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Investigating The Use of Digital Design Software in Adopting 21st-Century Learning Skills (PAK21) for The Improvement of Malaysian Fashion Education

Huda Najihah Zainudin, Arasinah Kamis*, Adhi Kusumastuti, Atika, Mohd Bekri Rahim, Vivi Efrianova
Department of Hospitality and Consumer Science, Faculty of Technical and Vocational, Universiti Pendidikan Sultan Idris, 35900, Tanjong Malim, Perak, Malaysia

***Corresponding author email: arasinah@ftv.upsi.edu.my**

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ABSTRACT - The fast shift to digital technology in education and fashion shows the need to include digital design tools in Malaysian fashion training programs. However, these technologies are not widely used. This limits their ability to teach skills for the 21st century (PAK21). This study looks at how digital design software can improve PAK21 skills and teaching in Malaysian fashion colleges. This study reviewed existing research that included national education policies, technical and vocational education strategies (TVET), PAK21 implementation, and studies on digital tools in fashion education locally and globally. The results show that these tools help develop important PAK21 skills such as creativity, critical thinking, teamwork, digital literacy, and environmental awareness. But challenges exist. These include poor infrastructure, unaligned curricula, lack of teacher training, and a gap between policies and classroom realities. The study concludes that digital design programs can be valuable. Success depends on changing curricula, ongoing teacher training, and strong support from institutions. Our findings emphasise the importance of matching digital teaching methods with industry standards and national goals. Future research should include detailed case studies in Malaysian fashion schools. These should evaluate how the programs are implemented, what students think, and how learning outcomes are affected.

INTRODUCTION

As Malaysia moves towards Industry 4.0, the country's fashion education sector must adapt by including modern digital tools in teaching methods. Under Malaysia's *Pembelajaran Abad Ke-21*, or 21st-century learning, there is a change in which the focus shifts from only teaching traditional content to developing skills like creativity, critical thinking, collaboration, communication, and digital literacy. This shift requires fashion education practices to evolve to ensure graduates have the skills needed by the current fashion industry (Kamis, Azman, Kob, Kusumastuti, Atika, Widihastuti, & Yunus, 2025; Kementerian Pendidikan Malaysia, 2015).

Digital design tools are increasingly critical in contemporary fashion industries worldwide, enabling students and professionals alike to virtually prototype garments, enhance design accuracy, and minimise material waste. These capabilities are critical for preparing graduates to address real-world industry demands. Prominent software applications such as CLO3D, Adobe Illustrator, Gerber, and TUKAcad are frequently employed within the sector. Notably, footwear design and manufacturing have begun integrating 3D modelling technologies, assisting customised geometric solutions and sustainable production methods like zero-waste fabrication (Spahiu et al., 2024). Concurrently, leading fashion brands including Burberry, Nike, and Zara are revolutionising product development, supply chain

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logistics, and retail operations through the adoption of artificial intelligence, blockchain technology, and digital garment innovations emphasising an increasing industry focus on cultivating digital proficiency among future professionals (Wu, 2024). Besides, brands such as Hugo Boss are implementing smart factory models that incorporate robotics, AI, and the Internet of Things, considerably boosting the speed of production and the capacity for customisation (Thadepalli & Choudhary, 2024).

Simultaneously, higher education institutions are increasingly accepting the integration of digital technologies to enrich student learning experiences and better align with industry demands. Research indicates that incorporating digital tools into fashion education promotes immersive learning environments, boosts student engagement, and cultivates essential future-ready skills such as design thinking, digital prototyping, and sustainability awareness (Papachristou & Tatsi, 2024). The growing popularity of digital design software can be largely attributed to its capacity to minimise fabric waste and reduce production costs. Recent studies emphasise that incorporating 3D software into vocational training has led to a 23% increase in design variation and a reduction of material waste by up to 40% (Widiyawati et al., 2024).

Although technology has advanced, utilising digital tools in Malaysian fashion education is limited. Many programs still depend on traditional methods like manual draping and flat patternmaking. Digital design software that allows accurate garment simulation and promotes sustainability is not widely adopted in Malaysia (Syed Azman et al., 2022; Syed Azman, Arsat, & Suhairom, 2022). This perseverance is largely due to constrained financial resources and outdated infrastructure within TVET institutions, which hinder the integration of innovative technologies and digital literacy into teaching methodologies (Ahmad & Rosnan, 2024; Azmi et al., 2024; Aizudin, Kamis, Zakaria, Yunus, & Jamaluddin, 2024; Bujeng, Kamis, Mohamed, & Puad, 2018). In the same studies, these challenges also make it more difficult to attract qualified instructors and to keep up with fast digital innovations. Besides, a preliminary survey was conducted across Malaysian tertiary institutions, and it indicates that while basic tools like Adobe Illustrator are commonly used, more advanced platforms such as CLO3D are still underused, emphasising a disconnect between current educational practices and industry standards.

This paper presents an extensive narrative literature review, focusing on how digital design tools enhance the development of 21st-century learning skills within fashion education and the challenges involved in integrating such tools to advance the PAK21 agenda. Using a narrative review methodology allows this article to synthesise findings from diverse sources including national policy documents, empirical studies in TVET, and international research on digital design software to provide a comprehensive and contextually relevant assessment. This review examines current practices and suggests ways to change the curriculum and improve teacher training in Malaysian fashion schools. It also looks at how digital tools can help fashion teaching meet modern industry needs. The analysis concludes that digital design tools can help develop skills needed in the 21st century. However, using digital tools well requires changes in the curriculum, training teachers, and support from institutions. These steps are necessary to match policies with classroom practice.

LITERATURE REVIEW

In a study conducted in Malaysia, Azmi et al. (2024) researched digital literacy among TVET teachers. The study looked at how digital skills relate to teaching work and professional development. The research was not based on a formal theory. Instead, it focused on 21st-century skills, especially digital skills. The study had two main goals: first, to find out how teachers see digital skills; second, to see how these skills affect teaching performance. The researchers used both surveys and interviews. They collected data from 138 TVET teachers in Southern Malaysia. The survey showed that basic digital skills such as using software, digital communication, and data handling are considered very important. The interviews identified problems such as a lack of training and resistance to new technology. The study concludes that digital literacy is important in vocational education. It also states that improving infrastructure and offering ongoing training are necessary to close the skills gap and prepare the workforce for future challenges.

In addition, Mansor and Jamaludin (2024) conducted a study on Malaysian school teachers. The study looked at their awareness and preparation for 21st-century learning practices (PAK21) within their classrooms. The study used a survey with 370 primary school teachers that focused on how teacher readiness influences the successful execution of PAK21 initiatives. This study followed the Malaysian Education Blueprint (2013–2025) that promotes student-centred teaching and the use of technology

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and checked if teachers had the right knowledge, skills, and strategies for PAK21. The results showed most teachers understood PAK21 ideas. However, some teachers had trouble applying them in schools with few resources. Teachers voiced concerns regarding the lack of time, training, and support from administrators. The study concluded that to improve PAK21 readiness, ongoing training, clear policies, and more school resources are needed.

Somantri (2021) discussed the skills teachers need today in the era of 21st-century education. He used the 21st Century Pedagogical Competency Model as a guide. This model shows important teacher skills like using technology, focusing on students, promoting critical thinking, and changing teaching methods. The research sought to address the question of how well teachers are equipped, pedagogically, to handle the multifaceted demands of modern classrooms. Through a qualitative literature review, the study compiled insights from previous empirical and conceptual works that emphasised the urgent need for professional development programs that foster not only technological proficiency but also higher-order thinking and inclusive learning strategies. The results highlighted a notable gap in the pedagogical preparedness of teachers, especially in adapting to digital learning environments. It concluded that pedagogical competence should be continuously nurtured through institutional support, ongoing training, and reflective practice to ensure teachers can effectively implement PAK21 strategies and foster holistic student development.

Papachristou and Tatsi (2024) conducted a detailed study on how 3D virtual modelling software can be used in fashion education. They looked at how this technology can help students be more creative and learn technical skills better. Their research is based on ideas from Education 4.0 and Industry 4.0. These ideas focus on using digital tools in teaching. The researchers asked a simple question: What happens to students' creativity and skills when they use 3D design software? They also asked if students become more aware of sustainability when using these tools. To answer this, they studied specific case studies and reviewed many previous research papers. They focused on software like CLO 3D and virtual prototyping programs used for teaching fashion design. The results showed that students who used these digital tools improved in understanding space and shape. They also became more creative in their designs and better at expressing their ideas. The study found that students also learned more about sustainable design practices. This was because digital sampling helped them think about how to make clothing in an environmentally friendly way. However, the study also showed some problems. Some students found it difficult to learn how to use the software. Also, there were not enough teachers trained to teach these digital tools. Overall, the research shows that digital technology can help students learn better in fashion design education. But it also points out that schools need to support students and teachers with training and resources.

Yoo and Lee (2024) studied how 3D virtual technology is used in teaching sustainable fashion. They looked at tools like CLO 3D and other visualisation platforms. Their study is part of a bigger effort to understand digital teaching methods and promote teaching about sustainable design. The goal was to identify what is happening now and what problems exist when using 3D technology to teach sustainability. They analysed 586 summaries of research papers from the ITAA Design Proceedings between the year 2015 and 2022. They checked how often and how well these tools are used in classrooms. Their analysis shows that starting around 2017, more schools started to use CLO 3D and similar tools. This shows that many institutions are interested in digital, eco-friendly design methods. Yoo and Lee pointed out that while 3D technology helps with visual showing and reduces material waste in fashion teaching, it is not yet a full part of most curricula. They noted that there are challenges that include teachers not knowing enough about how to use these tools, the absence of comprehensive training programs, and resistance within institutions to changing their courses. All of these issues slow down progress to advance fashion education. Their study emphasises the need for structured teacher training and curriculum revisions to better align fashion education’s sustainability goals with digital advancements.

In their 2020 study, Hartanto looked at how CLO3D can change the way traditional clothing is digitalised. The study focused on Indonesian batik and heritage-inspired fashion. The research was not anchored to a specific theoretical framework, but was guided by the idea of combining cultural preservation with digital tools in fashion education. Hartanto aimed to show how digital 3D garment simulation using CLO3D can be used for modern fashion design and to give new life to traditional clothing through virtual reinterpretation. The study used a simple design approach. It involved creating digital versions of cultural garments with CLO3D. The process focused on shaping the silhouette, placing motifs, and simulating material effects. The results showed that students using CLO3D could see traditional styles in a modern setting. This helps keep cultural identity and encourages creative ideas. The study

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concluded that CLO3D connects heritage and innovation. It can help future designers respect their culture while welcoming digital change.

Hu (2022) studied how CLO3D software can help teach garment structure drawing in Chinese fashion schools. The study used a simple learning approach that focuses on technology to look at how CLO3D can help students understand spatial relationships and improve accuracy in fashion courses. The main question was whether CLO3D is effective for showing complex garment parts like darts, seams, and pleats. Students first learned to use CLO3D tools, either replacing or adding to traditional flat sketching. The results showed students better understood 3D shapes and improved consistency between their sketches and digital images. Students were more engaged in their work. Hu concluded that adding CLO3D to pattern making and structure classes improves students' technical skills and their confidence in designing. This is especially true for visualising garments before making physical samples. The study also noted that using CLO3D widely requires good training and proper computers or devices.

Shetabi (2024) examined how digital tools like CLO3D affect clothing design. They analysed how the software changes the process from selecting fabric to creating a virtual prototype. The study focused on combining art, design, and technology. It asked how CLO3D helps designers improve style, function, and sustainability. Shetabi (2024) created digital garments using unusual materials and funky silhouettes. The results showed that CLO3D is useful beyond simulation. It allows designers to experiment and innovate. Using digital tools helps reduce waste by making it easier to try ideas quickly. This approach supports eco-friendly design. The study concluded that CLO3D provides new opportunities for creativity and testing ideas. It is a useful tool for students and professionals as fashion shifts toward digital presentations and production.

Safri and Jamaludin (2022) conducted a study in Malaysia about the problems teachers face when adding 21st-century skills (PAK21) into their lessons. Their research was based on the Malaysian Ministry of Education's goal of changing teaching methods to prepare students for the future. The main question was: what practical problems stop teachers from using PAK21 skills in class? They used a descriptive qualitative method. They analysed existing data from research reports and government documents. The findings showed that teachers know about PAK21, which includes personal skills, work skills, applied skills, and technology skills. But many teachers have trouble using PAK21 because of poor infrastructure, not enough training, and inconsistent policies. The authors said progress depends on teachers' efforts and support from ongoing training, curriculum changes, and leadership. These are important for creating good environments for 21st-century learning.

Complementing the academic studies, the publication *Buletin Anjakan* by *Kementerian Pendidikan Malaysia* (2015) explains the national plan to include 21st-century learning in Malaysian schools. This plan is part of the Malaysia Education Development Plan (PPPM) 2013–2025. The bulletin reviews national policies and describes how PAK21 is being implemented. It states that students need to develop high-level thinking skills, digital literacy, and teamwork abilities. The report asks how schools are adjusting their teaching approaches and classroom settings to align with PAK21 standards. It emphasises issues such as limited access to digital tools, some teachers' resistance to change, and a lack of new teaching methods. The bulletin also notes efforts to redesign classrooms, adopt student-centred learning, and provide teacher training. It calls on educators, administrators, and policymakers to work together to ensure education stays relevant and effective in the digital age.

In summary, the literature strongly supports the importance of integrating digital design tools, particularly CLO3D, into fashion education to develop essential 21st-century learning skills such as creativity, digital literacy, and sustainability awareness. Across both local and international contexts, studies consistently pointed out three main themes: first, the potential of digital tools to enhance teaching effectiveness and student engagement; second, the gap between policy aspirations and practical implementation, especially in resource-limited institutions; and third, the critical need for ongoing professional development to support educators in adopting these tools. While Malaysian educators acknowledge the value of PAK21 and digital innovation, implementation is hindered by infrastructural limitations, lack of training, and institutional inertia. Collectively, these findings indicate the relevance and urgency of this study, which aims to bridge the disconnect between educational practices and industry demands by critically examining how digital design tools can be more effectively embedded in fashion education curricula.

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METHODOLOGY

This study adopts a narrative review approach to critically synthesise and interpret existing literature related to digital design tools in fashion education and their relevance to 21st-century learning skills (PAK21). A narrative review allows for thematic exploration and critique without the constraints of rigid systematic protocols, making it especially suitable for capturing the changing, interdisciplinary nature of fashion education in Malaysia and beyond.

The secondary data for this review were collected from three main academic databases: Consensus, Google Scholar, and Scopus. These sources were selected due to their accessibility, breadth, and academic reliability. The search was limited to publications from 2015 to 2025 to ensure relevance in terms of technological developments and policy shifts affecting both education and the fashion industry. The following keywords and combinations were used during the literature search: “digital fashion education,” “fashion design software,” “PAK21,” “21st-century skills,” “TVET fashion Malaysia,” “fashion pedagogy,” and “virtual prototyping in education.”

Articles were included based on several criteria:

1. Must be peer-reviewed journal articles, conference proceedings, academic bulletins, or conceptual papers;
2. Must focus on either fashion education, digital learning tools, or PAK21 implementation in an educational context;
3. Must include either a Malaysian, Southeast Asian, or global education perspective that can inform local practices;
4. Must be written in English or *Bahasa Melayu*.

Once selected, the literature was analysed thematically. The studies were reviewed to identify patterns, contradictions, and emerging insights. These were then organised into three main focus areas:

1. Educator readiness and pedagogical transformation within PAK21 and TVET contexts;
2. Integration of digital design software such as CLO3D, Gerber, and Adobe Illustrator in fashion education;
3. Institutional and infrastructural challenges affecting the adoption of these tools, especially in Malaysian TVET settings.

The selected studies were not only summarised but also critically examined to reveal overlapping findings, identify gaps in existing research, and evaluate how they contribute to or hinder the goals of digital transformation in fashion education. The process of categorisation and synthesis follows a narrative review structure, with comparisons and reflections interwoven across the discussion, rather than a rigid coding framework typical of systematic reviews. This flexible yet structured methodology enables the paper to present a comprehensive understanding of how digital design tools are currently used, what barriers persist, and what future directions can be taken to enhance the quality and relevance of fashion education in Malaysia.

RESULT AND DISCUSSION

The existing body of literature emphasises an increasing recognition of the significance of digital tools and 21st-century learning (PAK21) methodologies in the field of education, especially within technical and vocational domains such as fashion design. While the focus varies from broad digital literacy among educators to utilising digital design software in fashion curricula, certain common themes, emerging patterns, and ongoing challenges become apparent.

Comparative Analysis of the Literature

An integrated analysis of the literature reveals both convergence and divergence across the studies reviewed, reflecting how digital design tools and 21st-century learning practices are adopted and challenged within Malaysian and global educational contexts. Consistent with the narrative review approach described in Section 3.0, this analysis moves beyond a descriptive summary to critically examine overlaps, contrasts, and implications for fashion education in Malaysia. Two dominant themes emerge: (1) educator readiness and pedagogical change in Malaysian schools and TVET institutions, and (2) the incorporation of digital technologies into fashion design education at the micro-level.

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Within the first theme, the works of Azmi et al. (2024), Mansor and Jamaludin (2024), Safri and Jamaludin (2022), and *Kementerian Pendidikan Malaysia* (2015) collectively show that, while awareness of PAK21 and digital literacy is high among Malaysian educators, notable gaps persist in practice. These gaps include limited training opportunities, insufficient institutional support, time constraints, and infrastructural barriers. Importantly, these findings reveal a disconnect between national aspirations (e.g., the Malaysian Education Blueprint) and classroom realities. From a critical perspective, these studies reveal that without a clear, standardised framework for professional development and resource allocation, PAK21's innovative goals remain largely aspirational rather than actionable.

In contrast, the second theme involves using digital design software in fashion education. Researchers such as Papachristou and Tatsi (2024), Hu (2022), Shetabi (2024), Hartanto (2020), and Yoo and Lee (2024) studied this topic and found that tools like CLO3D improve students' creativity, understanding of space, awareness of sustainability, and technical skills. These tools offer a better learning experience than traditional methods. However, many issues prevent full adoption. These include the difficulty of becoming skilled in the software, staff do not always have the right expertise, and some institutions resist changing their curricula. These issues show that while digital design tools are important for preparing students, Malaysian institutions still lack the structures needed to support their use effectively.

Bridging these two themes, Somantri (2021) states that teachers need to have flexible, student-focused teaching skills to work in digital learning environments. This confirms that the successful use of digital tools depends on how well teachers can use them effectively and reflexively. These findings provide a critical framework for understanding how Malaysia's fashion education sector can move from policy statements to real actions. This involves fixing gaps in training, infrastructure, and curriculum alignment.

Synthesis of Overlapping Findings

The reviewed literature shows that digital design tools and new learning strategies are being used more often in education that support 21st-century learning (PAK21) strategies within educational environments. This is especially true in technical and vocational courses like fashion design. Many studies find that teachers see digital tools as important role, but they do not always feel confident or have enough training to use these tools well. Research from Azmi et al. (2024), Somantri (2021), and the Ministry of Education's *Buletin Anjakan* (2015) consistently points out that while educators increasingly acknowledge the relevance of digital integration, they still lack confidence, need better training and support to use digital teaching methods effectively. These findings underline the necessity for structured professional development and institutional support for strengthening educators to implement digital pedagogies aligned with PAK21 goals.

In parallel, past research shows that digital design software can be useful for teaching that encourages students to improve accuracy and creativity. Studies by Hu (2022), Shetabi (2024), and Papachristou and Tatsi (2024) discovered that platforms like CLO3D provide a space for students to test digital garment creation, visualisation, stimulate creative experimentation, and promote greater student independence. These tools not only help students understand 3D shapes and space better, but they also let students explore new ideas without wasting materials or spending money on production. This supports key values of PAK21 skills such as creativity, critical thinking, and technology skills.

Another recurring theme across the reviewed articles discusses the connection between digital design and sustainability. Researchers like Papachristou and Tatsi (2024), Shetabi (2024), and Yoo and Lee (2024) say that virtual prototyping tools help students think more about the environment. They suggest that virtual prototyping not only minimises material waste but also promotes a more in-depth understanding of eco-conscious design among future fashion designers. These tools reduce the need for physical samples and support global efforts to include sustainability in education and industry. However, some studies emphasise problems that slow down the use of digital tools, which include a lack of staff training, poor infrastructure, and outdated curricula.

Finally, the synthesis of these works points to the necessity for policy alignment and structural support. Safri and Jamaludin (2022), Yoo and Lee (2024), and the *Buletin Anjakan* (2015) all emphasise that while individual educators may be motivated, sustainable change relies on cohesive strategies at the institutional and policy levels. Without consistent funding, training initiatives, and curriculum reform, the widespread adoption of digital technology in fashion education may remain fragmented and ineffective.

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Identified Gaps and Future Research Directions

While the reviewed literature offers valuable insights into the role of digital tools and PAK21 practices in education, several notable gaps remain, particularly in Malaysian fashion education. A key shortcoming lies in the limited availability of empirical studies that focus specifically on local fashion programs. Although studies like those by Azmi et al. (2024), Mansor and Jamaludin (2024), and Safri and Jamaludin (2022) contribute important findings on digital literacy and 21st-century pedagogy within general or TVET educational settings, they fall short of capturing the unique pedagogical dynamics, creative processes, and industry-specific skills required in fashion education. Similarly, while international studies by Papachristou and Tatsi (2024), Hu (2022), and Shetabi (2024) point out the pedagogical value of digital design tools, these findings are often contextualised within foreign institutions. The lack of research focused on how Malaysian fashion programs are adapting these tools to suit local teaching environments leaves a substantial knowledge gap in curriculum development, policy support, and teacher training strategies.

In addition, long-term studies are needed. These studies should observe how digital design software like CLO3D affects students over time. They should measure technical skills, creativity, and readiness for industry jobs. Current research predominantly emphasises short-term benefits, such as increased engagement and visualisation accuracy, but offers little insight into how these skills evolve over time or translate into professional outcomes. Understanding the sustained influence of digital tools is essential for institutions and policymakers seeking to justify investments in technology, training, and curriculum reform.

Another underexplored area is the lack of standardised models for integrating digital pedagogy into educator training. Although many studies stress the importance of preparing teachers to implement PAK21 effectively, few offer clear frameworks or tested models for doing so particularly in fashion-specific contexts. Plus, institutional change management remains a rarely addressed challenge. Research seldom explores how educational institutions overcome internal resistance, allocate budgets, or make evidence-based decisions about curriculum innovation. These operational insights are critical for supporting the successful transition to digital learning tools that are both scalable and sustainable.

Lastly, the student perspective is noticeably underrepresented in much of the literature. Most studies prioritise educator readiness, institutional limitations, or the technical potential of software. However, insights into how students themselves perceive the shift to digital tools what challenges they face, how they engage with virtual learning environments, and what support they need are essential for developing more learner-centred approaches. Including the voices of students could dramatically improve curriculum responsiveness and pedagogical strategies.

To bridge these gaps, future research should:

1. Conduct empirical case studies in Malaysian fashion institutions focusing on CLO3D adoption and its pedagogical impacts.
2. Develop longitudinal studies to examine the evolution of student competencies over time.
3. Propose and test training models that integrate PAK21 principles with digital design pedagogy.
4. Investigate students' and educators' lived experiences with digital tools through qualitative inquiry to complement quantitative evaluations.

CONCLUSIONS

This study aims to explore how digital design software supports the integration of 21st-century skills (PAK21) in Malaysian fashion education. The research involves a comprehensive review of relevant literature, including general education, technical and vocational training (TVET), and specialised fashion studies, to assess how digital tools can enrich learning experiences, meet industry standards, and contribute to national education reforms. The results indicate that digital design software provides benefits for teaching and learning. It helps students develop skills like creativity, thinking skills, digital skills, teamwork, and understanding sustainability. In fashion education, digital tools let students see how garment designs look in detail, simulate real production, and reduce material waste. These tools are aligned with industry standards and support sustainability goals. Also, digital software helps students learn by encouraging experiential learning, promoting student independence, and quick

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experimentation. This makes the learning environment more active, engaging, and prepared for the future.

However, the review further points out problems that slow down the adoption of digital tools in Malaysian fashion schools. These problems include poor infrastructure, limited chances for teachers to develop professional skills, inconsistent rules enforcement, and disjointed curriculum frameworks. Even though Malaysia has policies like the Malaysian Education Blueprint (2013–2025) and PAK21 that emphasise that digital change is important, there is a gap between what these policies say and what schools actually do. Many teachers lacked the necessary digital skills they needed or the institutional support essential for effective integration of these technologies. Also, research on this subject is limited and often conducted in isolation either focusing broadly on general education or involving international case studies in fashion education. Most studies do not focus specifically on Malaysia or on fashion education. There is little local data on how digital tools like CLO3D are used in Malaysian classrooms. Only a few studies include students' opinions or look at how these tools affect learning and job prospects. This makes it hard to understand how well these tools work in Malaysian fashion schools and how such technologies influence learner development and future employability.

To address these challenges and make full use of digital tools in fashion education, this study recommends a few steps. These include creating training programs for fashion teachers, adding digital design tools to the curriculum to meet learning goals, and encouraging partnerships between schools, industry, and government. Future research should look at studies over time and case-study research within Malaysian fashion schools. This will help to understand how digital design software affects teaching, what problems occur, and how students experience using these tools.

In conclusion, digital design software offers an important opportunity to revolutionise fashion education in Malaysia. It can make the education more relevant to the industry, increase the utilisation of technology and meet the needs of modern students in the 21st century. However, simply using new tools is not enough. We need a complete system that includes an updated curriculum, teacher training, sustainable practices, and strong support from the institution. When policies match what is used in the classroom, Malaysian fashion schools can better prepare students. This will help them succeed in the global fashion industry. The industry is now more digital and focused on sustainability, so education must adapt to meet the standard.

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he authors declare no conflicts of interest. This includes financial, political, personal, or professional relationships that could be perceived as influencing the content or conclusions of this manuscript.

AUTHORS CONTRIBUTION
All listed authors have made a significant scientific contribution to the research in the manuscript, approved its claims, and agreed to be an author.
Huda Najihah Zainudin: Conceptualization, Writing - Original draft preparation. **Arasinah Kamis:** Reviewing and editing. **Adhi Kusumastuti**: Expert consultation in fashion design. **Atika**: Methodology. **Mohd Bekri Rahim**: Conceptual validation. **Vivi Efrianova**: Data analysis.

AVAILABILITY OF DATA AND MATERIALS
Data available within the article or its supplementary materials.

DECLARATION OF GENERATIVE AI
During the preparation of this work, the author(s) used ChatGPT to enhance the clarity of the writing. After using ChatGPT, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

ETHIC STATEMENTS
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