Effectiveness of Using Cad (Computer-Aided Design) Through the Richpeace Digital Application Program in Grading Clothing Patterns in the Fashion Design Education Study Program PKK FT Unimed

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Article Info	Abstract
	The fashion industry is rapidly evolving with the support of digital technologies such as Computer-Aided Design (CAD). This study evaluates the effectiveness of using the Richpeace Digital application in garment pattern grading among students of the Fashion Education Study Program at the Faculty of Engineering, State University of Medan. The method employed is a quantitative pre-experimental design with two groups: an experimental group using the CAD application and a control group using manual methods. Data were collected through questionnaires, interviews, and documentation. The results show that the use of Richpeace Digital increased the speed of grading pattern completion by up to 50% compared to manual methods. Additionally, the accuracy of the patterns improved significantly with a reduction in measurement errors. Reliability testing yielded a Cronbach's Alpha value above 0.90, indicating highly reliable instruments, while normality tests showed normally distributed data. Simple linear regression analysis revealed a positive, albeit weak ($R = 0.155$), relationship between basic computer skills and the effectiveness of CAD application use. The application also significantly enhanced students' technical skills and motivated their interest in digital pattern grading. This study recommends integrating the Richpeace An abstract is a brief summary of a research article, thesis, review, conference proceeding or any-depth analysis of a particular subject or disipline, and is often used to help the reader quickly ascertain the paper purposes. When used, an abstract always appears at the beginning of a manuscript or typescript, acting as the point-of-entry for any given academic paper or patent application. Absatrcting and indexing services for various academic discipline are aimed at compiling a body of literature for that particular subject. Abstract length varies by discipline and publisher requirements. Abstracts are typically sectioned logically as an overview of what appears in the paper.

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1. INTRODUCTION

The fashion and apparel industry is one of the sectors that has experienced rapid development in recent decades. Technological advances, particularly in digitalization, have significantly impacted various production processes within this industry. One technological innovation widely used in the fashion industry is Computer-Aided Design (CAD), which

enables digital design and pattern creation with a high degree of precision and efficiency. The use of CAD has transformed the traditional manual and time-consuming process of patternmaking into a faster, more accurate, and error-free process (Wening & Kusumadewi, 2023).

Fashion design education, as part of vocational education, plays a crucial role in preparing a skilled workforce capable of adapting to technological developments. Fashion design curricula at universities and training institutions are now beginning to integrate the use of CAD software to support the learning process, particularly in pattern creation and grading. Pattern grading is the process of adjusting the dimensions of a basic pattern to various sizes, such as S, M, L, and XL, which is crucial for mass-producing garments for various body sizes. This process requires high precision to ensure the pattern's proportions remain appropriate and comfortable to wear (Setiawati & Shofwan, 2023).

Although CAD has been proven to provide numerous benefits in the industry, its implementation in fashion education still faces challenges. Some educational institutions still use inefficient manual methods and risk pattern errors (Fitrinaldi et al., 2024). Therefore, this study aims to evaluate the effectiveness of using Richpeace Digital as a CAD software application for fashion pattern grading. Richpeace Digital is known for its superior features that can automate the grading process and increase the speed and accuracy of the work.

This research is crucial to provide an empirical overview of the impact of CAD technology implementation in fashion design learning. By understanding its effectiveness, it is hoped that educational institutions can optimally adopt this technology to improve the quality of graduates who are ready to compete in the modern fashion industry. Furthermore, students' understanding of digital technology will also improve, providing them with relevant and up-to-date technical skills.

This study used a quantitative approach with a pre-experimental design. The subjects were students of the Fashion Design Education Study Program, Faculty of Engineering, State University of Medan, who were taking a course on fashion pattern grading. Data collection methods included questionnaires, interviews, and documentation of pattern work results. The data were analyzed to determine the difference in effectiveness between using the Rich peace Digital application and manual methods.

The research questions are: Is the use of CAD through the Rich peace Digital application effective in the fashion pattern grading process? How much influence does this application have on the speed and accuracy of fashion pattern creation? With these questions, this research attempts to address the challenges of implementing digital technology in fashion design education.

The benefits of this research are divided into two aspects: theoretical and practical. Theoretically, this research is expected to add to the literature and references regarding the application of CAD technology in fashion education and contribute to the development of theories on the effectiveness of technology-based learning. Practically, the results of this study can serve as a reference for lecturers and educational institutions in developing innovative learning methods relevant to industry developments. Students are also expected to improve their technical skills and understanding through the use of this digital application.

Thus, this research is a strategic step in integrating modern technology into the fashion design learning process, supporting the improvement of the quality of human resources in the fashion sector, and preparing competent graduates who are ready to face the challenges of Industry 4.0.

2. RESEARCH METHODS

A. Types and Design of Research

This study employed a quantitative method with a pre-experimental design approach. This type of research was chosen because it aimed to assess the effectiveness of using the Rich peace Digital CAD application in the fashion pattern grading process (Hidayat, 2015). The pre-experimental design used was a pretest-posttest design with two groups: The experimental group used the Rich peace Digital CAD application in grading fashion patterns, the control group used manual methods in grading fashion patterns.

The research design can be simply described as follows:

Group	Pretest (X)	Treatment	Posttest (Y)
Experiment	X1 (Initial Value)	Using CAD applications	Y1 (Final Grade)
Control	X2 (Initial Value)	Using the manual method	Y2 (Final Grade)

This design aims to measure changes in students' fashion pattern grading abilities before and after using CAD applications, and to compare them with manual methods.

The population in this study was all fifth-semester students of the Fashion Design Education Study Program, Faculty of Engineering, State University of Medan, in the 2025/2026 academic year. The sample was taken randomly from classes taking the fashion pattern grading course. The sample was divided into two groups based on treatment.

The instruments used in this study include: 1) A questionnaire to measure students' perceptions of the effectiveness of using CAD applications, 2) Observation sheet (assessment rubric) to assess students' psychomotor skills in the pattern grading process using CAD applications, 3) Documentation in the form of pattern grading results from both groups to analyze differences in quality and processing time (Monalisa et al., 2025).

Data was collected through the following techniques: 1) Questionnaire: Compiled with a Likert scale to measure the effectiveness of application use from a student's perspective, 2) Observation: Using an observation sheet to observe the process and results of students' work when grading fashion patterns, 3) Interviews: Conducted in a structured manner with lecturers and students to support quantitative data, 4) Documentation: Collecting pattern grading results as evidence of the performance of each method (Gusti & Hilda, n.d.).

The data analysis used in this study is as follows:

1. Validity Test

To test the validity of the questionnaire instrument, the Pearson Product-Moment correlation formula is used:

$$r_{xy} \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum and^2 - (\sum and)^2]}}$$

Where:

r_{xy} = correlation coefficient between item score and total score

n = number of respondents

x = score on a particular item

y = total questionnaire score

If $r_{xy} >$ table at a significance level of 0.05, the item is considered valid.

2. Reliability Test

The reliability of the questionnaire was tested using the Cronbach's Alpha formula:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum S_i^2}{S_t^2}\right)$$

Where:

k = number of items

S i2 = variance of each item

S t2 = total variance of questionnaire scores

A value ≥ 0.70 is considered reliable.

3. Normality Test

The normality test was performed using the Chi-Square (χ^2) test:

$$X^2 = \sum \frac{(fo - fe)^2}{fe}$$

Where:

fo = observation frequency

fe = expected frequency

If $_{count} <$ x$_{table2}$ then the data is normally distributed.

4. Hypothesis Testing with Simple Linear Regression

To test the relationship between basic computer skills (independent variable) and the effectiveness of using CAD applications (dependent variable), simple linear regression was used with the equation:

$$And = a + bX$$

Where:

Y^ = predicted value of the dependent variable

a = constant (intercept)

b = regression coefficient

X = independent variable (basic computer skills)

The regression coefficient is tested using the t-test:

$$t = \frac{b}{SE_b}$$

Were

SEb is the standard error of the regression coefficient.

B. Research Procedures

The research steps are:

1. Determine the sample randomly and divide it into two groups.
2. Conduct a pretest to measure initial fashion pattern grading skills.
3. Providing treatment to the experimental group using the Richpeace Digital application, while the control group used the manual method.
4. Conduct a posttest by measuring the results of the fashion pattern grading.
5. Collecting data through questionnaires, observation, and documentation.
6. Conduct data analysis using validity, reliability, normality, and simple linear regression tests to test the hypothesis.
7. Conclude the effectiveness of using CAD applications.

3. RESULTS AND DISCUSSION

This section explains the research results and provides a comprehensive discussion. Results can be presented in the form of images, graphs, tables, and other forms, making them easier for readers to understand [2, 5]. The discussion can be divided into several subchapters.

3.1. Research result

1. Pattern Grading Speed Improvement

One of the key findings of this study was the improvement in pattern grading speed. The results showed that using the Rich peace Digital Computer-Aided Design (CAD) application accelerated the pattern grading process by approximately 50% compared to manual methods. This increase in speed demonstrates that digital technology plays a significant role in improving student work efficiency in the process of creating and developing clothing patterns (Maysella et al., 2021).

In the manual method, pattern grading involves redrawing the base pattern in various sizes using tools such as rulers, pencils, and pattern paper. Each size change must be calculated and applied individually, thus requiring considerable time. Furthermore, the manual process demands a high level of precision and complete concentration, as even small measurement errors can affect the overall pattern outcome. This often results in students needing additional time to make corrections or redo patterns (Arifiana, 2021).

Unlike manual methods, the Rich peace Digital CAD application provides automation features that enable faster and more efficient pattern grading. Features such as grading rules, grading points, and auto-grading allow the system to automatically adjust dimensions based on predetermined parameters. Students simply enter the base dimensions and desired size range, and the system will instantly generate patterns in various sizes. This process significantly reduces the processing time previously spent on manual drawing and calculations (Sugandi et al., 2020).

The 50% speed increase achieved in this study demonstrates that CAD not only accelerates the technical process of pattern grading but also optimizes student workflow. The saved time can be used to evaluate pattern results, refine details, and gain a deeper understanding of grading concepts. Thus, CAD serves not only as a work tool but also as an effective learning tool.

These findings align with the theory of CAD use in the fashion industry, which states that computer-based technology can increase productivity by automating work processes. CAD is designed to reduce repetitive and time-consuming manual work processes, allowing users to work faster without sacrificing quality. In the context of fashion design education, increased pattern grading speed is an indicator of students' ability to adapt to the technology used in the industry.

Furthermore, the increased speed of pattern grading also positively impacts student learning motivation. Students no longer feel burdened by the lengthy and tedious grading process, allowing them to focus more on conceptual understanding and design creativity. This contributes to a more effective, efficient, and enjoyable learning environment.

Thus, it can be concluded that the 50% increase in pattern grading speed is a clear demonstration of the effectiveness of using the Rich peace Digital CAD application. The application of this technology overcomes the limitations of manual methods and positively contributes to improving the quality of learning and preparing students to face the demands of the modern fashion industry.

2. Improved Accuracy of Pattern Results

Another important finding of this study was the improvement in pattern accuracy. The results showed that using the Rich peace Digital Computer-Aided

Design (CAD) application produced clothing patterns with a higher level of accuracy and precision compared to manual methods. Accuracy in pattern grading significantly impacts the final quality of the garment, as errors in size or proportions can lead to inappropriate fit when worn (Khasanah et al., 2024).

In manual methods, the pattern grading process relies heavily on individual accuracy in calculating and transferring measurements from one pattern to another. Misreading errors, inaccurate use of measuring tools, and physical fatigue often lead to inconsistencies in measurements between patterns. Furthermore, subjectivity and limited technical skills can also affect the accuracy of manual pattern grading results (Manurung et al., 2024).

The use of the Richpeace Digital CAD application can minimize these errors through a mathematically programmed digital calculation system. Each size change is made based on predetermined grading points and grading rules. This system ensures that each size adjustment is made consistently and proportionally, resulting in patterns with a high degree of accuracy at every size (Chalik & Darmayunata, 2025a).

The results of pattern grading using CAD show that the size and shape of the pattern remain balanced between each dimension. This consistency is difficult to achieve using manual methods, especially when the number of dimensions required increases. With CAD, students can ensure that all the resulting patterns have uniform proportions without the need for repeated recalculations.

In addition to improving dimensional accuracy, CAD also enhances the precision of lines and pattern details. The resulting pattern lines are neater, clearer, and more precisely aligned with the initial design. This simplifies the fabric cutting and sewing process, as accurate patterns minimize errors in subsequent production stages. Thus, CAD directly contributes to improving the quality of student work.

Reducing human error is one of the main advantages of using CAD in fashion pattern grading. Digital technology can operate stably and consistently, regardless of the user's physical or psychological condition. As long as the data entered is correct, the system will produce accurate and precise pattern output. This is especially helpful for students who are still learning and need systematic guidance.

These findings align with the theory of CAD use in fashion design and production, which states that digital technology can improve the quality of work through increased accuracy and consistency. In the context of fashion education, the increased accuracy of pattern results demonstrates that CAD serves not only as a tool but also as an effective learning tool in developing students' technical skills.

Thus, it can be concluded that the use of the Rich peace Digital CAD application has been proven to significantly improve the accuracy of fashion pattern grading results. This improvement supports the achievement of higher quality standards in fashion design education and prepares students to meet the demands of the fashion industry, which prioritizes accuracy and precision.

3. **Work Efficiency and Pattern Neatness**

Work efficiency and pattern neatness are crucial aspects of the fashion pattern grading process, particularly in the context of professional fashion learning and production. Research shows that the use of Rich peace Digital's Computer-Aided Design (CAD) application not only improves speed and accuracy but also significantly contributes to work efficiency and pattern neatness. This efficiency is reflected in savings in time, effort, and resources used during the pattern grading process (Isnaini & Wahmuda, 2020).

With manual methods, the pattern grading process requires lengthy and repetitive work steps, from redrawing the pattern, calculating size adjustments, and making corrections if errors occur. Any changes or revisions to the pattern must be made by redrawing the entire piece, requiring additional time and effort. Furthermore, repeated use of pattern paper wastes material and increases the risk of pattern damage due to tears or creases (Christianto, 2020).

Using the Rich peace Digital CAD application can address these issues through an integrated digital work system. Pattern grading can be done within a single work file without the need for a separate work file. Redrawing the pattern from scratch. If an error occurs or a size change is required, students simply edit specific parameters, and the system automatically updates all pattern dimensions. This demonstrates that CAD offers greater work efficiency than manual methods.

In addition to increased work efficiency, the Rich peace Digital application also produces patterns with a higher level of neatness. The resulting pattern lines appear cleaner, more symmetrical, and more precise. This neatness is difficult to achieve consistently using manual methods, especially for students who are still learning. Neat patterns facilitate the process of reading patterns, cutting fabric, and assembling garment parts in subsequent production stages (Liliawati et al., 2025).

The neatness of the resulting pattern is also closely related to work professionalism. Patterns produced using CAD reflect the work standards of the modern fashion industry, which demand precision, cleanliness, and consistency. By familiarizing students with CAD applications, they are indirectly trained to work according to industry standards, thus enhancing their readiness for the world of work.

The work efficiency achieved by CAD also improves the quality of learning. Time previously spent redrawing and correcting errors can be diverted to other learning activities, such as pattern analysis, design development, and grading concept discussions. This makes the learning process more effective and oriented toward understanding, rather than simply completing assignments (Chalik & Darmayunata, 2025b).

These findings align with the theory of work efficiency in the use of digital technology, which states that computer-based systems can simplify work processes and reduce resource waste. In the context of fashion design education, the use of CAD not only increases technical efficiency but also fosters systematic and professional work patterns in students.

Thus, it can be concluded that the use of the Rich peace Digital CAD application has been proven to improve work efficiency and produce neater, more structured patterns. The application of this technology provides tangible benefits in the learning process of fashion pattern grading and supports the development of student competencies according to the needs of the modern fashion industry.

4. **Results of Instrument Validity and Reliability Tests**

Validity and reliability tests were conducted to ensure the validity and reliability of the questionnaire used in this study as a data collection tool. The research instruments consisted of a questionnaire on the effectiveness of using the Rich peace Digital CAD application and a questionnaire on students' basic computer skills.

a. Instrument Validity Test Results

The validity test results indicate that all statements in the research instrument are valid. This is indicated by the calculated r value for each item, which is greater than the table r value at a significance level of 0.05. Thus, all statement items accurately measure the variables studied and align with the research objectives.

In general, the calculated r values obtained were in the moderate to high range, indicating a strong correlation between the scores for each item and the total score. This indicates that each statement in the questionnaire significantly contributed to measuring the variables of effectiveness in using CAD applications and basic computer skills.

A summary of the instrument validity test results is presented in the following table.

Table 3.1 Results of Instrument Validity Test

No.	r count	r table	Information
1	0,612	0,361	Valid
2	0,684	0,361	Valid
3	0,725	0,361	Valid
4	0,701	0,361	Valid
5	0,659	0,361	Valid
6	0,733	0,361	Valid
7	0,688	0,361	Valid
8	0,742	0,361	Valid
9	0,695	0,361	Valid
10	0,718	0,361	Valid

Based on these results, it can be concluded that all statement items in the research questionnaire have met the validity criteria and are suitable for use as data collection instruments.

b. Instrument Reliability Test Results

Reliability testing was conducted to determine the level of consistency of the research instrument in measuring the same variables under different conditions. The results of the reliability test indicated that the research instrument had a very high level of reliability.

The Cronbach's Alpha values obtained for the Rich peace Digital CAD application effectiveness and basic computer skills variables were each above 0.90. These values fall into the highly reliable category, indicating that the instrument is capable of providing consistent and stable measurement results.

A summary of the results of the instrument reliability test is presented in the following table.

Table 3.2 Results of Instrument Reliability Test

Variables	Cronbach's Alpha	Category
Effectiveness of Using Rich peace Digital CAD	> 0,90	Very Reliable
Basic Computer Skills	> 0,90	Very Reliable

Based on the results of the reliability test, it can be concluded that the research instrument has a very good level of reliability and can be used as a data collection tool in this study without the need for repair or replacement of items.

5. **Normality Test Results**

A normality test was conducted to determine whether the research data were normally distributed, as one of the requirements for parametric statistical analysis. The data tested included the effectiveness of the Rich peace Digital CAD application and students' basic computer skills.

The results of the normality test indicate that all research data are normally distributed. This is indicated by a significance value greater than 0.05. Thus, the data meet the assumption of normality and are suitable for further statistical analysis.

A summary of the normality test results is presented in the following table.

Table 4.3 Results of Data Normality Test

Variables	Significance Value	Information
Effectiveness of CAD Usage	> 0,05	Normally Distributed
Basic Computer Skills	> 0,05	Normally Distributed

Based on the results of the normality test, it can be concluded that the research data meet the normality requirements, so that simple linear regression analysis can be carried out in the next stage.

6. **Simple Linear Regression Analysis Results**

A simple linear regression analysis was conducted to determine the effect of basic computer skills on the effectiveness of using the Rich peace Digital CAD application in the fashion pattern grading process. The analysis results showed a positive relationship between the two variables.

The correlation coefficient obtained was R = 0.155, indicating that the relationship between basic computer skills and the effectiveness of CAD application use was positive but weak. This indicates that improvements in basic computer skills tend to be followed by improvements in the effectiveness of CAD application use, although the effect is not very large.

The coefficient of determination obtained was R Square = 0.024. This value indicates that basic computer skills contribute 2.4% to the effectiveness of using the Rich peace Digital CAD application, while the remaining 97.6% is influenced by other factors outside the research variables.

The results of the significance test show that the significance value is less than 0.05, so it can be concluded that basic computer skills have a significant effect on the effectiveness of using the Rich peace Digital CAD application.

A summary of the results of the simple linear regression analysis is presented in the following table.

Table 4.4 Results of Simple Linear Regression Analysis

Variables	R	R Square	Sa y.	Information

Basic Computer Skills on CAD Effectiveness	0,155	0,024	< 0,05	Significant Influence

Based on these results, it can be concluded that although the influence of basic computer skills on the effectiveness of using CAD applications is relatively low, this variable still has a role as a supporting factor in the use of CAD technology in the fashion pattern grading process.

7. **Improving Student Interest and Skills**

The research results show that the use of the Rich peace Digital CAD application in fashion pattern grading learning has a positive impact on increasing student interest and skills. Based on the analyzed questionnaire results, the majority of students responded positively to the use of the CAD application in the learning process.

The increased interest in learning among students was evident in their enthusiasm and active engagement throughout the learning process. Students demonstrated greater interest in fashion pattern grading when using digital applications compared to manual methods. Technology-based learning was deemed more engaging, modern, and less boring, encouraging students to focus and actively participate in learning activities.

In addition to increased interest, students' technical skills also improved significantly. Students became more skilled in operating the Rich peace Digital CAD application, particularly in digitally grading clothing patterns. Students' abilities to determine grading points, adjust measurements, and produce neat and accurate patterns demonstrate improved psychomotor skills after using the CAD application.

Observations also showed that students grasped the pattern grading workflow more quickly when using digital visualization. The sizing process can be seen directly on the screen, making it easier for students to understand the relationship between pattern size and proportion. This has resulted in increased student confidence in completing clothing pattern grading assignments.

A summary of the results of increasing student interest and skills is presented in the following table.

Table 4.5 Results of Increasing Student Interest and Skills

Rated aspect	Results
Student Learning Interest	Increase
CAD Operating Skills	Increase
Understanding Pattern Grading Concepts	Increase
Activeness in Learning	Increase

Based on these results, it can be concluded that the use of the Rich peace Digital CAD application not only improves the technical effectiveness of fashion pattern grading but also positively contributes to improving students' learning interest and skills. This demonstrates that the application of CAD technology in fashion design learning is highly relevant and supports the development of student competencies in line with the needs of the modern fashion industry.

3.2.Discussion

1. **The Effectiveness of CAD in Increasing Work Speed**

    The results of the study showed that the use of the Rich peace Digital Computer-Aided Design (CAD) application was able to increase the speed of the fashion pattern grading process by up to ± 50% compared to the manual method. This increase is a key indicator that the application of digital technology has a significant impact on student work efficiency in the pattern grading process. In the manual method, students must redraw the pattern for each size in stages, which requires high accuracy and a relatively long processing time. This process is also often hampered by physical fatigue and concentration, thus potentially slowing down the completion of the work.

    In contrast, the Richpeace Digital application offers automation features such as size rules, grading points, and auto-grading, allowing for quick and consistent size adjustments. Students simply enter basic measurement data, and the system automatically develops the pattern to the desired size range. This frees up time previously spent on manual drawing to evaluate and refine the pattern. This efficiency concretely explains why work speeds have increased by up to 50%.

    These findings align with the theory of CAD use in the fashion industry, which states that computer-based technology can significantly reduce production time through the automation of work processes. CAD functions not only as a drawing aid but also as an integrated work system that simplifies production stages. Therefore, the speed improvements achieved in this study are not merely technical in nature but also demonstrate a paradigm shift from manual to digital work.

    Furthermore, increased work speed also impacts student productivity. With shorter processing times, students have the opportunity to practice more, explore design variations, and understand grading concepts more deeply. This demonstrates that the effectiveness of CAD lies not only in the final result but also in a more efficient and meaningful learning process.

2. **The Role of CAD in Improving Accuracy and Precision**

    In addition to increasing work speed, the use of the Rich peace Digital CAD application has also been proven to improve the accuracy and precision of clothing pattern grading results. Pattern accuracy is crucial in clothing manufacturing, as even the slightest error in measurements can impact the comfort and fit of the garment. With manual methods, measurement errors often occur due to human factors, such as inattention, misreading the scale, or inconsistencies when transferring measurements from one pattern to another.

    The research results show that pattern grading using CAD produces more consistent and proportional measurements across sizes. This is due to the digital calculation system used by the Rich peace Digital application, where each size change follows a mathematically determined formula and grading point. This significantly minimizes the risk of uneven size differences.

    Reducing human error is one of the main advantages of using CAD. Digital technology can operate precisely regardless of the user's physical or psychological condition. As long as the measurement data is entered correctly, the system will produce patterns with a high degree of accuracy. This offers significant advantages, especially in educational contexts where students are still mastering basic skills.

    These findings reinforce the view that CAD is an effective solution for improving the quality of work in fashion patternmaking. The resulting accuracy and precision not only support learning needs but also reflect the working standards of the modern fashion industry. Therefore, the use of CAD in fashion design education

is a strategic step in aligning student competencies with the demands of the workplace.

3. Positive Impact on the Learning Process

The use of the Rich peace Digital CAD application has had a significant positive impact on the learning process of fashion pattern grading. Previously, conventional and monotonous learning has become more interactive, engaging, and relevant to technological developments. Students not only learn to draw patterns but also understand the digital workflows used in today's fashion industry.

The digital visualization provided by CAD applications helps students understand the concept of pattern grading more clearly. Size changes can be seen directly on the screen, allowing students to easily observe the differences in proportion between sizes. This differs from manual methods, which often make it difficult for students to visualize the final result before the pattern is fully drawn.

Furthermore, the use of CAD also increases student motivation and interest in learning. Based on the results of the questionnaire, the majority of students expressed greater interest and enthusiasm in participating in pattern grading lessons using digital applications. This interest contributes to increased student engagement in the learning process, which ultimately has a positive impact on learning outcomes.

From a pedagogical perspective, the application of CAD aligns with the principles of technology-based learning, which emphasize 21st-century skills, such as digital literacy, problem-solving, and critical thinking. Students are not only required to follow instructions but also to operate software, analyze work results, and conduct independent evaluations. Thus, CAD serves as a learning medium that not only improves technical skills but also students' cognitive and affective abilities.

4. The Relationship Between Basic Computer Skills and CAD Effectiveness

The results of a simple linear regression analysis showed a correlation value of R = 0.155, indicating a positive but weak relationship between basic computer skills and the effectiveness of using the Rich peace Digital application. Although the relationship was not strong, the results of statistical tests showed that the effect of basic computer skills remained partially significant.

The low correlation value indicates that the effectiveness of CAD use is not solely determined by basic computer skills. Other factors, such as user-friendly application interface design, lecturer guidance, and ongoing practice, also play a role in determining successful CAD use. This indicates that the Rich peace Digital application is relatively easy to learn, even for students with limited computer skills.

However, basic computer skills remain a crucial supporting factor. Students with a basic understanding of computer operation tend to adapt more quickly to CAD application features. They also feel more confident exploring the advanced functions available within the software. Therefore, although not a dominant factor, basic computer skills still need to be considered in implementing CAD-based learning.

These findings imply that basic computer training should still be provided to students before or concurrently with CAD instruction. This way, technical barriers can be minimized and the learning process can be more optimal.

5. Implications for Fashion Education

The results of this study have important implications for the development of fashion education, particularly in facing the challenges of the digital era and Industry 4.0. The effectiveness of CAD in improving the speed, accuracy, and quality of learning demonstrates that integrating digital technology into the curriculum is no longer an option, but a necessity.

Mastery of the Rich peace Digital CAD application is essential for students entering the modern fashion industry, which demands high efficiency and precision. Graduates with CAD skills will be more competitive than those who only master manual methods. Therefore, educational institutions need to seriously integrate CAD into relevant courses, particularly in fashion pattern creation and grading.

Furthermore, the results of this research can serve as a basis for developing more innovative, technology-based learning methods. Lecturers are expected to act not only as instructors but also as facilitators, guiding students in mastering digital technology. With adequate facilities and infrastructure, fashion design learning can be more effective and aligned with industry needs.

Thus, this study confirms that the use of the Rich peace Digital CAD application significantly contributes to improving the quality of learning and preparing students for the workforce. Integrating CAD technology into fashion design education is a strategic step toward producing competent, adaptable, and competitive graduates in the digital-based fashion industry.

4. CONCLUSION

Based on the results of research and discussion regarding the effectiveness of using the Rich peace Digital CAD application in the fashion pattern grading process, it can be concluded that the application of Computer-Aided Design technology has a significant positive impact on the learning process and student work results.

The use of the Rich peace Digital CAD application has been shown to increase the speed of fashion pattern grading by approximately 50% compared to manual methods. This demonstrates the CAD application's automation features are highly effective in reducing processing time and improving student work efficiency.

In addition to increasing speed, CAD can also improve the accuracy and precision of pattern production. The resulting patterns are more consistent across sizes, proportional, and minimize measurement errors. Reducing human error is a key advantage of CAD technology over manual methods.

Using the Rich peace Digital CAD application also improves work efficiency and pattern neatness. The grading process is more systematic, pattern revisions can be made easily, and the resulting patterns are neater and meet modern fashion industry standards.

The research instrument used was declared feasible and reliable. All questionnaire items were declared valid, and reliability tests showed a Cronbach's Alpha value above 0.90, which is considered highly reliable. Normality tests indicated that the research data were normally distributed, making them suitable for further analysis.

The results of a simple linear regression analysis indicate a positive relationship between basic computer skills and the effectiveness of CAD application use, with a correlation value of R = 0.155. Although the relationship is relatively weak and only contributes 2.4%, basic computer skills still play a role as a supporting factor in the use of the Rich peace Digital CAD application.

Beyond the technical aspects, the use of CAD applications also has a positive impact on increasing student interest and skills. Students demonstrate a higher level of interest in learning, active engagement in learning, and improved technical skills in digitally grading clothing patterns.

Overall, this study concludes that the use of the Rich peace Digital CAD application is effective in learning fashion pattern grading. The integration of CAD technology into fashion education is highly recommended as an effort to improve the quality of learning, student skills, and graduate readiness to face the demands of the digital-based fashion industry.

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