates within cognitive assessment strategies can be a powerful approach to nurturing cyber-ethical behaviour among youth.

CONCLUSION

In conclusion, this study has identified and examined three key social learning strategies-cyber ethical digital games, lecturer reminders, and motivation impact of achievement certificates as effective tools for fostering ethical behaviour among TVET students. These strategies align with the core principles of Social Learning Theory and address the cognitive, motivational, and contextual needs of learners in vocational and technical education environments. By engaging students through interactive simulations, reinforcing learning through verbal persuasion, and recognizing performance through achievement-based incentives, these strategies collectively support both ethical understanding and behavioural change. Their practical applicability within TVET institutions reflects a balanced approach to integrating ethical instruction with measurable cognitive outcomes. Ultimately, the strategic use of these methods holds strong potential to shape digitally responsible graduates who are prepared to navigate ethical challenges in an increasingly complex digital world.

However, implementing these strategies must consider specific challenges TVET institutions face in Malaysia, such as technological infrastructure limitations, insufficient educator expertise in cyber ethics, and inadequate funding. These systemic barriers may impede the effective adoption of social learning approaches and reduce their potential impact on shaping students' ethical behaviour. Therefore, addressing these challenges through policy support, targeted professional development, and enhanced resource allocation is essential to integrate social learning strategies within the TVET system successfully. Ultimately, this study paves the way for a new paradigm in TVET education, one in which responsible digital citizenship is recognized as a core educational outcome, on par with technical skill acquisition.

These findings significantly affect TVET institutions' mission to cultivate ethically conscious digital citizens. By implementing these social learning strategies, institutions can equip their students with robust cognitive skills essential for navigating the ever-evolving landscape of cyber threats. The practical value of these strategies extends beyond the classroom, preparing students to maintain ethical conduct during their education and professional careers. While this study focused on social learning approaches, it opens doors for future research, particularly in exploring complementary frameworks such as the General Deterrence Theory (GDT) for crime prevention strategies. GDT, which emphasizes the role of perceived certainty and severity of consequences in deterring misconduct, can enhance the impact of social learning by reinforcing internalized ethical values with clear institutional policies, disciplinary procedures, and real-life examples of enforcement. Integrating GDT elements into the learning environment may strengthen students' awareness of consequences, reinforce ethical decision-making and promote sustained behavioural change.

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