Development of Learning Media for Drawing Womens Suit Patterns Using Industrial Engineering Based Richpeace Software to Improve the Digital Patterns Drawing Skills of Fashion Students

Halimul Bahri[1], Farihah[2], Dina Ampera[3], Erni[4], Ulfa Annida Damanik[5], Dermawan[6], Rahmi[7], Hazevi Atila Yazel Aze[8]

{halimulbahri@unimed.ac.id [1], farihah@unimed.ac.id[2], dinaampera@unimed.ac.id[3]}

Department of Family Welfare Education, Faculty of Engineering, Universitas Negeri Medan, Indonesia[123]

Abstract. The purpose of this research is to produce a video tutorial on making digital patterns for womens suits that are feasible, practical and effective. This research was carried out to harmonize the demands of the curriculum where students are required to be able to create fashion patterns using a computer-assisted application. The method used is a research and development method consisting of three steps, namely instructional, develop and implementation. The results of the analysis of student needs were obtained that 36,7% needed teaching materials in the form of video tutorials in making womens coat patterns. The video tutorial on making digital patterns of Womens Suits was declared very feasible in terms of video material 0.88 and video feasibility 0.84. The tutorial video for making digital patterns for Womens Jackets based on the responses of lecturers and students was declared very practical. Effective video tutorials can increase the results of student pattern-making skills by 11.31%. Thus, it can be concluded that learning using video media developed is significantly effective in improving high-level thinking skills and student learning outcomes in pattern making..

Keywords: Learning Media, Women's Suits, Richpeace App, Industrial Engineering, Digital Patterns.

1 Introduction

The quality of a garment's shape when worn is influenced by the effectiveness of the pattern applied to the clothing. Producing a well-shaped garment is closely related to the systematic creation of patterns and the flexibility of the pattern lines. Previous research on the use of E-jobsheets in the Tailoring course found that 94% of students were satisfied with the teaching materials. However, after evaluating the results of manual pattern-making practices, many students were still not competent in manual pattern creation. One of the reasons for the lack of students' skills in making Tailoring patterns manually is influenced by their educational background before entering the fashion design program at Universitas Negeri Medan.

ICIESC 2024, September 17, Medan, Indonesia

DOI 10.4108/eai.17-9-2024.2352839

This is what the fashion design students of the 2022/2023 academic year at the State University of Medan experienced, where the results of manual pattern making revealed numerous deficiencies in the patterns created by the students. These included accuracy in connecting pattern lines, flexibility in the shape of curved pattern lines, and cleanliness in pattern making. Furthermore, difficulties were evident due to the diverse educational backgrounds, such as: General High School, both from the Natural Sciences and Social Sciences majors, State Madrasah Aliyah, and Vocational High Schools from both the Fashion Design major and other majors. This clearly made the learning process and outcomes challenging for students without a background in Vocational High School (Fashion Design). The schools attended by the Fashion Design students in the 2022/2023 academic year can be seen in the diagram below:

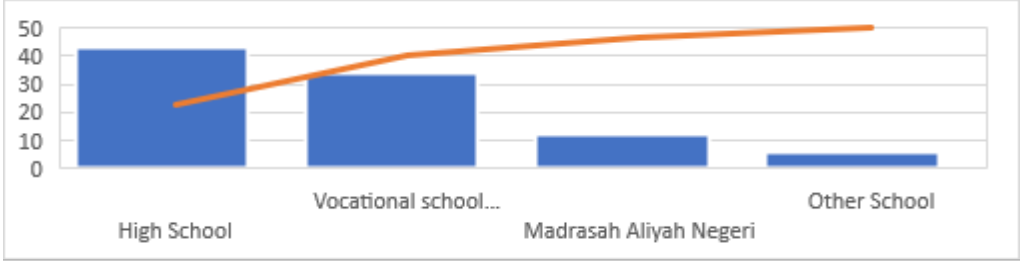

Fig. 1. Student's Original School Data Academic Year 2022/2023

From the table above, it can be seen that fashion design students are predominantly made up of high school graduates at 43%. Following in second place are vocational school graduates in fashion design at 34%, and then by graduates of Madrasah Aliyah Negeri at 12%, and other schools at 6%. The quality of student input significantly affects the learning process in the classroom. The creation of digital patterns has become a solution in the learning process, allowing students to create pattern lines and ensure the accuracy of pattern sizes according to the specifications in the jobsheet by checking their measurements using tools on Richpeace. Richpeace is software for pattern making, creating size/grading, editing, adding stitch marks/notches, adding seam lines, etc. Richpeace functions to create patterns and grading, while Richpeace for marker patterns or arranging garment patterns before entering the cutting stage. [4]. The competency results of students using video tutorial learning media are better than the competency results of students who only used modules in the practice of making blouse patterns with Richpeace. The use of digital pattern electronic learning media has been tested for its feasibility to be used as a self-study aid for students as well as a teaching medium for teachers handling the Industrial Fashion Design subject, specifically the material on digital jacket pattern making.

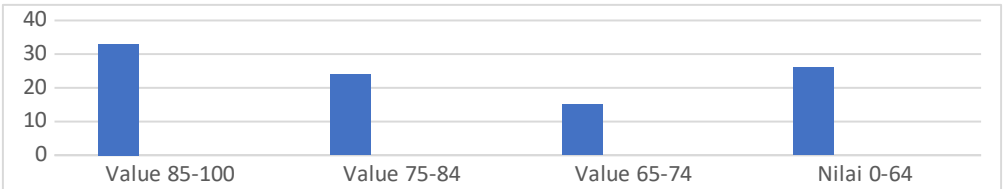

Fig. 2. Results of Manual Pattern Creation Evaluation [6]

In the assessment of the 26 students, it has been declared that they have not passed the manual pattern-making practice In a brief interview with several students who have taken the Tailoring fashion course, the students believe that the difficulty often encountered when creating patterns manually lies in accurately shaping the flexibility of pattern lines and not yet fully understanding the technique of precise pattern line construction. By conducting digital pattern making transformation, the abilities and skills of students will be enhanced through the digital pattern system The purpose of this research is to produce a suitable, practical, and effective video tutorial for creating digital fashion patterns in the Tailoring course.

2 Method

This type of research is Research and development methods. Research and development methods are methods used to produce new products or improve existing products [11] [12]. This method involves several steps, such as: analysis of the product to be developed, development of the initial product or product draft, expert validation and revision of the product, small-scale and large-scale field trials, final product.

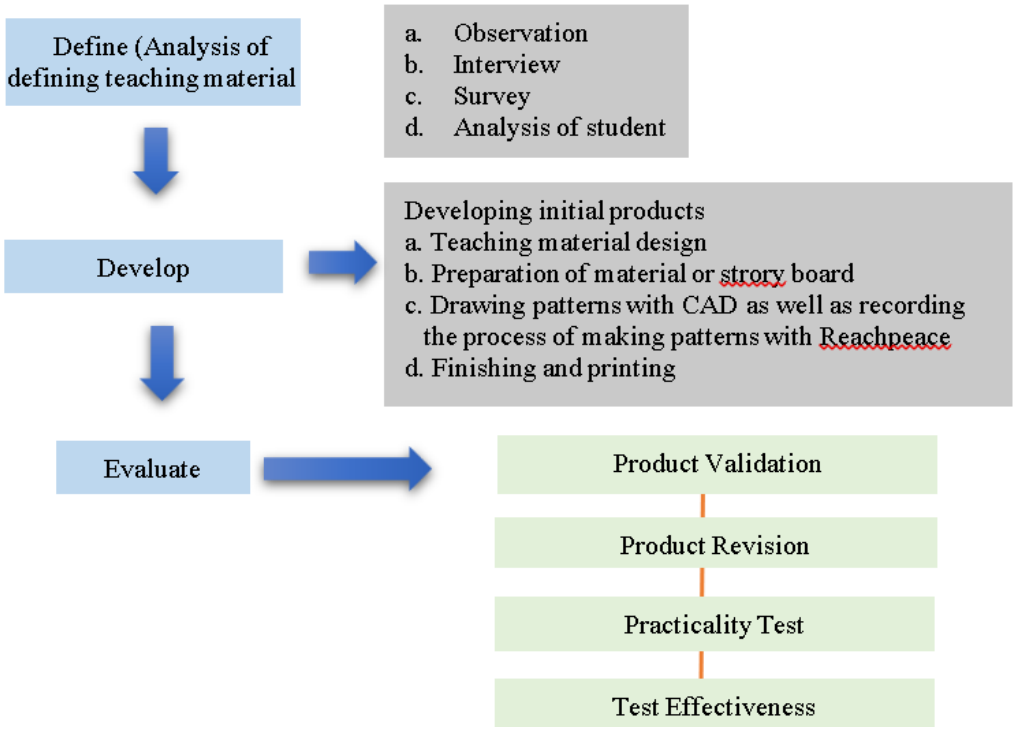

Fig. 3. Research Procedure

2.1 Define

2.1.1 Observation

Observation activities are carried out at the beginning of learning to get an overview of the learning media development plan that will be carried out. Observation activities also distributed questionnaires to students regarding student needs for learning media to be developed. After obtaining data on the needs of learning media, the highest percentage of student needs was taken.

2.1.2 Interview

The interview was conducted to get in-depth data related to the Tailoring fashion course. Interviews were conducted with lecturers and students who had taken the Tailoring fashion course.

2.1.3 Survey

Survey activities include looking at the learning activities of class A fashion students for the 2022 academic year, related to what learning methods are applied by lecturers, to obtain information on learning resources used during learning, conducting documentation and collecting other supporting data needed for research.

2.1.4 Analysis of student

The analysis of student needs was carried out after obtaining the needs analysis questionnaire data that was distributed during the initial observation activities. The results of the analysis are useful for obtaining information related to what kind of learning media students want during the learning process in the Tailoring fashion course..

2.2 Develop

2.2.1. Teaching Material Design

The first product development activity is to design teaching materials that will be used in the Tailoring fashion course.

2.2.2. Preparation of material of strory board

After the teaching materials are designed, the materials are arranged according to the learning outcomes.

2.2.3. Drawing pattern with CAD

Making patterns with the Richpeace application as well as recording pattern making activities with the aim of producing a digital pattern making tutorial video at the end.

2.2.4. Finishing

Finishing activities include adjusting the speed of video, video sound and duration.

2.3 Evaluate

2.3.1. Product validation

After the teaching material product is completed, the product is then validated to experts. Product validation was carried out to two experts, the first material expert and the second

media expert. Material experts are people who understand the study of the content of material related to the media products produced, material expert validation is given to lecturers in charge of the Fashion Tailoring course while media experts are given to lecturers of the Information and Computer Engineering Education study program.

2.3.2. Product revission

After validation with material and media experts. If there are improvements according to expert comments, then the teaching material products are revised according to the suggestions.

2.3.3. Practicallity test

After the product is valid, a test is carried out to students and lecturers regarding the practicality of the teaching materials made.

2.3.4. Test effectiviness

From the results of the product trial with 30 students, the results of the effectiveness of the teaching material products developed were obtained.

2.4 Research Location

location of the research is in the Fashion Education Study Program, Department of Family Welfare Education, Faculty of Engineering, State University of Medan, Jl. Willem Iskandar Psr.V- Post Box 1589 Medan 20221.

2.5 Research Population

The research population is all students of the fashion education study program for the 2022 academic year totaling 97 students, while the research sample is 30 students of class A fashion design for the 2022 academic year.

2.6 Data Collection and Analysis Techniques
2.6.1 Validity Questionnaire

The validation questionnaire is used to determine the validity of the product developed The validation sheet contains several aspects of the assessment of the components of the teaching materials. There are two categories of validation questionnaires, namely the validity of content and the validity of media. [13] [14].

2.6.1.1 Material validation questionnaire

The material validation questionnaire contains several validator responses to the suitability of the material in the teaching materials with the syllabus and RPS, the correctness of the concept that can be accounted for and the suitability of the description with the indicators.

2.6.1.2 Media validation questionnaire

The media validation questionnaire contains the statements and responses of validators to the developed learning media. Validity data analysis was obtained using quantitative descriptive analysis techniques, namely by analyzing quantitative data obtained from validation questionnaires given to material experts and media experts. The results of Aiken's calculation [15] range from 0 to 1, the number 0.6 can be interpreted as having a high enough coefficient, then the validity value of 0.6 and above is expressed in the valid category [16] [17].

2.6.2 Practicality Questionnaire

This practicality questionnaire is used to see the practicality of the teaching materials developed. This questionnaire contains assessment responses by supporting lecturers and students who take the Fashion Tailoring course. Indicators of the lecturer questionnaire include looking at the ease of use of media, student learning interest, understanding of the material by students, effectiveness and time efficiency, attractiveness and suitability of learning media materials. Meanwhile, the questionnaire indicators for students are minimal interest in learning, ease of use, easy-to-understand language, easy to understand, increase motivation and learning activity. The practicality analysis was obtained from data in the form of response sheets given to lecturers and students on the use of the developed teaching materials, to analyze the response sheets and students used descriptive analysis [18].

$$NA=S/SM \times 100\% \quad [19]$$

NA = Final Score
S = Scores obtained
SM = Maximal Score

2.6.3 Effectiveness Sheet

The effectiveness sheet was measured from the results of manual pattern drawing skills and digital tailoring fashion patterns. The percentage of media effectiveness was obtained from the difference in the results of the analysis of manual and digital pattern drawing skill assessments. Indicators of the assessment of the effectiveness of making tailoring fashion patterns include: the accuracy of all image sizes on the pattern, the flexibility of the pattern lines and the speed in the process of making tailoring fashion patterns [19].

3 Results and Discussion

3.1 Results dan discussion Stage Define

3.1.1 Observation

Observation activities carried out at the beginning of learning obtained data including: 1) graduates of fashion education study program students for the 2022/2022 school year came from fashion vocational high schools, vocational schools other than fashion, high schools and state aliyah madrasas. 2) The results of the questionnaire distributed to students obtained data that in learning to make tailoring fashion patterns, students prefer to use video tutorial media. 3) The number of students who took part in the Tailoring fashion course was 97 students.

3.1.2 Interview

The results of the interview with the lecturer of the Tailoring fashion course obtained the following information: 1) the learning of the Tailoring fashion course is constrained by the quality of input and the background of the student graduates. 2) students find it difficult to understand the subject matter because of the learning ratio of courses related to Tailoring fashion 3) students are used to sewing casual women's clothing, so in producing Tailoring clothing, students have some difficulties in the process of doing it. 4) learning in pattern

making, especially in the Tailoring fashion course, requires technological assistance such as the use of the Richpeace application.

The results of interviews with student representatives obtained information that the Tailoring fashion course is a difficult course for students. Students are used to sewing feminine fashion forms, while sewing Tailoring clothes must display masculine shapes. This is one of the reasons why many students have not been able to fully master the material of the Tailoring fashion course. Then the learning resources for the Tailoring fashion course are still limited and there are no learning resources that describe in detail the technique of making patterns to the process of sewing Tailoring fashion.

3.1.3 Survey

The survey was carried out directly during the learning process in the classroom in the Tailoring fashion course. The students surveyed are students of the fashion design study program class A for the 2022 academic year. During the practical learning, the lecturer used the demonstration method in making Tailoring fashion patterns. Lecturer theory learning uses power point media with the help of a projector. The learning resources used during the learning of the Tailoring fashion course are Tailoring fashion books, jobsheets and tailoring fashion modules.

3.1.4 Student Analysis

Student analysis is carried out to obtain the form of teaching material products that will be made in this study. The data collection technique was in the form of a student needs questionnaire which was distributed to 67 students during the observation activity.

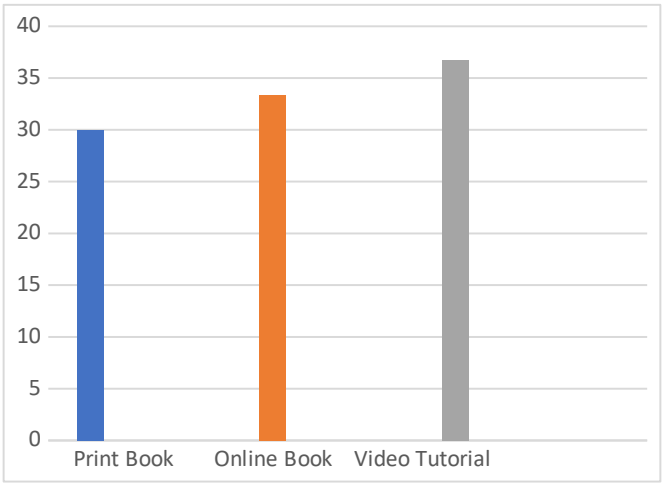

Fig. 4. Results of Needs Analysis

The diagram above shows that students prefer the use of video tutorial media in the learning process of fashion courses, especially pattern making. Video media makes learning easier to understand because it can be played back according to students' abilities, providing an

attractive and clear display of images and audio. [10], So it was decided that the learning media made was a video tutorial in making patterns in the Tailoring fashion course.

3.2. Result and Discussion Stage Develop

3.2.1. Teaching Material Design

The teaching materials made are in the form of video tutorials on making digital tailoring fashion patterns. The video material is made in the form of a tutorial on making a Tailoring suit pattern which is divided into three parts. The first part of the video tutorial on making a pattern for a front tailoring suit. The second video tutorial on making a pattern of tailoring the back of the suit. Third, a tutorial video on making a suit sleeve pattern.

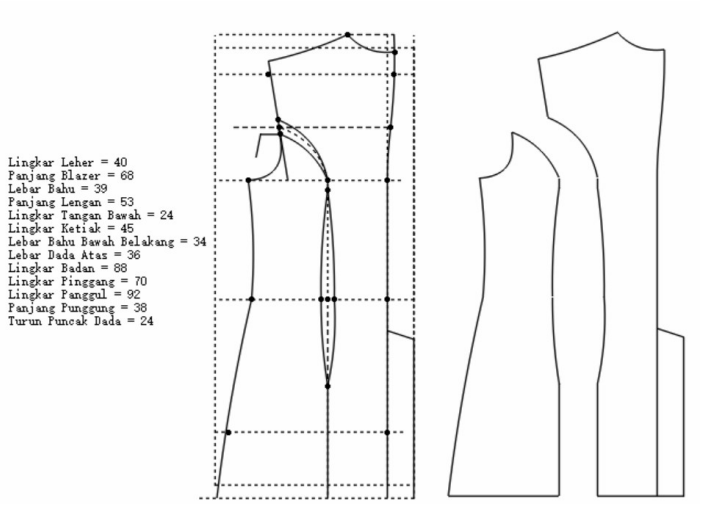

Fig. 5. The part of the Tailoring suit pattern that will be used as a video

3.2.2. Putting together a Story Board

Creating a story board video tutorial on making a tailoring suit pattern digitally can be seen as follows:

1. Story board video tutorial first part of the pattern of the front of the suit
   a. The opening scene is the CAD pattern title text
   b. The second scene is in the form of digital pattern text of the Tailoring suit
   c. The third scene of the steps in making the front tailoring suit pattern
   d. Closing scene
2. Story board video tutorial for the second part of the pattern of the back of the suit
   a.The opening scene is the CAD pattern title text
   b.The second scene is in the form of digital pattern text of the Tailoring suit
   c. Third scene steps in making a pattern of tailoring the back of the suit
3. Story board video tutorial part three suit sleeve pattern
   a.The opening scene is the CAD pattern title text
   b.The second scene is in the form of digital pattern text of the Tailoring suit
   c. Third scene of steps in making a suit sleeve pattern
   d. Closing scene

3.2.3. Drawing patterns using CAD as well as screen recording for video tutorials

After the material and arrangement of teaching materials have been determined, the next process is to make a video tutorial on making Tailoring fashion patterns digitally using an application. The screen recording process is made according to the story board that has been designed, namely the first part of the pattern on the back of the suit.

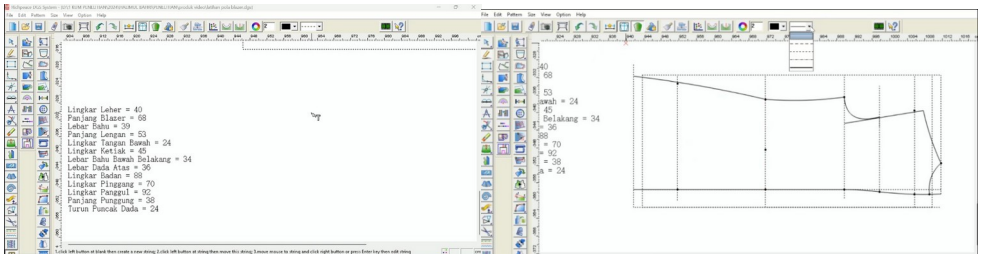

Fig. 6. One of the video scenes of the digital pattern making tutorial

3.2.4. Finishing

In simple terms, the finishing process is an effort to tidy up and make a video show more useful and pleasant to watch. Creating continuity of images and sounds so that they run naturally and logically. Creating image dynamics through the arrangement of images and sounds so that boredom does not arise. The duration of the first part of the tutorial video is 15 minutes with a file size of 190 mb. The video duration of the second part is 10 minutes with a file size of 113 mb, while the video duration of the third part is 8 minutes with a file size of 85 mb.

3.3 Result and Discussion Stage Evaluate

3.3.1 Material Validity Analysis

The data that will be used to measure the validity of the video tutorial on making digital patterns for the Tailoring fashion course is data obtained through input from validators using questionnaires. The validation stage is carried out to media experts and material experts. The results of the video validation tutorial on making digital patterns for the Tailoring fashion course can be seen in the following table:

Table 1. Material Validity Analysis

Number Item	Question indicator	Average Expert
Statement 1	Adaptability of the content to fundamental skills	4.5
Statement 2	The information is understandable	4.5
Statement 3	The information is in line with the goals of learning	4
Statement 4	Adaptability of the content to fundamental skills	4
Statement 5	The learning video's lesson material adheres to the syllabus in terms of content	4.5
Statement 6	This video tutorial's learning curve is obvious.	4.5
Statement 7	This educational movie may pique kids' interests.	4.5
Statement 8	This educational movie can help pupils study on their own.	4
Statement 9	In line with Indonesian laws, the language in the video is utilized.	5

Statement 10	Sentences include information that can guide students' activities.	4.5
	Score = 44, max score = 50, Validity Average = 0.88	

Validation of the video tutorial material of the Tailoring fashion course is given to material experts who understand the study in the field of Tailoring fashion course. The use of video tutorials is an alternative that can be used by lecturers as a learning medium in explaining practicum material, where lecturers do not need to repeat explanations of practicum steps as in making blouse patterns. On the other hand, students can repeat the explanation of the lecturer's material by watching video tutorials anywhere and anytime without always having face-to-face with the lecturer so that students are able to learn independently [20]. During the validation process of video material tutorials on making digital Tailoring fashion patterns, suggestions and input from experts were obtained for the perfection of the developed media.

Table 2. Revision of video material tutorial on making digital fashion patterns Tailoring

Number	Before revision	After Revision
1	Tutorial on the drawing of curved pattern lines, to explain how and techniques in detail.	Each work step that connects between pattern lines has been explained in detail Techniques and functions
2	We recommend that when making back body patterns, use the front body pattern as a guideline in making back body patterns, thus saving time making back body patterns.	The back pattern making video tutorial already uses a front pattern, so the time needed in making a back pattern is more efficient.
3	Adjust the use of auxiliary lines in the pattern. Do not mix auxiliary lines and pattern mark lines.	The use of lines has been changed according to their function.

3.3.2 Media Validity Analysis

The validation of the video tutorial media of the Tailoring fashion course was obtained from media experts who understand the study in the field of learning media. The validation results of the three experts obtained an average score of 0.85. In accordance with the results of Aiken's calculation ranging from 0 to 1, the number 0.6 can be interpreted as having a high efficiency quite high then the Validation value of 0.6 and above is expressed in the valid category.

Table 3. Media Expert Validation

Number Item	Question indicator	Average Expert
Statement 1	The content and cover picture choices support the information offered.	4.3
Statement 2	The lesson video's pictures are simple to grasp.	4
Statement 3	The image's look is consistent with its dimensions.	4
Statement 4	Students' attention may be drawn by the sight of this instructional film.	4
Statement 5	Front cover (text and picture layout) cover layout that is proportionate to the necessities	4
Statement 6	For lecturers and students involved in the learning process, videos can serve as an alternate instructional resource.	4
Statement 7	Color, text, and picture choices made in accordance with requirements	4.3
Statement 8	The hue of the text does not interfere with vision.	4.3

Statement 9	Adjusting the video text size as necessary	4.3
Statement 10	The lesson films' text and phrases are simple to read.	4.3
Score = 42, max score = 50, Validity Average = 0.84		

Media validation of the Tailoring fashion course tutorial video is given to media experts. CAD is one of the theoretical and practical courses that examines the basic concept of making and arranging patterns according to models using the Richpeace CAD System. Therefore, in the lecture process, appropriate learning media is needed and able to help students to learn independently. With the existence of video tutorial learning media, it can help lecturers' activities in presenting material face-to-face so that lecturers will later focus more on guiding and facilitating students in lectures. In addition, video tutorials can help students to learn individually and repeat and practice the knowledge that has been given by lecturers anywhere and anytime [21]. During the process of media validation video tutorial for making Tailoring fashion patterns digitally, suggestions and input from experts were obtained for the perfection of the media developed.

Table 4. Revision of video material tutorial on making digital fashion patterns Tailoring

Number	Before revision	After Revision
1	The length of the video is reduced to make it less long.	The length of the video has been reduced by eliminating unnecessary parts.
2	Videos are reduced in size so that all viewers can download or watch online more lightly.	The video size has been decompressed, so if downloaded or viewed online it is lighter when played.
3	The video resolution is enlarged for a clearer image display.	The video export resolution process has been improved, so the video quality is better than the previous one
4	Explain the use of tools that are often used at the beginning of the video, in order to reduce the length of the video.	The opening already describes only the parts of the tool used, without explaining the functions of the tool that are not used when drawing patterns

3.3.3 Media Practicality Analysis

Practicality is related to the ease of using the developed Fashion Tailoring tutorial video. Practicality data was obtained through a questionnaire filled out by Tailoring Fashion Course Lecturers.

Table 5. Lecturer Practicality Analysis

Number Item	Question indicator	Average Expert
Statement 1	Adaptability of the content to fundamental skills	4.5
Statement 2	The information is understandable.	4
Statement 3	The content complies with the learning objectives.	4.5
Statement 4	The lesson video's subject matter is of an adequate size.	4
Statement 5	The learning video's lesson material adheres to the syllabus in terms of content.	4
Statement 6	The learning path in the video is clear	5
Statement 7	Learning videos can interest students in learning	4
Statement 8	Learning via videos can help pupils progress independently.	4
Statement 9	The language in the video complies with Indonesian regulations.	5

Statement 10	Sentences include information that can guide students' activities.	4
Score = 42, max score = 50, Practivality Average = 0.84		

The results of the practical analysis of the video tutorial of the Tailoring fashion course were given to the lecturer of the Tailoring fashion course. From the results of the analysis of the practicality of using video tutorials, this learning media is very practical to use in the practice of making patterns, especially in the Tailoring fashion course. [22].

The practicality of learning videos for the Tailoring fashion course also requires a response from students. This data was obtained through a questionnaire given to students after learning using learning videos for the Tailoring fashion course.

Table 6. Student Practicality Analysis

Number Item	Question indicator	Number of Score
Statement 1	I can learn material for making Tailoring patterns digitally by using this video tutorial media.	30
Statement 2	Video tutorial media provides an opportunity to learn according to my ability.	30
Statement 3	I easily follow the steps of making Tailoring patterns digitally in this video tutorial media.	40
Statement 4	Video tutorial media provides an opportunity to learn according to my ability.	40
Statement 5	I know well the difference between making conventional menswear patterns and digitally	30
Statement 6	I think this Tailoring digital pattern making video tutorial media provides benefits in my scientific field.	30
Statement 7	In my opinion, making digital patterns can be used as guidelines in making clothes in accordance with growing fashion trends.	30
Statement 8	I'm more interested in creating patterns digitally than conventionally	30
Statement 9	Making patterns digitally is more efficient in terms of pattern results and processing time.	30
Statement 10	This digital pattern provides my creative and innovative space in developing various types of fashion patterns.	30
Total Score = 320, max score = 40, Practivality Average = 0.80		

The results of the practical analysis of the video tutorial of the Tailoring fashion course were also given to students who took the Tailoring fashion course. A practicality questionnaire was given to all students who took the Tailoring fashion course. The results of the analysis of the practicality of using video tutorials, this learning media is very practical to be used by students in the practice of making patterns, especially in the Tailoring fashion course [23].

3.3.4 Results of Media Effectiveness Analysis

The learning outcome data was taken with the aim of seeing the results of students' ability to make tailoring fashion patterns digitally. The results of the ability test are given to students by giving assignments in the form of making suit patterns digitally using the body size used at the beginning of the practice of making manual patterns. This is done in order to be able to take a psychomotor assessment of the results of making manual patterns and digital patterns.

Table 7. Media Effectiveness Analysis

No	Pretest dan post test		
	Observation indicator	Average Pre test	Average Post test
1	Accuracy and flexibility of the neckline	77.00	82.00
2	Shoulder line precision and flexibility	80.00	85.00
3	Front and rear shoulder down precision	83.00	95.00
4	Accuracy and suppleness of arm convoluted lines	76.00	83.00
5	Accuracy and flexibility of body side lines	79.00	90.00
6	Precision and flexibility of shirt bottom lines	89.00	96.00
7	Accuracy and flexibility of arm pattern peak lines	70.00	89.00
8	Compatibility of arm coil circumference body pattern and arm pattern	80.00	90.00
9	The accuracy of the size of the body circumference in the pattern	80.00	96.00
10	The accuracy of the length of the shirt on the pattern	85.00	98.00
	Average	79.09	90.40
	90.40 – 79.09		
	Efektivity = 11.31%		

The results of the analysis showed that there was a significant improvement in terms of students' ability in the process of making special patterns for suit patterns that were used as test objects in this study. Thus, the video tutorial media for making Tailoring fashion patterns using CAD greatly contributes to the practical learning activities of making Tailoring fashion patterns, especially Tailoring suit patterns [24] [25].

4 Conclusion

This research produced a video tutorial on making digital patterns of Tailoring fashion using the Richpeace application. Validation of tutorial video materials and media was obtained in the category of feasible to be applied in the learning process. The practicality of video tutorial media for making patterns digitally by lecturers and students is included in the category of very practical use during the learning process. The effectiveness of video tutorial media has a significant impact on students' ability to make tailoring fashion patterns. Based on the findings of the research, it can be concluded that the tutorial video for making digital patterns of Fashion Tailoring is feasible, practical and effective to be used as learning material in Fashion Tailoring courses at the university level.

References

[1] Farihah, Dina Ampera, Halimul Bahri. Konstruksi Pola. Jawa Tengah: Cv. Sarnu Untung. 2022.

[2] Idah Hadijah, Hapsari Kusumawardani, Nurul Aini. Kompetensi Pembuatan Pola Busana Berbasis Cad Pattern System Guru SMK Tata Busana di Malang Raya. Jurnal Karinov. Vol. 1 No. 2, 2018. Pp 1-6. DOI: http://dx.doi.org/10.17977/um045v1i2p%25p

[3] Program Studi Pendidikan Tata Busana. Biodata asal sekolah mahasiswa. devakad.unimed.ac.id. 2023.

[4] Muhdhor, dkk. Pattern, Grading dan Marker dengan CAD (Richpeace). Direktorat Pembinaan SMK – Kemdikbud. 2018.

[5] Irmayanti dan Hamidah Suryani. Pengembangan Modul Aplikasi Komputer Terapan Tata Busana bagi Mahasiswa PKK FT UNM. Jurnal Teknoboga, Vol. 8 No. 1, 2020. DOI:https://doi.org/10.15294/teknobuga.v8i1.23999

[6] Arsip Dosen penialain tugas praktek matakuliah busana Tailoring. 2020.

[7] Departemen Pendidikan Nasional. Pengembangan Bahan Ajar. Sosialisasi KTSP 2008.

[8] Prastowo, Andi. Panduan Kreatif Membuat Bahan Ajar Inovatif. Yogyakarta: Diva Press. 2015.

[9] Belawati, Tian. Pengembangan Bahan Ajar. Jakarta: Pusat Penerbitan Universitas Terbuka. 2003.

[10] Trianto. Mendesain Model Pembelajaran Inovatif-Progresif. Jakarta: Perenada Media Grup. 2012.

Sugiyono. Metode Penelitian Kuantitatif, Kualitatif dan R&D. Bandung. Alfabeta. 2019.

[11] Agus Irianto. Statistik: Konsep Dasar, Aplikasi dan Pengembangannya. Prenamedia Group. Jakarta. 2004.

[12] Sudjana. Metoda Statistika. PT. Tarsito Bandung. Bandung. 1996.

[13] Sutrisno Hadi. Statistik. Pustaka Pelajar. Yogyakarta. 2015.

[14] Aiken, L. R. Three Coefecients for Analyzing the Reliability and Validity of Ratings. Educational and Psychological Measurement. 1985

[15] Suharsimi Arikunto. Dasar-Dasar Evaluasi Pendidikan. Bumi Akasara. Jakarta. 2018.

[16] Ngalim Purwanto. Prinsip-Prinsip dan Teknik Evaluasi Pengajaran. Remaja Rosdakarya. Bandung. 2020.

[17] Azwar, S. Dasar-dasar psikometri. Yogyakarta: Pustaka Belajar. 2014.

Riduwan. Skala Pengukuran Variabel-Variabel Penelitian. Alfabeta, Bandung. 2010.

[18] Magdalena Dwi Anggreni dan Sicilia Sawitri. Pengembangan Media Pembelajaran Elektronik Pola Digital di SMK Negeri 6 Semarang. Jurnal Fashion And Fashion Education Journal, Vol 9 No. 1, 2020. Pp 19-27. https://doi.org/10.15294/ffej.v9i1.41257

[19] Amadori, K.; Tarkian, M.; Ölvander, J.; Krus, P. Flexible and robust CAD models for design automation. Adv. Eng. Inform. 2012, 26, 180–195, DOI: http://10.1016/j.aei.2012.01.004

[20] Bodein, Y.; Rose, B.; Caillaud, E. Explicit reference modeling methodology in parametric CAD system. Comput. Ind. 2014, 65, 136–147, doi: http://10.1016/j.compind.2013.08.004

[21] Iwakaran, R.P.; Johnson, M.D. Analyzing the effect of alternative goals and model attributes on CAD model creation and alteration. Comput.-Aided Des. 2012, 44, 343–353, DOI: https://10.1016/j.cad.2011.11.003

[22] Ondogan and Erdogan. The comparison of the Manual and CAD System for Pattern Making,Grading and Making Processes. Journal Fibres & Textiles in Eastern Europe. Vol. 14 No.1, 2006.

[23] Seels, Barbara B. & Richey, Rita C. Teknologi Pembelajaran: Definisi dan Kawasannya. Penerjemah Dewi S Prawiradilaga dkk. Jakarta: Kerjasama IPTPI LPTK UNJ. 1994