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Mobile-Based Sloper Courseware for Pattern Drafting in Malaysian Private Higher Education Institutions

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Abstract

Pattern drafting is one of the fundamental techniques in fashion design, yet many students experience difficulties in learning it. The present study investigated factors that affect the pattern drafting learning among 275 students at five private higher education institutions (IPTS) in Malaysia. Four constructs were explored: Constructive Learning, Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning. Curriculum Development ($\beta = 0.473$, $p < .001$) was the strongest predictor of Constructive Learning. The results are useful for developing a mobile-based sloper courseware for pattern drafting education in the future.

Keywords: mobile learning; sloper courseware; pattern drafting; fashion design education

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1.0 Introduction

Pattern drafting is one of the essential skills in fashion that converts design concepts into patterns to make a garment (Lawton, 2023; Yu, 2021). Understanding body measurements, body proportions, and pattern manipulation is also crucial for creating good-fitting garments and meeting industry standards (Yu, 2021). Therefore, the fashion industry demands fashion graduates with strong pattern drafting skills (Bicho, 2022).

Although pattern drafting is important, it is not easy for students to learn it because some students lack an understanding of the concepts of pattern drafting, or they always use the pattern blocks that have been prepared in advance, or pattern making is separated from garment making, which may affect the competency development of students (Fitria, 2025; Bicho, 2022).

Mobile learning and digital technologies have been increasingly used to facilitate flexible and student-centered learning in higher education. Digital learning resources have previously proven to have positive effects on students' engagement, understanding, and independent learning (Arzeman, 2026). However, there remains a need for a structured mobile learning resource that incorporates the pedagogy of pattern drafting in fashion learning of fashion (Adams & Alexander, 2018). Therefore, there is a need to develop a mobile-based sloper courseware to support pattern drafting learning.

In particular, the study focuses on Constructive Learning, Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning to provide empirical evidence for the future development of sloper courseware based on mobile devices.

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2.0 Literature Review

2.1 Pattern Drafting Education

Pattern drafting is a basic skill in the fashion curriculum that is the basis of building garments, checking the fit and creating fashion products. Pattern drafting allows students to take their design concepts and create well-fitting clothing, while also providing them with the technical expertise needed in the fashion industry (Mohamed et al., 2021; Kuzmichev, 2020). Nevertheless, pattern drafting is one of the most difficult subjects for students in fashion because of the technical, spatial, and application skills needed throughout the learning process.

Previous studies have reported several learning difficulties in pattern drafting education. These are a mismatch between traditional teaching methods and students' preferred learning style, translating two-dimensional (2D) patterns into three-dimensional (3D) garments, and the split of pattern making from garment construction in the curriculum, which can affect student understanding of the overall garment development process (Fitria et al., 2025; Galada & Baytar, 2025; Bicho et al., 2022).

All these issues require more learner-centered and technology-driven teaching methods to enhance student learning and the hands-on skills in pattern drafting, and the results show that the technological innovations are closely aligned with the basics of pattern making (Kumar et al., 2025; Kong, 2025).

2.2 Constructive Learning, Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning

Constructive learning is an important pedagogical approach in fashion education because it allows students to build knowledge through hands-on activities, group work, problem-solving and other learning activities instead of passively receiving knowledge from the teacher. Challenge-based learning, experiential learning, action learning and co-design activities have been shown in previous studies to increase student engagement, creativity and practical skills in the field of fashion education (Ma, 2022; Kim, 2022; Harvey, 2025). These learner-centered methods enable students to learn from theory in a context of authentic context, which is especially suitable for technical matters like pattern drafting.

The effectiveness of constructive learning is closely related to the curriculum design, students' learning preferences, and the application of educational technology. A well-designed curriculum needs to consider the learning preferences of students with mainly visual and kinesthetic learning styles and provide practical, technology-supported learning activities (Qiu et al., 2018; Crutsinger et al., 2005). Recent studies also focus on the positive impacts of digital learning environments, such as CAD, virtual prototyping, AI, and mobile learning, in enhancing students' engagement, flexibility, and hands-on capabilities in fashion education, provided they are integrated appropriately (Lam et al., 2026; Kumar et al., 2025; Sholikhah et al., 2026; Triyanto et al., 2024).

Mobile learning is growing and is seen as more flexible and accessible, offering new possibilities for supporting technical and practice-based learning outside the classroom in higher education. However, existing research has primarily focused on mobile learning in general, with few studies examining specialized learning materials for pattern drafting and basic block pattern development in fashion learning.

2.3 Research Gap

Previous studies have emphasized the need for learning style considerations, curriculum enhancement, learner-centered pedagogies, and technology-enhanced learning in the field of pattern drafting (Bicho et al., 2022; Kumar et al., 2025; Sholikhah et al., 2026). Besides, mobile learning is considered a potential solution in providing flexible and accessible learning in fashion education (Triyanto et al., 2024; Kong, 2025). However, most studies have examined these aspects independently, and efforts have been limited to integrating curriculum development, learning styles and preferences, and technology-enhanced learning into a structured, mobile-based approach for pattern drafting education. Therefore, this study addresses this gap by exploring the association of these factors and empirical evidence for the future development of a mobile-based sloper courseware for fashion education.

3.0 Methodology

3.1 Research Design and Participants

This study used the quantitative phase of a Sequential Explanatory Mixed Methods Design to study the fashion students' problems in pattern drafting instruction in Malaysian private higher education institutions (IPTS). A pilot survey was conducted with a structured questionnaire with 275 participants from five IPTS in Klang Valley namely, UCSI University, Management and Science University (MSU), UNITAR International University, City University and Raffles University. A stratified sampling technique was used to ensure respondents were selected proportionately according to academic level.

3.2 Research Instrument and Statistical Analysis

Quantitative data from the respondents were obtained through the use of a structured questionnaire. It was a four-construct instrument (Constructive Learning, Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning) with a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). Reliability analysis was performed before the statistical analysis, to determine the internal consistency of the questionnaire, using Cronbach's Alpha.

All data collected were entered into IBM SPSS Statistics Version 29 and analyzed. Descriptive statistics were used to analyze respondents' perceptions of pattern drafting teaching, and Pearson correlation was applied to examine how the study variables are related. Later in this study Multiple Linear Regression (MLR) analysis was used to determine the factors affecting the dependent variable of this study which is Constructive Learning.

4.0 Findings

4.1 Demographic Profile

Table 1. Demographic Profile of Respondents (N = 275)

Variable	Category	Frequency (n)	Percentage (%)
Age	18–20 years	64	23.3
	21–25 years	167	60.7
	26–30 years	38	13.8
	31 years and above	6	2.2
Gender	Female	186	67.6
	Male	89	32.4
Education Level	Certificate	32	11.6
	Diploma	184	66.9
	Bachelor's Degree	59	21.5
Current Year of Study	Junior	66	24.0
	Second Year (Sophomore)	141	51.3
	Senior	49	17.8
	Graduate Student	19	6.9

Table 1 shows the demographic information for the present study participants. The survey was carried out with a total of 275 fashion students in five Malaysian private higher institutions (IPTS). The majority of the respondents were between 21 and 25 years (60.7%), 23.3% were between 18 and 20 years, and only 2.2% were 31 years old or older. Female respondents accounted for 67.6%, and males were 32.4%. Most respondents were Diploma students (66.9%), followed by Bachelor's Degree (21.5%,) and Certificate (11.6%) students. For the current year of study, the majority (51.3%) of respondents were in their second year of study, followed by Junior (24.0%), Senior (17.8%), and Graduate students (6.9%). The overall picture shows that respondents were from various academic levels in Malaysian private higher education institutions.

4.2 Reliability Analysis

Construct	Number of Items	Cronbach's Alpha
Constructive Learning	4	0.837
Curriculum Development	3	0.796
Learning Style and Preference	4	0.825
Technology-Enhanced Learning	4	0.808

The reliability analysis of the four research constructs is shown in Table 2. All constructs demonstrated acceptable internal consistency, with Cronbach's Alpha values ranging from 0.796 to 0.837. Constructive Learning recorded the highest reliability (α = 0.837), followed by Learning Style and Preference (α = 0.825), Technology-Enhanced Learning (α = 0.808), and Curriculum Development (α = 0.796). These results indicate that all constructs demonstrated good reliability and were suitable for further statistical analyses.

4.3 Descriptive Analysis

Table 3. Descriptive Statistics of the Research Constructs

Construct	N	Minimum	Maximum	Mean	Standard Deviation
Constructive Learning	275	1.50	5.00	4.006	0.638
Curriculum Development	275	1.33	5.00	4.089	0.633
Learning Style and Preference	275	1.00	5.00	4.135	0.607
Technology-Enhanced Learning	275	1.00	5.00	4.127	0.577

The descriptive statistics of the four constructs of the study are presented in Table 3. Results show that the mean scores of all the constructs were very high (4.006 – 4.135), indicating a high level of agreement among respondents. Learning Style and Preference recorded the highest mean score (M = 4.135, SD = 0.607), followed by Technology-Enhanced Learning (M = 4.127, SD = 0.577), Curriculum Development (M = 4.089, SD = 0.633), and Constructive Learning (M = 4.006, SD = 0.638). In general, the results indicated that respondents had positive attitudes toward the proposed pedagogical approaches such as technology learning, pattern improvement and mobile learning sloper courseware for pattern drafting learning.

4.4 Pearson Correlation

Table 4. Pearson Correlation Analysis of the Research Constructs

Variables	CL	CD	LSP	TEL
Constructive Learning (CL)	1			
Curriculum Development (CD)	0.770**	1		
Learning Style and Preference (LSP)	0.705**	0.705**	1	
Technology-Enhanced Learning (TEL)	0.690**	0.698**	0.731**	1

Note: Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows the Pearson correlation analysis of four research constructs. Results show that all the variables were positively and significantly correlated with each other at the 0.01 level of significance ($p<0.001$). The positive relationships of the students with the four components of the four research constructs were strongest with Curriculum Development ($r = 0.770$, $p < 0.001$), followed by Learning Style and Preference ($r = 0.705$, $p < 0.001$) and Technology-Enhanced Learning ($r = 0.690$, $p < 0.001$). The results showed a positive correlation between improvements in curriculum development, preferred learning approaches, and technology integration to the constructivist learning among fashion students.

4.5 Multiple Linear Regression

Table 5. Multiple Linear Regression Analysis

Predictor	*β*	*t*	*p-value*	*VIF*
Curriculum Development	*0.473*	*8.776*	*<0.001*	*2.317*
Learning Style and Preference	*0.232*	*4.099*	*<0.001*	*2.556*
Technology-Enhanced Learning	*0.190*	*3.395*	*<0.001*	*2.504*

Model Summary

- $R = 0.812$
- $R^2 = 0.660$
- Adjusted $R^2 = 0.656$
- $F = 175.100$
- $p < 0.001$

The results of Multiple Linear Regression (MLR) analysis to determine the influence of Curriculum Development (CD), Learning Style and Preference (LSP) and Technology-Enhanced Learning (TEL) to Constructive Learning (CL) is presented in Table 5. The regression model was statistically significant ($F = 175.100$, $p < 0.001$), and accounted for 66.0% of the variance in Constructive Learning ($R^2 = 0.660$; Adjusted $R^2 = 0.656$). The results of the three predictors showed that Curriculum Development was the strongest predictor for Constructive Learning, followed by Learning Style and Preference, and Technology-Enhanced Learning. Also, the Variance Inflation Factor (VIF) values were between 2.317 and 2.556, suggesting that multicollinearity was not a problem in the regression model.

5.0 Discussion

5.1 Constructive Learning in Pattern Drafting

The results showed respondents' positive perceptions about Constructive Learning in pattern drafting education, which implies that they perceived positive value in having structured learning approaches in learning pattern drafting. This indicates students' willingness to participate in learning environments that involve active learning, real-world applications and technology-driven instruction. Constructive learning also offers students the opportunity to learn and build technical competency in pattern drafting, as the process involves the application of theory with hands-on work. These results are in line with those of Yu (2021), who emphasized that systematic training and practice are needed to develop technical accuracy in mastering pattern drafting. Likewise, Lawton (2023) highlighted the importance of teaching pattern drafting through an active learning approach in order to build up practical skills as students' progress. Additionally, Bicho et al. (2022) emphasized the importance of providing students with more opportunities for comprehensive understanding of the concept of pattern making in conventional teaching methods. Thus, the respondents expressed positive attitudes towards the Constructive Learning model, which gives empirical evidence of the use of innovative pedagogical models in pattern drafting education, especially in the form of structured mobile learning resources like the proposed sloper courseware.

5.2 Relationships Among Constructive Learning, Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning

The findings revealed significant positive relationships between the variables of pattern drafting learning, Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning, which means the variables of the three constructs are complementary to each other in the process of supporting pattern drafting learning. In particular, the relationships between Constructive Learning and Curriculum Development imply that design of the curriculum is crucial in creating meaningful learning experiences and developing technical competencies. Mohamed et al. (2021) highlighted the importance of curriculum design aligned with industry learning needs and expectations to improve competency development. Similarly, Jotsov et al. (2023) reported that suitable teaching methods and digital learning materials should be utilized to enhance students' engagement and achievement in the effective implementation of the curriculum. In addition, significant relationships among Learning Style and Preference and Technology-Enhanced Learning suggest the students are receptive to learning styles that cater to various learning preferences and incorporate educational technologies. The findings are consistent with Arzeman et al. (2026) which found that technology-supported learning environment increases student engagement and offers flexible learning opportunities for skills development. In summary, the results indicated that the curriculum design, learner characteristics, and technology integration were complementary elements for improving pattern drafting education and they could not be separated.

5.3 Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning as Predictors of Constructive Learning

The Multiple Linear Regression analysis showed that all three factors were significant predictors of Constructive Learning ($p < .001$), with Curriculum Development ($\beta = 0.473$) being the strongest predictor. The result indicates that curriculum improvement is an important factor in enhancing students' constructive learning experiences during pattern drafting. A well-structured curriculum offers opportunities for students to learn technical knowledge in a systematic way, and facilitates the incorporation of suitable teaching methods and learning materials. This is in line with Lawton (2023), who stated that curriculum design needed to be built to allow for learning to be developed step by step using structured learning approaches. Likewise, Adams and Alexander (2018) emphasized the need to incorporate technology into the curriculum and not use technology as a standalone teaching method. The importance of Learning Style and Preference and Technology-Enhanced Learning also suggests the use of teaching methods that allow for students' learning styles and preferences and the use of digital technologies in the learning of pattern drafting. Thus, the results of this study support the development of the sloper courseware for fashion students in the Malaysian private higher education institutions (IPTS) for fashion pattern drafting in the following aspects: curriculum enhancement, learner-centred pedagogy, and technology supported learning.

6.0 Conclusion & Recommendations

This study examined the factors affecting Constructive Learning in pattern drafting education among fashion students in Malaysian private higher education institutions (IPTS). The results showed that Curriculum Development, Learning Style and Preference, and Technology-Enhanced Learning had a significant effect on Constructive Learning, of which Curriculum Development had the highest significant effect. The results show that curriculum enhancement, pedagogical approaches centered on learners and educational technologies should be used in combination to enhance the pattern drafting education. Based on the above, the following research is conducted to provide empirical evidence for creating a structured pedagogical intervention: sloper courseware for mobile devices. In the future, the courseware framework development and validation should be continued to be developed so that the developed courseware can be evaluated by its usability and education effectiveness in supporting the learning of pattern drafting in the higher education institutions.

Acknowledgement

Paper Contribution to Related Field of Study

This study contributes to the field of fashion design education by providing empirical evidence on the factors influencing pattern drafting learning among the students in the Malaysian private higher education institution (IPTS). The results also provide a basis to develop a pattern drafting mobile-based sloper courseware as an innovative teaching resource for pattern drafting education.

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