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Interactive Learning Media for Fashion Design Competencies in Training Institutions

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A B S T R A C T

Vocational fashion training requires effective instructional media to support procedural learning, particularly in pattern-making competencies that involve sequential measurement and construction processes. However, many training institutions still rely on conventional media that provide limited visual guidance and hinder learners' understanding. This study aims to identify instructional challenges and analyze the needs for interactive learning media in women's basic pattern-making competencies. A qualitative descriptive approach was employed using a needs analysis design adapted from the preliminary stage of the Borg and Gall development model. Data were collected through structured interviews with five fashion instructors at Pusat Pelatihan Kerja Daerah (PPKD) in Jakarta and analyzed using thematic analysis supported by descriptive statistics. The findings indicate that existing media such as PowerPoint presentations, printed modules, and general online videos are insufficient to support procedural understanding and independent learning. Trainees frequently experience errors in body measurement, pattern proportion, and line construction due to limited visual explanations and time constraints. The study concludes that the development of interactive learning media incorporating step-by-step visualization, simulation features, and immediate feedback is essential to enhance learning effectiveness in vocational fashion training.

1. Introduction

Interactive learning media have become an increasingly important component in vocational education due to their potential to enhance learning effectiveness in skill-based training environments. Interactive media integrate multiple forms of information such as text, images, audio, animation, and user interaction into a single learning system that supports active cognitive engagement. According to multimedia learning theory, learners are more likely to understand complex

concepts when instructional materials present information through both visual and verbal channels in an integrated manner (Mayer, 2014). In practice oriented learning environments, such as vocational education, interactive media are particularly valuable because they allow learners to observe procedures, manipulate learning elements, and receive immediate feedback during the learning process. These features enable learners to construct knowledge actively while developing practical competencies required in professional settings and also to improve the learning outcomes (Kusmayadi et al., 2026).

Within fashion vocational education, pattern-making represents one of the most fundamental and technically demanding competencies. Pattern-making involves transforming body measurements into two dimensional pattern structures that later form the basis of garment construction. This process requires learners to master several interconnected skills, including accurate body measurement, proportional calculation, spatial visualization, and sequential technical procedures. For beginners, these tasks often present significant cognitive challenges because they require both conceptual understanding and procedural accuracy. The complexity of pattern-making becomes even more pronounced in vocational training institutions that serve adult learners from diverse educational backgrounds. Many participants in non-formal fashion training programs are individuals seeking employment opportunities or skill development rather than formal academic qualifications. Consequently, learners may have limited prior knowledge of fashion design principles, measurement systems, or technical terminology. Under such circumstances, instructional strategies that rely primarily on textual explanations or static visual materials may not sufficiently support the development of procedural understanding (Rahman, et al., 2022; Sari & Fitriani, 2021).

Previous studies have demonstrated that interactive learning media can significantly enhance procedural learning in vocational education. Multimedia-based instruction, simulation-based learning environments, and interactive e-modules have been reported to improve learners' comprehension, engagement, and skill performance. Research indicates that interactive interactive learning media can increase learning efficiency by enabling learners to visualize step-by-step procedures, practice tasks independently, and receive feedback that helps them correct errors during the learning process (Ningsih, et al., 2023; Putri & Rachmawati, 2024). In the context of fashion education, these features are particularly relevant because pattern-making requires repeated practice and precise execution of sequential steps. Interactive media can therefore facilitate independent practice while reducing learners' dependence on continuous instructor demonstrations.

Recent developments in digital learning technologies have further expanded the possibilities for instructional innovation in fashion education. Various forms of digital learning media have been introduced, including interactive e-learning modules, mobile-based learning applications, and video-based tutorials designed to support practical skill development (Iwan, et al., 2026). These technologies provide learners with flexible access to instructional materials and enable self-paced learning experiences. In addition, the integration of Computer Aided Design (CAD) software and three dimensional garment simulation technologies has shown

promising results in improving learners' understanding of pattern transformation and garment structure (Ningsih, et al., 2023). Through virtual prototyping and digital visualization tools, learners can observe how two dimensional patterns translate into three-dimensional garments, which helps them develop spatial awareness and technical accuracy. Such technological advancements reflect the growing role of digital learning environments in supporting vocational education and industry-oriented training.

Despite these developments, the implementation of interactive learning media in vocational pattern-making instruction remains relatively limited. Many vocational training institutions continue to rely on conventional instructional tools such as printed modules, PowerPoint presentations, and generic online videos. Although these materials provide basic conceptual explanations, they often lack the capacity to illustrate the dynamic and sequential processes involved in pattern construction. As a result, learners may encounter difficulties when attempting to translate theoretical instructions into practical pattern-making tasks. These difficulties commonly include challenges in interpreting body measurements, determining pattern points, calculating proportional adjustments, and visualizing the relationship between pattern components. Such issues suggest that existing interactive learning media may not adequately address the cognitive demands of pattern-making instruction.

In addition to technological limitations, previous research has also highlighted pedagogical challenges in the design of digital learning media for vocational education. Many digital instructional tools focus primarily on content delivery without sufficiently considering the cognitive characteristics of learners or the instructional design principles necessary for effective skill development. For example, some learning media present large amounts of information simultaneously without providing guided segmentation or interactive feedback mechanisms (Ifrianingsih, et al., 2025). As a result, learners may experience cognitive overload when processing complex procedural information. Furthermore, several studies have noted that interactive learning media in vocational training contexts often remain instructor centered, limiting opportunities for learners to engage in self directed learning or reflective practice (Dewi & Hartono, 2022; Wulandari, et al., 2023). These limitations indicate that technological innovation alone is insufficient without careful integration of pedagogical principles that support meaningful learning.

From a theoretical standpoint, several educational frameworks provide guidance for the effective design of interactive learning media in vocational training. Cognitive load theory suggests that instructional materials should be structured in ways that minimize unnecessary cognitive burden while facilitating schema construction during learning (Sweller, 2019). For complex procedural tasks such as pattern-making, information should be presented gradually through segmented explanations, guided demonstrations, and visual representations that help learners build mental models of the task sequence. Similarly, the cognitive theory of multimedia learning emphasizes the importance of integrating visual and verbal information in ways that promote coherent cognitive processing (Mayer, 2014).

Interactive learning media that combine visual demonstrations with concise explanations can therefore improve learners' ability to understand complex procedures.

In addition to cognitive learning theories, andragogical principles also play a significant role in vocational education settings that involve adult learners (Fadlulullah, et al., 2026). Andragogy emphasizes that adult learners tend to be self directed, goal oriented, and motivated by practical relevance in learning activities. Consequently, instructional environments should provide opportunities for learners to explore, practice, and evaluate their learning progress independently. Interactive learning media that include simulation features, practice exercises, and immediate feedback mechanisms can support these characteristics by enabling learners to engage actively with learning tasks and monitor their own progress (Yunita, et al., 2025).

Although these theoretical perspectives provide valuable guidance for instructional design, limited research has systematically examined how they can be integrated into the development of interactive learning media specifically for pattern-making training in vocational institutions. Existing studies have often focused on technological innovation or skill performance outcomes without thoroughly exploring the instructional challenges experienced by instructors and learners during the training process. Understanding these challenges is essential for designing learning media that are both pedagogically effective and contextually appropriate for vocational training environments.

Therefore, this study aims to conduct a needs analysis to identify the instructional challenges and learning requirements associated with pattern-making competencies in vocational training institutions. By examining instructors' perceptions of trainees' learning difficulties and the limitations of current interactive learning media, this research seeks to provide an empirical foundation for the development of interactive learning media that integrate procedural visualization, simulation features, and formative feedback mechanisms. The findings of this study are expected to contribute to the advancement of instructional design in fashion vocational education by proposing a theoretically grounded and contextually relevant framework for developing interactive learning media that support effective procedural learning.

2. Methodology

This study employed a qualitative descriptive design using a needs assessment approach, adapted from the preliminary research stage of the Borg & Gall (2003) development model and the front end analysis framework proposed by Richey & Klein (2014). This design was selected to address theoretical, methodological, and practical gaps in the development of interactive learning media for fashion vocational training, particularly in women's basic pattern-making competencies. The approach enables an in depth exploration of current instructional conditions, learner characteristics, and media requirements as a conceptual foundation for

developing contextually relevant and pedagogically grounded interactive learning media.

Research Location and Subjects

The study was conducted over a two month period, from October to November 2025, at Pusat Pelatihan Kerja Daerah (PPKD) South Jakarta and Central Jakarta, Indonesia. These institutions were selected because they represent public vocational training centers that provide fashion design and pattern-making programs for adult learners. The primary objective of this study was to identify instructional needs, learning constraints, and media requirements related to the teaching of women's basic pattern-making in vocational training contexts. The findings were intended to serve as a conceptual basis for the development of interactive, web-based learning media aligned with adult learning characteristics and industry demands.

The research subjects consisted of five fashion instructors selected through purposive sampling based on their direct involvement and expertise in teaching pattern-making competencies. Three instructors held bachelor's degrees in Fashion Design from Universitas Negeri Jakarta (UNJ), while two instructors came from non-fashion academic backgrounds but had more than ten years of professional experience in the fashion field and were graduates of PPKD. The instructors were aged between 40 and 60 years and had extensive experience in both vocational training and the fashion industry. Their professional backgrounds ensured the credibility and relevance of the data obtained.

Data Collection Techniques

The research procedures began with a literature review focusing on interactive learning media, multimedia learning theory, cognitive load theory, and andragogy (Mayer, 2014; Sweller, 2019). This stage was followed by the formulation of media needs indicators. Subsequently, field data collection was conducted through structured interviews to explore instructional practices, learning challenges, and expectations regarding interactive learning media. All procedures were carried out ethically, with informed consent obtained from each participant. Data were collected through structured interviews, supported by documentation and observational notes. Interview data constituted the primary source of information, while documentation and observations were used to strengthen data triangulation and contextual understanding.

Research Instruments

The main research instrument was a structured interview guide consisting of nine open ended questions designed to capture instructors' experiences and perceptions related to learning media use, instructional challenges, recurring learner errors, required competencies, and desired interactive features. Interviews were conducted face to face, audio-recorded with permission, and transcribed verbatim. To maintain confidentiality, participants were identified using codes (R1–R5) in accordance with research ethics guidelines (American Psychological Association, 2017). The

interview guide, which was designed to explore five fashion instructors' needs and opinions in more detail, is presented in Table 1.

Table 1. Fashion Instructors Interview Guide

Aspects	Open-ended Questions	Theoretical Sources
Current Learning Conditions	1. What learning media are most used in your training institute?	Theory of Media Utilization in Learning: underlining the principles of the use of interactive media for vocational learning (Source: Sadiman, et al. (2018). Educational Media: Definition, Development, and Utilization. Rajawali Press.)
The Need for Interactive Learning Media	2. What form of interactive learning media do you envision most effective for pattern-making learning? 3. In your opinion, what obstacles may arise in the application of interactive learning media in training institutions?	Learning design model theory: emphasizing needs analysis as the basis for the development of contextual media. (Source: Branch, R. M., & Kopcha, T. J. (2014). Instructional Design Models. In Handbook of Research on Educational Communications and Technology. Springer.)
Learning Media Design and Technology	4. What do you think an attractive, easy-to-use media look like? 5. Which platform do you think would work best (e.g. Android apps, interactive websites, or offline multimedia)?	Multimedia Learning Theory: explaining the importance of visual integration and verbal to improve conceptual understanding. (Source: Mayer, R. E. (2014). The Cambridge Handbook of Multimedia Learning (2nd ed.). Cambridge University Press.)
Competencies that must be included in the media	6. What competencies do you think should be present in the interactive learning media of fashion (e.g.: body measurements, pattern construction, design modification)? 7. What is the most effective form of evaluation or exercise to measure participants' competency after using interactive media?	Cognitive load theory: the media should minimize cognitive load with a simple and targeted interactive design. (Source: Sweller, J. (2011). Cognitive Load Theory. Psychology of Learning and Motivation, 55, 37–76.)
Readiness and Support in Implementation	8. What are your expectations for the results of the development of interactive learning media in the field of fashion? 9. How ready is your training institution to adopt digital learning media?	Andragogy theory: adults learn more effectively when the material is relevant to their actual experiences and needs.

Aspects	Open-ended Questions	Theoretical Sources
		(Source: Knowles, M. S. (1980). The Modern Practice of Adult Education: From Pedagogy to Andragogy. Cambridge Books.)

Data Analysis Techniques

Data analysis employed qualitative thematic analysis supported by descriptive statistics (Creswell & Creswell, 2022). Interview data were analyzed through the stages of data condensation, data display, and conclusion drawing, following the framework of Miles, et al. (2020), to identify key themes related to learning challenges, adult learner characteristics, and media needs. The integration of these techniques enhanced data triangulation and validity (Fetters, et al., 2019). The final output was a media needs map encompassing content, procedural visualization, and interactivity aspects as the basis for interactive learning media development. To ensure trustworthiness, the study applied method and source triangulation, member checking, and transparent documentation of analytical procedures. Ethical considerations included informed consent, anonymity, and confidentiality of participants throughout the research process. The results of interview data coding are summarized in Table 2.

Table 2. Thematic Coding of Interview Findings

Thematic Number	Theme	Sub-theme	Theme Building Code
1	Existing Learning Media Conditions	Use of static learning media	• Learning relies on PowerPoint, printed modules, and whiteboards • Media does not show step-by-step construction processes • Static images cannot represent line changes and pattern dynamics
		Limited relevance of online videos	• YouTube videos often use different construction methods • Videos cause confusion rather than clarification • Instructors must re-explain procedures directly
2	Effectiveness of Current Media	Media does not support procedural understanding	• Learners need to see movement, not only explanations • PPT is insufficient for explaining pattern construction • Demonstrations must be repeated frequently

Thematic Number	Theme	Sub-theme	Theme Building Code
		Dependence on instructor demonstration	• Learners rely heavily on instructors • Independent learning is difficult • Media fails to guide learners autonomously
3	Technical Learning Difficulties	Errors in measurement and proportion	• Learners misread body measurements • Difficulty adjusting personal body sizes • Patterns become disproportionate
		Errors in line construction	• Incorrect drawing of body lines • Mistakes in determining key pattern points • Errors occur repeatedly due to lack of visual examples
4	Time Constraints in Training	Short duration of training	• Pattern-making is taught within one week • Limited time for repetition and correction • Learners struggle when transitioning to personal sizes
		Difficulty adapting to body variations	• Standard sizes differ from actual body shapes • Learners cannot visualize size adjustments • Instructors must provide intensive guidance
5	Need for Interactive Learning Features	Step-by-step procedural visualization	• Learners need visual guidance for each step • Dynamic visuals reduce confusion • Visual sequencing supports understanding
		Simulation and feedback features	• Measurement simulations are required • Immediate feedback helps reduce errors • Evaluation features support independent learning
6	Priority Competencies in Media Content	Body measurement as foundational skill	• Incorrect measurement leads to overall pattern errors • Measurement accuracy determines pattern quality
		Critical pattern components	• Armhole and hip lines are frequent error points

Thematic Number	Theme	Sub-theme	Theme Building Code
			• Proportions must be visualized gradually • Pattern alteration is essential for body diversity
7	Learning Barriers	Low visual literacy and numeracy	• Learners struggle with technical terminology • Limited calculation skills affect pattern accuracy
		Lack of dynamic learning media	• Static media cannot show progressive changes • Learners wait for demonstrations • Media does not support self-paced learning
8	Expectations for Interactive Media	Accessibility and usability	• Media should be accessible via smartphones • Simple navigation is required • Short videos and clear visuals are preferred
		Industry-oriented learning support	• Media should reflect industry standards • Learners need to understand real production quality
9	Readiness for Digital Media Adoption	Instructor openness to innovation	• Instructors are willing to use digital media • Digital tools improve teaching efficiency • Interactive media reduce repetitive explanations

3. Results and Discussion

This section presents the findings based on themes generated through thematic analysis of structured interviews with five fashion instructors. The themes reflect instructors' perceptions of the learning difficulties experienced by trainees and the limitations of existing interactive learning media used in the training program. Each theme begins with a summary of thematic interpretation followed by selected quotations as supporting evidence.

Theme 1: Existing Learning Media Conditions

The thematic analysis indicates that instructors perceive the learning media currently used in the training institution as largely static and insufficient for supporting procedural learning in pattern-making instruction. Four instructors

reported that instructional activities still rely primarily on PowerPoint presentations, printed modules, and whiteboards. According to the instructors, these media provide limited support for demonstrating the sequential and dynamic processes required in pattern construction. From the instructors' perspective, the lack of step by step visualization often leads to confusion among trainees during practical activities.

One instructor explained:

> "Online videos often use different methods, so the instructor has to explain the material again." (R1)

Another instructor added:

> "The videos do not follow the institution's standards, so direct explanation from the instructor is still needed." (R5)

These findings indicate that instructors perceive the current learning media as insufficient to support trainees' procedural understanding in pattern-making training.

From a theoretical perspective, this condition can be explained through the Cognitive Theory of Multimedia Learning, which states that effective learning occurs when verbal and visual information are integrated in a coordinated manner (Mayer, 2009). When instructional materials rely primarily on static visuals or text, learners must mentally reconstruct the procedural steps themselves, which may reduce comprehension. Studies on multimedia-based vocational learning show that dynamic visual representation improves procedural understanding and skill acquisition because learners can observe sequential processes more clearly (Siregar et al., 2024). Thus, the instructors' perceptions in this study reinforce previous findings that multimedia-supported instruction is more suitable for skill-based training environments.

Theme 2: Effectiveness of Current Media

The second theme reflects instructors' perceptions regarding the limited effectiveness of current interactive learning media in facilitating procedural understanding. According to the instructors, static materials are unable to demonstrate movements and transformations involved in pattern construction, which are essential in practice-based learning. Four instructors explained that explanations using PowerPoint slides and printed materials are often insufficient to help trainees understand procedural steps.

One instructor stated:

> "We need to see the movement directly, not just explanations on slides. PowerPoint cannot clearly show how the pattern is constructed." (R2)

Another instructor explained that the lack of clear visualization requires instructors to repeat demonstrations multiple times.

> "Because the media does not show the process clearly, the instructor has to demonstrate the steps repeatedly." (R3)

Instructors also observed that trainees tend to rely heavily on instructor demonstrations due to the limitations of the existing media.

> "Trainees often report that they cannot practice independently because the media does not guide the steps clearly. I always wait for the instructor's demonstration." (R1)

Another instructor expressed a similar concern:

> "Without the instructor explaining directly, it is difficult to understand the procedure using the current media." (R5)

These findings indicate that instructors perceive the current interactive learning media as insufficient for supporting independent learning and procedural comprehension.

This finding can be interpreted using Cognitive Load Theory, which explains that instructional design should minimize unnecessary cognitive load to enable effective information processing (Sweller, 2019). Static interactive learning media may increase extraneous cognitive load because learners must mentally infer movement and transformation processes that are not visually presented. Interactive multimedia can reduce this cognitive burden by providing segmented instructions and visual demonstrations that align with learners' cognitive processing capacities (Paas, et al., 2021). Therefore, the instructors' observations highlight the need for media that visually demonstrates procedural steps to support learners' cognitive processing during skill acquisition.

Theme 3: Technical Learning Difficulties

The thematic analysis also revealed instructors' perceptions of recurring technical difficulties experienced by trainees during pattern-making instruction. These difficulties mainly involve errors in body measurement interpretation, pattern proportion adjustment, and line construction. According to the instructors, trainees frequently misinterpret measurement data when translating body measurements into pattern structures.

One instructor explained:

> "I often misread body measurements, and as a result, the pattern becomes disproportionate." (R2)

Another instructor highlighted the difficulty trainees face in adjusting patterns to individual body sizes:

> "Everyone has different body measurements, and it is still difficult to adjust them accurately in the pattern." (R4)

Instructors also reported recurring errors in drawing pattern lines due to insufficient visual guidance.

> "I often draw the body lines incorrectly because I cannot clearly visualize the final shape." (R1)

Another instructor added:

> "Mistakes in determining pattern points happen repeatedly because the explanation is mostly verbal without sufficient visual examples." (R5)

These findings suggest that instructors perceive limited visual support in interactive learning media as a major factor contributing to technical errors in pattern-making practice. Previous studies on vocational skill training emphasize that visual

demonstration plays a critical role in procedural learning because it helps learners build mental models of the task sequence (Clark & Mayer, 2023). When learners lack visual references, they rely heavily on verbal explanations, which may lead to misinterpretation and repeated errors. Thus, the instructors' observations align with research indicating that visual scaffolding and interactive simulations can significantly improve learners' accuracy in technical skill training (Aryani & Lestari, 2024).

Theme 4: Time Constraints in Training

Instructors also emphasized that limited training duration creates challenges for trainees in mastering pattern-making competencies. All instructors reported that pattern-making is typically taught within a relatively short training period, leaving limited opportunities for practice and error correction.

One instructor stated:

> "The training duration is very short, so before fully understanding one step, we have to move on to the next." (R3)

Instructors also observed that trainees experience difficulty adapting standard patterns to diverse body sizes due to time limitations.

> "Standard sizes are different from real body shapes, and it is difficult to visualize how to adjust them." (R1)

Another instructor explained:

> "Because the time is limited and body sizes vary, the instructor has to provide intensive guidance for each participant." (R2)

These findings indicate that time constraints combined with procedural complexity create significant learning challenges in pattern-making training.

In the context of adult vocational training, such challenges can be interpreted using the principles of andragogy, which emphasize the importance of self-directed learning and practical problem-solving (Knowles, et al., 2015). Interactive learning media can support these principles by enabling trainees to review procedural steps independently and repeatedly outside classroom hours. Research on digital vocational training also indicates that technology-supported learning environments allow learners to revisit instructional materials, which improves skill retention despite limited training time (Díaz-Redondo, et al., 2021).

Theme 5: Need for Interactive Learning Features

Instructors consistently emphasized the need for interactive learning features to support trainees' procedural understanding and reduce repeated instructional explanations. According to the instructors, step-by-step procedural visualization is essential for helping trainees understand pattern construction processes.

> "If each step is shown visually one by one, it will be much easier to follow and understand the process." (R3)

Another instructor highlighted the importance of dynamic visualization:

> "Moving visuals make the steps clearer and reduce confusion compared to static images." (R1)

Instructors also emphasized the importance of simulation and feedback features.

> "A measurement simulation would help me understand how size changes affect the pattern." (R2)
>
> "If there is direct feedback when a mistake is made, it will help reduce errors." (R5)

These findings suggest that instructors no longer rely solely on static learning media, but increasingly expect interactive media that can support deeper understanding through procedural visualization, simulation tools, and immediate feedback mechanisms. According to learning design model theory (Branch, R. M., & Kopcha, T. J., 2014) Procedural visualization helps learners grasp processes in a clear and structured way, while simulations allow them to explore and experiment within a safe and controlled environment. In addition, immediate feedback plays a crucial role in accelerating the learning process, as learners can quickly identify mistakes and make improvements independently. This aligns with modern instructional design approaches that emphasize active, adaptive, and learner-centered experiences.

Theme 6: Priority Competencies in Media Content

The thematic analysis also identified instructors' perceptions of priority competencies that should be emphasized in interactive learning media. Instructors consistently highlighted body measurement accuracy as a fundamental competency.

> "If the measurements are incorrect from the beginning, the entire pattern will be wrong." (R2)

Another instructor emphasized:

> "Accurate measurements are the key to producing a good-quality pattern." (R4)

Instructors also reported that trainees frequently make errors in drawing armhole and hip lines.

> "The armhole and hip lines are the most difficult parts and where mistakes usually occur." (R1)

These findings indicate that interactive learning media should prioritize body measurement and critical pattern components. From a theoretical perspective, this finding relates to the concept of worked examples in Cognitive Load Theory, which suggests that learners benefit from detailed demonstrations of problem-solving steps when learning complex procedural tasks (Sweller, 2019). Providing step-by-step demonstrations of measurement techniques and pattern construction can reduce cognitive overload and support more efficient skill acquisition.

Theme 7: Learning Barriers

The analysis further revealed instructors' perceptions of learning barriers experienced by trainees, particularly related to limited visual literacy and numeracy

skills. According to instructors, trainees sometimes struggle to understand technical terminology and perform measurement calculations.

> "I find it difficult to understand technical terms and calculate measurements accurately." (R2)

Another instructor noted:

> "Because calculation skills are limited, pattern measurements often become inaccurate." (R4)

Instructors also emphasized that the absence of dynamic learning media restricts trainees' ability to learn independently.

> "Static media cannot show gradual changes, so trainees have to wait for the instructor's demonstration." (R1)

These findings indicate that cognitive difficulties in interpreting visual and numerical information may affect trainees' performance during pattern-making practice. From a theoretical perspective, these challenges may increase intrinsic cognitive load during learning tasks. Instructional design that incorporates visual scaffolding and simplified calculation aids may help learners process information more effectively (Paas, et al., 2021).

Theme 8: Expectations for Interactive Media

Instructors also reported trainees' expectations regarding the accessibility and usability of interactive learning media. Instructors observed that trainees prefer media that can be accessed through smartphones and provide simple navigation.

> "The learning media should be accessible on smartphones so it can be used anytime." (R2)

Another instructor added:

> "The navigation should be simple so users do not get confused." (R4)

These findings indicate that accessibility and user-friendly interface design are essential considerations in developing digital learning media. Research on mobile learning suggests that smartphone-based interactive learning media can improve learning flexibility and increase learner engagement in vocational education settings (Díaz-Redondo, et al., 2021).

Theme 9: Readiness for Digital Media Adoption

Finally, instructors indicated that both instructors and trainees show readiness to adopt digital learning media. Instructors noted that digital tools could reduce repetitive explanations and improve instructional efficiency.

> "The instructor is willing to use digital media because it makes teaching more efficient." (R1)

Another instructor added:

> "Digital tools help reduce repeated explanations, especially during practice sessions." (R2)

These findings indicate a positive readiness toward the adoption of interactive learning media in vocational training contexts, particularly when viewed through

the lens of adult learning theory proposed by Knowles (1980). Adult learners tend to be self-directed, goal-oriented, and motivated by practical, real-world applications, making interactive media a suitable approach to support their learning needs. The use of engaging tools such as simulations and hands-on digital experiences aligns with their preference for experiential learning and immediate relevance to their work or skills development. As a result, integrating interactive learning media in vocational training not only enhances engagement but also supports more effective and meaningful learning outcomes.

The findings of this research indicate that conventional static learning media, such as text and images, often lead to procedural difficulties in pattern-making because learners struggle to visualize step-by-step processes and apply them in practice. This limitation aligns with previous studies that emphasize the importance of interactive media, which provide visualization, simulation, and immediate feedback to support skill-based learning. Both the literature and the results of this study highlight a clear need for more engaging and experiential learning tools in vocational education. This research contributes by offering a strong foundation for developing interactive learning media tailored to fashion design competencies in training institutions. Therefore, it is recommended that future research focus on designing and implementing interactive learning platforms that integrate procedural visualization and simulation features, followed by empirical testing to evaluate their effectiveness in improving learners' technical skills and learning outcomes.

4. Conclusion

The findings of this study indicate a significant gap between the learning needs of basic women's garment pattern-making and the interactive learning media currently used at PPKD. Existing learning media, which mainly consist of printed modules, PowerPoint presentations, and general instructional videos, are insufficient to support complex procedural learning that requires systematic and detailed process visualization. These limitations contribute to recurring errors in pattern-making, particularly in reading measurements, determining pattern points, and connecting construction lines, confirming that static media do not adequately support step-by-step learning required to reduce cognitive load. The findings further demonstrate that interactive media aligned with the principles of multimedia learning through integrated text, short videos, and procedural illustrations are more effective in supporting vocational learning that emphasizes practice and experiential understanding. The demand for smartphone accessible media highlights the importance of learning flexibility for adult learners, in accordance with andragogical principles that emphasize learner autonomy and self paced learning. In addition, instructors' readiness to adopt digital media presents a strong opportunity for implementing more adaptive instructional innovations in vocational training institutions. Overall, this study confirms that the development of visual, procedural, accessible, and feedback oriented interactive learning media is essential to bridge the gap between theory and practice in pattern-making, reduce repeated errors, and support independent learning in line with the characteristics of PPKD participants and the competency demands of the fashion industry.

References

Aini, N., & Setiawan, R. (2021). Vocational Education Transformation Through Digital-Based Learning Media: A Study In Fashion Design Training. *Journal of Technical and Vocational Education Research*, 5(2), 115–128. https://doi.org/10.31002/jtver.v5i2.4312

Aryani, N., & Lestari, A. (2024). Applying Multimedia Learning Theory To Improve Instructional Effectiveness. *Jurnal Media Akademik*. https://jurnal.mediaakademik.com/index.php/jma/article/view/3941

Borg & Gall. (2003). Educational Research, an Introduction, Seventh Edition. New York: Longman Inc.

Branch, R. M., & Kopcha, T. J. (2014). *Instructional Design Models. In Handbook of Research on Educational Communications and Technology*. Springer

Clark, R. C., & Mayer, R. E. (2023). *E-Learning And The Science Of Instruction* (5th ed.). Wiley.

Creswell, J. W., & Creswell, J. D. (2022). *Research Design: Qualitative, Quantitative, And Mixed Methods Approaches* (6th ed.). Thousand Oaks, CA: Sage Publications.

Dewi, R., & Hartono, H. (2022). Development Of Multimedia Learning In Vocational Education To Improve Students' Technical Skills. *Jurnal Pendidikan Vokasi*, 12(1), 60–72. https://journal.uny.ac.id/index.php/jpv/article/view/42673

Díaz-Redondo, R., Caeiro-Rodríguez, M., López-Escobar, J., & Fernández-Vilas, A. (2021). Integrating Microlearning Content In E-Learning Platforms. *Multimedia Tools And Applications*.

Divjak, B., & Kukurin, M. (2020). Designing Digital Learning Ecosystems: Framework For Implementation. *Education and Information Technologies*, 25(4), 3203–3221. https://doi.org/10.1007/s10639-020-10103-7

Fadlulullah, Y. . A., Wagiran, W., Yuniarti, N., Maulana, M. R., & Yusuf, A. (2026). Bibliometric Analysis of Characteristics and Trends in Technical and Vocational Education and Training (TVET). *Journal of Educational Sciences*, *10*(2), 2048-2067. https://doi.org/10.31258/jes.10.2.p.2048-2067

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2019). Achieving Integration In Mixed Methods Designs—Principles And Practices. *Health Services Research*, 54(2), 213–230. https://doi.org/10.1111/1475-6773.13117

Hidayati, T., & Nuraini, A. (2022). Digital Learning In Vocational Fashion Education: Challenges And Opportunities. *Journal of Educational and Vocational Studies*, 14(3), 223–234. https://doi.org/10.1080/00220671.2022.2110453

Ifrianingsih, I., Syarifudin, S., & Fitrianingsih, N. (2025). Development of Interactive Learning Media Based on Genially in Informatics Subjects to Improve Digital Literacy of SMPN 4 Madapangga Students. *Journal of Educational Sciences*, *9*(6), 5414-5425. https://doi.org/10.31258/jes.9.6.p.5414-5425

Iwan, I., Khaerudin, K., Kustandi, C., & Rahmadi, I. F. (2026). Effectiveness of Personalized Learning with Interactive Flipbook Media in Learning Sequences and Series: A Systematic Literature Review. *Journal of*

Educational Sciences, *10*(3), 595-608. https://doi.org/10.31258/jes.10.3.p.595-608

Knowles, M., Holton, E., & Swanson, R. (2015). *The Adult Learner* (8th ed.). Routledge.

Knowles, M. S. (1980). *The Modern Practice of Adult Education: From Pedagogy to Andragogy.* Cambridge Books.

Kusmayadi, K., Ibrahim, N., & Wibowo, S. (2026). E-Learning Development Based on Multimedia Learning Strategies to Improve Learning Outcomes. *Journal of Educational Sciences*, *10*(3), 263-280. https://doi.org/10.31258/jes.10.3.p.263-280

Lee, S., & Kim, J. (2022). Digital Media-Based Vocational Learning In Fashion Design: An Analysis Of Learner Engagement And Competency Development. *Journal of Vocational Education Studies*, 45(2), 67–79. https://doi.org/10.1080/13636820.2022.2041867

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.

Mayer, R. E. (2014). *The Cambridge Handbook Of Multimedia Learning* (2nd ed.). Cambridge University Press.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook* (4th ed.). Thousand Oaks, CA: Sage Publications.

Ningsih, S., Rachmawati, Y., & Pratama, A. (2023). Interactive Multimedia Development For Fashion Pattern-Making Learning In Vocational Education. *Jurnal Pendidikan Teknologi dan Kejuruan*, 29(1), 90–100. https://journal.uny.ac.id/index.php/jptk/article/view/55761

Paas, F., Renkl, A., & Sweller, J. (2021). Cognitive Load Theory And Instructional Design: Recent Developments. *Educational Psychology Review*.

Putri, D. A., & Rachmawati, L. (2024). Development Of Interactive E-Modules To Improve Procedural Learning Outcomes In Vocational Education. *Jurnal Pendidikan Vokasi*, 14(1), 45–56. https://journal.uny.ac.id/index.php/jpv/article/view/65421

Rahman, A., Sari, N., & Kurniawati, D. (2022). Digital Learning Innovation In Vocational Education: Challenges And Opportunities. *Jurnal Pendidikan Teknologi dan Kejuruan*, 28(2), 115–125. https://journal.uny.ac.id/index.php/jptk/article/view/49567

Rahmawati, D., Yuliani, N., & Santoso, A. (2023). The Effectiveness Of Interactive Digital Media In Vocational Fashion Training: A needs-based approach. *International Journal of Instructional Technology and Vocational Education*, 8(1), 45–59. https://doi.org/10.1016/ijitve.2023.01.005

Richey, R. C., & Klein, J. D. (2014). *Design and development research: Methods, strategies, and issues.* Routledge.

Sadiman, A. S., Rahardjo, R., Haryono, A., & Harjito. (2018). *Media Pendidikan: Pengertian, Pengembangan, dan Pemanfaatannya*. Rajawali Pers.

Sari, D., & Suhartini, S. (2021). Development Of Digital Learning Media In Fashion Vocational Education. *Jurnal Pendidikan Teknologi dan Kejuruan*, 27(2), 200–210. https://journal.uny.ac.id/index.php/jptk/article/view/39062

Sari, M., & Fitriani, R. (2021). Multimedia Learning Approaches In Vocational Training Programs. *Jurnal Pendidikan Vokasi*, 11(1), 10–20. https://journal.uny.ac.id/index.php/jpv/article/view/36541

Siregar, B. H., Panjaitan, A., Hasratuddin, H., et al. (2024). Digital Media Innovation Based On Multimedia Cognitive And Constructivist Theory. *Jurnal Teori dan Aplikasi Matematika*. https://journal.ummat.ac.id/index.php/jtam/article/view/16800

Sugiyono. (2019). *Metode penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Sweller, J. (2011). Cognitive Load Theory. *Psychology of Learning and Motivation*, 55, 37–76.

Sweller, J. (2019). Cognitive Load Theory And Educational Design: Recent Developments. *Educational Psychology Review*, 31(2), 263–284. https://doi.org/10.1007/s10648-019-09465-5

Wijayanti, A., & Lestari, D. (2020). The Development Of Interactive Multimedia To Improve Fashion Pattern-making Skills In Vocational Education. *Journal of Education and Learning Technology*, 5(2), 89–98. https://doi.org/10.17509/jelt.v5i2.24890

Wulandari, S., Pratama, R., & Hidayat, T. (2023). Interactive Learning Media In Vocational Education: A Systematic Review. *Jurnal Pendidikan Vokasi*, 13(2), 140–150. https://journal.uny.ac.id/index.php/jpv/article/view/61122

Yunita, R., Effendi, E., & Firmansyah, J. (2025). Development of Interactive Multimedia-Based IPAS Learning Media to Improve Learning Outcomes and Critical Thinking Skills of Fifth Grade Elementary School Students. *Journal of Educational Sciences*, *9*(6), 6311-6323. https://doi.org/10.31258/jes.9.6.p.6311-6323

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