

Need Analysis of The Smart Pattern Application Elements as an Innovative Teaching Aid for Evening Gown Pattern-Making for Home Economics Students

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ABSTRACT - This study aims to analyse the elements of the Smart Pattern Application as an innovative teaching aid to facilitate evening gown pattern-making among Home Economics students at Universiti Pendidikan Sultan Idris (UPSI). Evening gown pattern-making is a complex technical skill that requires visual understanding, measurement accuracy, and step-by-step practice to ensure that students are able to produce accurate and well-structured garment patterns. However, conventional teaching methods and limited instructional time constrain students' mastery of this skill, particularly in understanding the systematic process involved in evening gown pattern-making. These limitations create challenges for both lecturers and students in achieving effective teaching and learning outcomes in the Women's Garment Making Course. Therefore, there is a need for a more effective and technology-based teaching aid that can support the learning process and enhance students' understanding. The Design and Development Research (DDR) approach was implemented throughout the study. The needs analysis phase involved two experienced lecturers who teach the Women's Garment Making Course at UPSI. This phase employed interview methods to identify challenges encountered in teaching and learning, determine the content requirements, and explore the necessary functions needed in the development of the digital application. The findings indicate that there is a need for a learning platform that integrates visual and interactive elements while also supporting self-directed learning. Such a platform is important in helping students understand the process of making evening gown patterns systematically and more effectively. The Smart Pattern Application will be developed by integrating elements such as step-by-step pattern-making guidance, visual pattern illustrations, systematic measurement calculations, interactive notes, and support for self-directed learning. The development of this application is expected to support technology-based pedagogy, enhance students' understanding of evening gown pattern-making, and serve as a relevant digital teaching aid in delivering the Women's Garment Making Course at UPSI.

INTRODUCTION

The transformation of higher education in Malaysia emphasizes the integration of digital technology in line with the demands of the Industrial Revolution 4.0 and 21st Century Learning, particularly in empowering self-directed, interactive, and student-centered learning. In the context of vocational education such as Women's Garment Making courses, the use of digital teaching aids based on multimedia and interactive applications is seen to have the potential to enhance understanding of complex skills through visual elements, step-by-step processes, and opportunities for self-paced revision (Adeyele, 2024). However, the use of digital applications in teaching and learning remains limited, creating a gap between the need for educational digitalization and actual classroom practices.

On the Advanced Women's Garment Making course at UPSI, students were found facing difficulties in mastering evening gown pattern-making due to a lack of basic understanding, limited time for practical training, and the absence of interactive and visual teaching aids. A needs analysis conducted through lecturer interviews and student surveys revealed a clear need for the development of a digital application that provides visual guidance, systematic steps, and support for self-directed learning. Therefore, this study focuses on the first objective, which is to identify the required elements in the development of the Smart Pattern Application through the needs analysis phase, serving as the foundation for developing an effective digital teaching aid. This study is beneficial to students, lecturers, and institutions in supporting the teaching and learning of garment making.

LITERATURE REVIEW

2.1 21st Century Learning

21st Century Learning (PAK-21) shifts the focus from lecturer-centered teaching to student-centered learning, emphasizing skills such as communication, collaboration, and digital literacy (Ministry of Higher Education Malaysia, 2022). In the context of higher education and TVET, the integration of digital technology has become a key element in supporting active and self-directed learning (Abdul Razak, Noordin & Abdul Khanan, 2022). The use of multimedia platforms and digital Teaching Aids (ABM) helps to clarify complex content through simulation and visualization, which is particularly beneficial in skills-based courses (Zainuddin et al., 2023).

2.2 Technology-Based Learning

In the field of TVET, interactive learning based on digital technology has proven effective in mastering practical skills through flexible and repetitive learning (Chen et al., 2021). This approach reduces dependence on face-to-face demonstrations and allows students to understand procedural steps more clearly at their own pace (Mohamed Razali, Ramlan & Saidin, 2022). However, the effectiveness of this approach largely depends on the systematic design of learning materials to ensure that students do not experience cognitive overload or confusion during the learning process.

2.3 Pattern-Making Applications

In the specific context of garment pattern-making, technologies such as Computer-Aided Design (CAD) and software like CLO3D have improved accuracy and efficiency through three-dimensional visualization. These innovations enable automatic measurement adjustments and reduce human error compared to manual methods (Abdul Razak et al., 2022). Although professional software such as Gerber AccuMark already exists, its use requires advanced technical skills, highlighting the need for more user-friendly applications suitable for students.

2.4 Android-Based Applications

To bridge this gap, the development of interactive Android-based applications is considered highly relevant and practical (Alosman & Ismail, 2022). These applications integrate multimedia elements such as graphics and animations to help students understand the technical process of pattern-making, particularly for complex garments such as evening gowns (Hidayah & Kusumastuti, 2025). Overall, the

integration of accessible digital technology ensures that the learning process becomes more visual, systematic, and effective in meeting the demands of modern education.

METHODOLOGY

3.1 Design and Development Research

This study adopts the Design and Development Research (DDR) approach proposed by Richey and Klein (2007) to develop a learning product in public higher education institutions (IPTA). The DDR model is selected because it encompasses a systematic process. This methodology ensures that the developed application aligns with instructional objectives and meets established academic standards.

The Needs Analysis Phase is a critical initial step to identify the essential elements required for the development of the Smart Pattern application. This process involves data collection through interviews with expert lecturers who have more than 10 years of experience in teaching fashion design. The main purpose is to ensure that the content, learning elements, and application features developed are truly relevant to students' needs and aligned with the existing curriculum.

The content of this application focuses on the topic of Advanced Women's Garment Making, particularly on the complex process of evening gown pattern-making. Based on the information obtained from experts, the researcher is able to determine the visual and procedural elements that need to be incorporated to help students understand each step systematically. This indirectly reduces students' dependence on face-to-face demonstrations and supports more efficient self-directed learning.

3.2 Samples of Research

For the needs analysis phase, the research sample consists of two lecturers from the Fashion Design field at Universiti Pendidikan Sultan Idris (UPSI), each with more than 10 years of teaching experience. Their selection is based on their extensive expertise in teaching Pattern and Garment Making Courses. In addition, this study also involves one sixth-semester student from the Home Economics (ERT) program at UPSI who is currently enrolled in the Advanced Women's Garment Making Course, in order to obtain the student's perspective.

Table 3.1. Sample Information

Research Participant	Teaching Experience	Expertise
Lecturer 1	25 years	Technical and Vocational Education (Fashion)
Lecturer 2	20 years	Technical and Vocational Education

3.3 Research Instrument

This phase employs interviews as the primary instrument to obtain detailed feedback on the requirements for developing the interactive application. Semi-structured interview questions were designed to gather accurate information regarding the elements needed in the application development process.

3.4 Data Analysis Method

The data obtained from the interview sessions were analyzed descriptively. The analysis process was carried out systematically, beginning with audio recordings, followed by the preparation of comprehensive transcripts. Subsequently, the researcher identified and listed key elements from the transcripts to serve as a guide in determining the components for application development. These include aspects such as content, module organization, visual elements, and support for self-directed learning. The findings from this needs analysis phase were then used as the main reference to initiate the design and development phase of the Smart Pattern application.

3.5 Research Findings

3.5.1 Elements Required for the Development of the Smart Pattern Application

The findings indicate that interactive applications, particularly for evening gown pattern making, are not yet available at UPSI as a Teaching Aid. This was acknowledged by both Lecturer 1 and Lecturer 2, who stated:

“...as I mentioned earlier, students still draft patterns manually, so a pattern note application has never been used in teaching and learning sessions...”

“...so far, pattern notes are provided by instructors in hardcopy form. An application like this has never existed as a reference for students, especially one that explains each step and every line...”

3.5.2 Content and Design Elements Required in the Smart Pattern Application

The analysis of the interviews shows that the development of the Smart Pattern application should emphasize self-directed learning through clear step-by-step delivery. In addition, Lecturer 2 stressed that the use of visuals such as images is very important in helping students' understanding, along with concise notes that are not too lengthy. Furthermore, Lecturer 1 suggested that multimedia elements such as demonstration videos should also be included to support the learning of practical skills. The module content should be organized progressively, starting from basic patterns to pattern manipulation.

“...so for your application, the advantage is that you include every process and explain how to do each step. So students can learn independently. That's the concept of your app, right? That's sufficient. The notes don't have to be too long. As long as you include images and explanations, that's already good. If there's time, you can add short demo videos...”

“...the important thing is that you must include images. Starting from the basic pattern, then only move on to pattern manipulation...”

The analysis of the interview findings also shows that lecturers agreed that assessment and evaluation do not need to be included in the Smart Pattern application. This is because the production of the evening gown pattern itself can serve as an assessment for both the student and the lecturer. Lecturer 2 also emphasized that the application should focus clearly and precisely on a specific purpose.

“...for assessment, I think it is not necessary because we will evaluate the final outcome of the student's evening gown pattern...”

DISCUSSION AND CONCLUSION

This study focuses on achieving the first objective, which is to identify the required elements in the development of the Smart Pattern application. The findings from the analysis reveal that the key elements needed include step-by-step content delivery, the use of visuals such as images, and multimedia support such as videos to help students understand the process of pattern-making more clearly and systematically. These findings are consistent with previous studies that highlight the importance of visual and interactive multimedia elements in enhancing students' understanding of complex and technical content (Sun et al., 2022). Furthermore, the emphasis on self-directed learning through digital materials aligns with the principles of 21st Century Learning, which promotes student-centered and flexible learning environments (Ministry of Education Malaysia, 2019). Therefore, the findings confirm that the development of the Smart Pattern application should prioritize structured, visual, and interactive content to ensure its effectiveness as a digital teaching aid.

Overall, this study successfully developed the Smart Pattern Application as a digital teaching aid that supports the learning of evening gown pattern-making in a more systematic, visual, and interactive manner. The main strength of this application lies in the elements identified during Phase One, which effectively meet the learning needs by helping students understand each step of pattern-making more clearly, supporting self-directed learning, and improving efficiency in acquiring technical skills. In

addition, the application assists lecturers in delivering content in a more organized and consistent manner.

However, several limitations were identified, including the scope of the study being limited to evening gown pattern-making and the application's dependency on Android devices. The application's features can also be further enhanced by incorporating more advanced functions and supporting a wider range of garment designs.

In terms of practical application, the Smart Pattern Application has strong potential to be widely implemented in garment-making courses at higher education institutions, particularly in the TVET field, as a tool to support technology-based teaching. Future research can expand this study by enhancing application features such as integrating automatic pattern calculations, incorporating 3D simulation elements, and extending its use to various types of garments to improve its usability and overall impact in education.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

AUTHORS CONTRIBUTION

Nursyaqira Zainulmujahidin: Writing original draft preparation. **Mohd Nazri Abdul Raji:** Methodology and supervision. **Rina Rachmawati:** Conceptualization. **Farah Najwa Ahmad Puad:** Review and editing. **Shofiyah:** Validation. **Syarifah Salma Syed Mohammad Sobri:** Data collection.

AVAILABILITY OF DATA AND MATERIALS

Data available on request from the authors.

DECLARATION OF GENERATIVE AI

The authors declare that generative AI or AI-assisted technologies were used solely to improve the language and readability of this manuscript. All such use has been appropriately disclosed and the authors take full responsibility for the content of the work.

ETHIC STATEMENTS

Not applicable.

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