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Fashion design education students' ability to create fashion patterns: investigating the effect of antecedent factors

Ernawati Ernawati^{*)}

Universitas Negeri Padang, Indonesia

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ABSTRACT

This study is based on the problem of many students having a low ability to create fashion patterns. This study aimed at the influence of knowledge, discipline, and facility on the fashion design education students' ability to create fashion patterns. The total population was 65 students that enrolled in the Fashion Pattern Construction of the Fashion Design Education Program of Universitas Negeri Padang. The sampling technique used in this study is total sampling. A total of 65 respondents were successfully collected. The data analysis technique used is Partial Least Square Structural Equation Modelling (PLS-SEM). The results showed that: There is an insignificant influence of knowledge on fashion design education students' ability to create fashion patterns. Meanwhile, there is a significant effect of discipline and facility on fashion design education students' ability to create fashion patterns. What could be said from the result of the study is that high discipline of students in the learning process and adequate facilities are owned by students and provided by the university could be increased fashion design education students' ability to create fashion patterns.



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Corresponding Author:

Ernawati Ernawati,

Universitas Negeri Padang

Email: ernawati@fpp.unp.ac.id

Introduction

One of the abilities that fashion education students need to have is creating fashion patterns. Creating a fashion pattern is the most important step in making ready-to-wear clothes. Without a pattern, an outfit could be made, but the result is not as good as expected. Patterns that match the size could produce clothes that fit the wearer's body. According to Yuan and Huh (2018), the notion of a pattern in the field of sewing is a piece of cloth or paper that is used as an example to create clothes. made of paper, which will be used as an example to cut someone's clothes, this body shape is called the archetype. The basic pattern is the basis for creating fashion patterns according to the desired model so knowledge about creating basic patterns is needed as an initial provision in making various kinds of clothing patterns (Kwon, 2018; Matthews-Fairbanks, 2018).

In achieving competence in creating fashion patterns, a fashion pattern construction course is given which is useful for improving students' ability to create fashion patterns. The ability to create fashion patterns is the ability of students to produce a fashion pattern that will be sewn into a garment. According to Emery (2014) creating a fashion pattern is not just a picture, but making a fashion pattern could be done starting by taking measurements to create the appropriate pattern from the size results obtained. In other words, the fashion pattern is a person's guide in realizing the actual form of clothing. It is clear that design pattern plays an

important role in making a garment. The ability to measure the body is the ability of students to carry out systematically, where the results of the assessment of these measurements could be used as guidelines/benchmarks in making pattern construction. According to Zhang et al. (2021), the size is adjusted to each system of the construction pattern to be drawn, however, the size is required in drawing the construction pattern. So, it could be concluded that the ability to create fashion patterns is the ability of students to quote the shape of a person's body which is then drawn on flat media, namely paper that is used as the subject or benchmark for making a dress and has not been changed according to the desired model.

Factors that could improve students' ability to create fashion patterns are knowledge (Azman et al., 2019; Ma et al., 2020; Zhang & Yang, 2021), discipline (Zhang & Liu, 2018), and facilities (Maryanti et al., 2020; Romlah & Latief, 2021). Efforts could be made to improve students' abilities to create patterns by providing clearer knowledge by lecturers to students. By gaining knowledge about the construction of fashion patterns, students could work on creating the expected fashion patterns. However, many students are currently following the theoretical learning process given by the lecturer in an unprepared condition (Baber, 2020; Dangol & Shrestha, 2019; Widodo et al., 2020). Most students who attend class only fulfill the quantity of attendance in the theoretical learning process without preparing themselves to follow the learning process properly. Whereas the implementation of this theory class is done to strengthen knowledge in carrying out the practice of creating fashion patterns. This requires a study to uncover matters relating to the student's ability to create fashion patterns as an outcome of the expected learning outcomes. Many students could not create good fashion patterns, such as measurements that are not precise and the resulting pattern is not following body posture.

Discipline is also a determining factor in students' ability to create fashion patterns (Duckworth et al., 2019). Utama et al., (2021) explained that learning discipline is the obedience of all students to carry out their learning obligations consciously so that changes occur in themselves. In the teaching and learning process, it is very necessary because it aims to prevent students from things that could interfere with the teaching and learning process. Discipline will create students who have the habit of doing good actions and could control their every action so that students will obey the rules in the learning stages including the stages in creating fashion patterns. Thus, students who are disciplined in carrying out the steps in creating fashion patterns will have an impact on student learning outcomes. It could also be obtained that the ability of students in creating fashion patterns could be formed.

Meanwhile, facilities are also a determining factor in improving students' abilities in creating fashion patterns. Without complete facilities, students could not do pattern-making properly. Learning facilities are facilities and infrastructure used to facilitate student learning activities (Garba et al., 2015; Sholihah, 2019). According to Ali (2018) places to study that do not meet the requirements, the climate or weather is hot and stinging, and the noisy environment will interfere with learning concentration. The teaching and learning process will run well if there are learning facilities and infrastructure that support the achievement of learning objectives. Likewise, the availability of equipment for making fashion patterns is a determining factor for students to have the ability to create fashion patterns. The availability of a pattern-making table, pattern-making paper, pencils, and rulers are equipment that is part of the facility which may be a factor that increases students' ability to create fashion patterns.

With this scenario, several questions arise: (1) How does the influence of knowledge on fashion design education students' ability to create fashion patterns? (2) How does the influence of discipline on fashion design education students' ability to create fashion patterns? and (3) How does the influence of facility on fashion design education students' ability to create fashion patterns? Previously studies have mainly focused on pattern cutting (Almond & Power, 2018; McQuillan, 2019; Murashko et al., 2018; Sgro, 2020), the learning process in pattern marking (Azman et al., 2019; Linet et al., 2021; Naznin et al., 2020; Sleem & Elwan, 2018) and fashion sketch and pattern (Kato et al., 2019; Lee & Kim, 2021; Liu et al., 2019). However, there is a lack of studies that focus on investigating the effect of antecedent factors that are knowledge, discipline, and facility toward the fashion design education students' ability to create fashion patterns. The results of this study are expected to provide empirical investigation regarding the factors that influence the fashion design education students' ability to create fashion patterns as a form of achieving the objectives of the learning process.

Method

This study was conducted with a quantitative approach. The type of study is causal research. The total population was 65 students that enrolled in the Fashion Pattern Construction (KKE1.61.1110) of the Fashion Design Program of Universitas Negeri Padang. The sampling technique used in this study is total sampling. The sample consisted of 100% female students. Most of the respondents (48 or 73.8%) were 20-21 years old

and 17 (26.2%) were above 21. The type of data used is primary and secondary data. The data collection technique was conducted through a questionnaire to students and assessment results for students from the lecturer using 5 scales Likert. The variables of the study are theoretical knowledge, discipline, facility (independent variables), and ability to create fashion patterns (dependent variable). The instrument in this study was a Likert scale. The inferential analysis technique in this study used PLS-SEM (Partial Least Square Structural Equation Modelling).

Results and Discussions

This study has a limited sample size, so the data analysis uses SmartPLS software. SmartPLS used the bootstrapping method or multiplication random. Therefore, the assumption of normality will not be a problem. Besides that, by doing bootstrapping, SmartPLS does not require a minimum number of samples, so it could be applied to research with a small number of samples. PLS-SEM analysis consists of two sub-models, namely the measurement model or outer model and the structural model or inner model.

Measurement Model

Hair et al. (2017) stated that the measurement model assessment is used to assess the latent or unobservable concept that caused changes in the observable indicators. During the process of evaluating reflective measuring models, four factors had to be completed and recorded as statistics: (1) internal consistency reliability, (2) indicator reliability, (3) convergent validity, and (4) discriminant validity (Hair et al., 2017). A measurement model was undertaken, and the result as shown in figure 1 and Table 1 reports the outer loading, indicator reliability, composite reliability, AVE scores, and the Cronbach Alpha value.

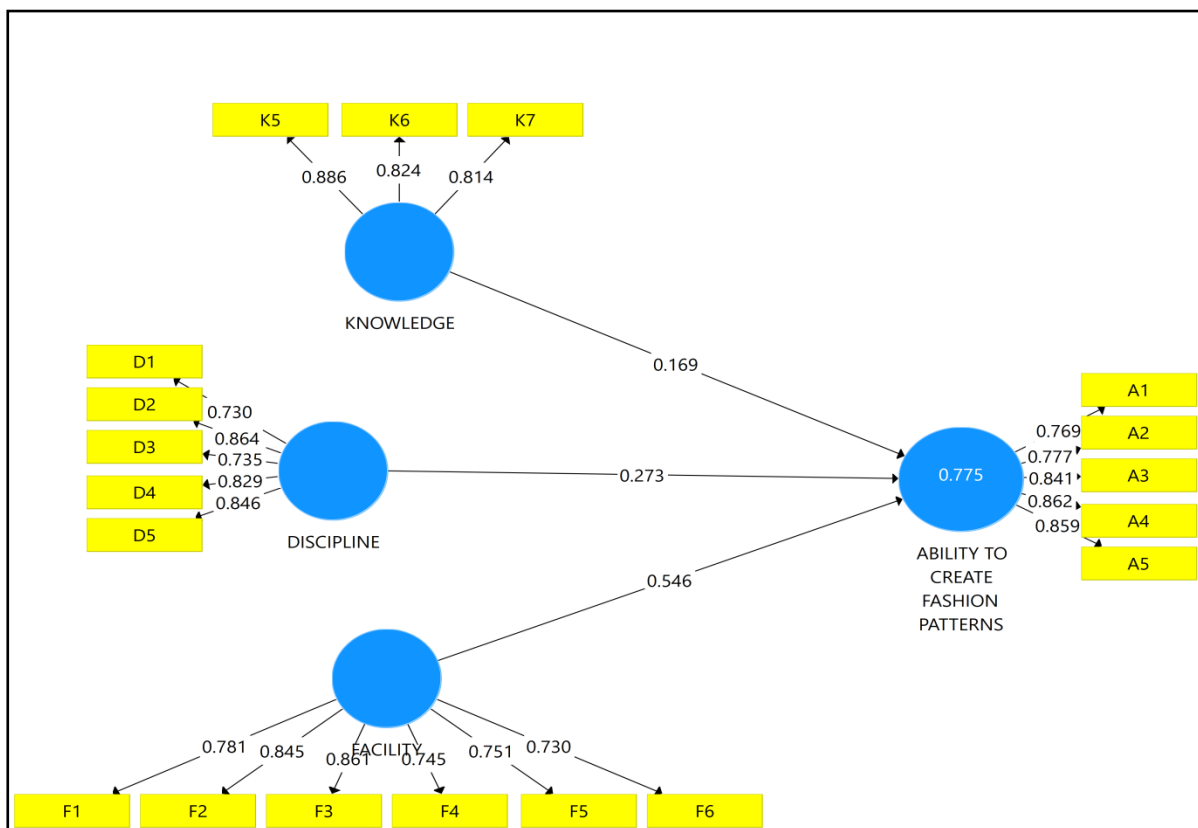


Figure 1. Measurement Model

Table 1. Measurement Model

Latent Variable	Indicators	Mean	S. D	Outer Loadings	Cronbach Alpha	Composite Reliability	AVE
Knowledge	K5	3.91	0.655	0.886	0.795	0.879	0.709
	K6	3.86	0.682	0.824			
	K7	3.71	0.744	0.814			
<i>Item removed: K1, K2, K3</i>							
Discipline	D1	4.00	0.612	0.730	0.860	0.900	0.644
	D2	4.03	0.611	0.864			
	D3	4.22	0.673	0.735			
	D4	4.08	0.620	0.829			
	D5	3.78	0.624	0.846			
<i>Item removed: D6</i>							
Facility	F1	3.45	0.936	0.781	0.876	0.907	0.620
	F2	3.54	0.985	0.845			
	F3	3.72	0.839	0.861			
	F4	3.98	0.718	0.745			
	F5	3.89	0.640	0.751			
	F6	3.97	0.612	0.730			
Ability to Create Fashion Patterns	A1	3.92	0.620	0.769	0.880	0.913	0.677
	A2	3.91	0.678	0.777			
	A3	3.85	0.667	0.841			
	A4	3.88	0.696	0.862			
	A5	3.97	0.585	0.859			

Based on Table 1, Cronbach's Alpha value of knowledge (0.795), discipline (0.860), facility (0.876), and ability to create fashion patterns (0.880), while the composite reliability value of knowledge (0.879), discipline (0.900), facility (0.907) and ability to create fashion patterns (0.913), this indicates that internal consistency reliability is accepted because Cronbach's Alpha value and composite reliability are higher than 0.70. Next, all items loaded are also acceptable significantly (outer loadings ranging from 0.730 to 0.886) onto their respective factors, verifying their indicator reliability. The measurement model used to collect respondents' data had sufficient convergent validity based on the AVE values. The AVE values of knowledge (0.709), discipline (0.644), facility (0.620), and Ability to Create Fashion Patterns (0.677) were well above the required minimum level of 0.50.

The outer loadings exceeded the recommended value of 0.5 (Hair et al., 2017), and the CR values are greater than 0.7 (Hair et al., 2017). The AVE value also exceeds the Hair et al. (2017) recommended value of 0.5. The results showed acceptable reliability and convergent validity for the study constructs. Next, discriminant validity was evaluated using two criteria: Fornell and Larcker's (1981) criteria and the Chin (1998) cross-loadings criteria. Based on the Fornell-Larcker assessment, all off-diagonal elements are lower than the AVE's square roots (bolded on the diagonal), which met the criteria stipulated by Fornell and Larcker (1981). Meanwhile, the cross-loading output confirms the measurement model's discriminant validity, based on the second assessment (Chin, 1998). This study is, therefore, indicating that the measurement model is discriminately valid.

Structural Model

The second evaluation in the PLS-SEM analysis is the structural modeling or path analysis in response to the proposed hypothesis. This research aims to establish the influence of fashion design education on students' ability to create fashion patterns. Table 2 reports the structural model with the result of path coefficients, T-statistic and significance levels of the proposed hypothesis (the result of Bootstrapping). The path coefficients are acceptable when their significance is at least at the 95% confidence level. Based on the path analysis output (Table 3), all hypotheses are accepted.

Table 2. Path Coefficients, Observed T-statistics, and Significance Levels

Path Analysis		Path Coefficient B	T Statistics	P Values	Result
H ₁	Knowledge -> Ability to Create Fashion Patterns	0.164	1.798	0.073	Reject
H ₂	Discipline -> Ability to Create Fashion Patterns	0.281	6.747	0.003	Accept
H ₃	Facility -> Ability to Create Fashion Patterns	0.544	14.459	0.000	Accept

* $p < .05$, ** $p < .01$, *** $p < 0.001$

The results of the path coefficients which respond to the hypotheses showed that knowledge is showing an insignificant effect on the fashion design education students' ability to create fashion patterns ($\beta = 0.164$ and $t = 1.798$). Meanwhile, discipline is showing a significant effect on the fashion design education students' ability to create fashion patterns ($\beta = 0.281$ and $t = 6.747$) and the facility is showing a significant effect on the fashion design education students' ability to create fashion patterns ($\beta = 0.544$ and $t = 14.459$).

The results coefficient of determination (R^2) showed a substantial amount of variance (R^2 values 0.775) in fashion design education students' ability to create fashion patterns that could be explained by the proposed predictor (knowledge, discipline, and facility). Referring to Figure 1 the knowledge, discipline and facility were able to explain 77.5% ($R^2 = 0.775$) of the variance in fashion design education students' ability to create fashion patterns. The effect size function (f^2), which is similar to the traditional partial F-test, explains the increases in R^2 relative to the proportion of variance of the dependent variable that remains unexplained. In Table 3, the f^2 column revealed that the relations presented effect sizes.

Table 3. f^2 - Factor of the research model

	f^2 Ability to Create Fashion Patterns	Effect size
Knowledge	0.058	Weak
Discipline	0.153	Moderate
Facility	0.670	Substantial

Notes: f^2 values of 0.02=weak; 0.15=moderate; and 0.35=substantial.

The result from Table 3 above, there is a weak effect for the significant paths of knowledge toward the ability to create fashion patterns among education students, a moderate effect for the significant paths of discipline toward the ability to create fashion patterns among education students, and a substantial effect for facility toward the ability to create fashion patterns among education students.

Values of q^2 of 0.02, 0.15, and 0.35 indicate exogenous constructs as small, medium, or large predictive relevance for a selected endogenous construct (Hair et al., 2022). The result of test predictive relevance (q^2) is illustrated in Table 4.

Table 4. Test of predictive relevance (q^2)

Independent Variable	Ability to Create Fashion Patterns
Knowledge	
Discipline	0.502
Facility	

The result for q^2 is explained in Table 4. An omission distance of seven implies that every 7 data points of the target construct are eliminated in a single blindfolding round. Using the omission distance of 7, this study obtains a q^2 value of 0.502 for the ability to create fashion patterns among education students, which is the ability to create fashion patterns among fashion design education students indicative of a large predictive model. The higher the value of q^2 , the greater the predictive relevance of the structural model. In this sense, the independent variables (knowledge, discipline, and facility) proposed in this study are predictors of the ability to create fashion patterns among fashion design education students.

The Influence of Knowledge Toward Fashion Design Education Students' Ability to Create Fashion Patterns

H₁ as the first hypothesis proposed a causal relationship between knowledge and the fashion design education students' ability to create fashion patterns. An insignificant relationship appeared between knowledge and fashion design education students' ability to create fashion patterns with $\beta = 0.164$ and $t = 1.798$, $p > 0.05$. With

that, hypothesis H₁ is not supported. Despite this, with the positive beta values, it could be said that fashion design education students believed knowledge is given an impact on their ability to create fashion patterns. What could be said from this result is that knowledge is an integral part of supporting fashion design education students' ability to create fashion patterns, therefore students in this study probably think that knowledge is no longer a consideration in achieving students' ability to create fashion patterns. Students may think that knowledge is something that must be obtained from lecturers who are experts in their fields in the learning process and no longer need to be the focus of attention in improving their ability to create fashion patterns. This finding in a way supports the notion of Azman et al. (2019) that knowledge is important for designers, pattern-making knowledge is one of the hands-on knowledge areas that designers should understand and be able to apply in a real-life situation. Without this knowledge, the production of garments would not be able to start.

The Influence of Discipline Toward Fashion Design Education Students' Ability to Create Fashion Patterns

H₂ as the second hypothesis proposed a causal relationship between discipline and the fashion design education students' ability to create fashion patterns. This proposition made is also based on the belief that discipline could influence fashion design education students' ability to create fashion patterns. The result showed a significant influence of discipline on the fashion design education students' ability to create fashion patterns ($\beta = 0.281$ and $t = 6.747$, $p < 0.05$) and thus supported hypothesis H₂ of the study. This result, in general, demonstrated that discipline has given a significant impact on the fashion design education student's ability to create fashion patterns. What could be said here is that the high discipline of fashion design education students could be increased their ability to create fashion patterns. This finding is consistent with Hagger and Hamilton (2019) that self-discipline is a predictor of effort and academic attainment as well as student ability to create fashion patterns in this contextual study.

The Influence of Facility Toward Fashion Design Education Students' Ability to Create Fashion Patterns

Lastly, H₃ is looking at the causal relationship between the facility and the fashion design education students' ability to create fashion patterns. This hypothesis is supported when a significant relationship appeared between the predictor and a criterion variable ($\beta = 0.544$ and $t = 14.459$, $p < 0.05$). In this sense, the fashion design education students could able to create fashion patterns due to the influence of completeness of the facilities provided in the learning process. This finding is parallel with Sholihah (2019) that learning facilities and infrastructure are very important components in every educational activity especially to support success in teaching and learning activities as well as student ability to create fashion patterns in this contextual study.

Conclusions

It is clear from this study that knowledge does not give a significant effect on fashion design education students' ability to create fashion patterns. Meanwhile, the result of the study found that discipline and facility give a significant effect on fashion design education students' ability to create fashion patterns. Fashion design education students may feel that the facility meets their expectations has high discipline, and thus have a strong level of ability to create fashion patterns. The context of fashion design education students at Universitas Negeri Padang where most of the fashion design education students have an increased level of ability to create fashion patterns caused of the high discipline of students in the learning process and a adequate facilities are owned by students and provided by the university. This research implies that it is recommended that future research be carried out related to the fashion pattern technique, technology for fashion patterns, and design development of fashion.

References

- Ali, S. M. (2018). *Measured and Perceived Conditions of Indoor Environmental Qualities (IEQ) of University Learning Environments in Semi-arid Tropics*. University of Portsmouth.
- Almond, K., & Power, J. (2018). Breaking the rules in pattern cutting: an interdisciplinary approach to promote creativity in pedagogy. *Art, Design & Communication in Higher Education*, 17(1), 33–50. https://doi.org/10.1386/adch.17.1.33_1
- Azman, S. M. S., Arsat, M., & Suhairom, N. (2019). Integrating innovation in pattern making teaching and learning for higher education in fashion design. *Innovative Teaching and Learning Journal (ITLJ)*, 3(1), 70–77.
- Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning

- during the pandemic of COVID-19. *Journal of Education and E-Learning Research*, 7(3), 285–292.
- Chin, W. W. (1998). The Partial Least Squares Approach to Structural Equation Modeling. In *Modern methods for business research* (Vol. 2, pp. 295–336). <http://www.researchgate.net/publication/232569511>
- Dangol, R., & Shrestha, M. (2019). Learning readiness and educational achievement among school students. *The International Journal of Indian Psychology*, 7(2), 467–476.
- Duckworth, A. L., Taxer, J. L., Eskreis-Winkler, L., Galla, B. M., & Gross, J. J. (2019). Self-control and academic achievement. *Annual Review of Psychology*, 70, 373–399.
- Emery, J. S. (2014). *A history of the paper pattern industry: The home dressmaking fashion revolution*. Bloomsbury Publishing.
- Fornell, C., & Larcker, D. F. (1981). Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *Journal of Marketing Research*, 18(3), 382–388. <https://doi.org/10.1177/002224378101800313>
- Garba, S. A., Byabazaire, Y., & Busthami, A. H. (2015). Toward the Use of 21 st Century Teaching-Learning Approaches: The Trend of Development in Malaysian Schools within the Context of Asia Pacific. *International Journal of Emerging Technologies in Learning*, 10(4), 72–79.
- Hagger, M. S., & Hamilton, K. (2019). Grit and self-discipline as predictors of effort and academic attainment. *British Journal of Educational Psychology*, 89(2), 324–342. <https://doi.org/10.1111/bjep.12241>
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152. <https://doi.org/10.2753/MTP1069-6679190202>
- Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, 1(2), 107–123.
- Kato, N., Ozone, H., Oomori, K., Ooi, C. W., & Ochiai, Y. (2019). Gans-based clothes design: Pattern creator is all you need to design clothing. *Proceedings of the 10th Augmented Human International Conference 2019*, 1–7.
- Kwon, S. (2018). Development of Basic Pattern of Wedding Dress I-Focused on Torso Pattern for Top Dresses. *Fashion & Textile Research Journal*, 20(4), 439–448.
- Lee, Y.-J., & Kim, S. (2021). Feature-based fashion flat sketch design using automatic module alignment algorithm. *International Journal of Clothing Science and Technology*, 33(3), 824–837. <https://doi.org/10.1108/IJCST-10-2020-0162>
- Linnet, M., Chipso, C., & Felisia, C. (2021). Online Instructional Material for Computer Aided Garment Pattern Making Training in Colleges: A Case Study of Zimbabwe. *International Journal of Costume and Fashion*, 21(1), 54–66.
- Liu, K., Zeng, X., Tao, X., & Bruniaux, P. (2019). Associate design of fashion sketch and pattern. *IEEE Access*, 7, 48830–48837.
- Ma, Y., Ding, Y., Yang, X., Liao, L., Wong, W. K., & Chua, T.-S. (2020). Knowledge enhanced neural fashion trend forecasting. *Proceedings of the 2020 International Conference on Multimedia Retrieval*, 82–90.
- Maryanti, N., Rohana, R., & Kristiawan, M. (2020). The principal's strategy in preparing students ready to face the industrial revolution 4.0. *International Journal of Educational Review*, 2(1), 54–69.
- Matthews-Fairbanks, J. L. (2018). *Pattern Design: Fundamentals: Construction and Pattern Drafting for Fashion Design*. Fairbanks Publishing LLC.
- McQuillan, H. (2019). Hybrid zero waste design practices. Zero waste pattern cutting for composite garment weaving and its implications. *The Design Journal*, 22(sup1), 803–819.
- Murashko, F. V., Ryzhkova, E. A., & Vlasenko, O. M. (2018). Search for an object in an image by image difference method to find contours of a natural leather blank in pattern cutting process. *Fibre Chemistry*, 50(1), 38–41. <https://doi.org/10.1007/s10692-018-9925-z>
- Naznin, K. N., Tabraz, M., & Sultana, S. (2020). Process & Effective Methods of Pattern Making for the RMG (Ready-made Garment) Sector. *Journal of Research & Method in Education*, 7, 46–48.
- Romlah, O. Y., & Latief, S. (2021). Empowering the Quality of School Resources in Improving the Quality of Education. *Bulletin of Science Education*, 1(1), 37–41.
- Sgro, D. (2020). Dynamic Cutting Using Material Engagement with Textiles in Pattern Cutting for Fashion Design Practice. *Journal of Textile Design Research and Practice*, 8(2), 232–255. <https://doi.org/10.1080/20511787.2020.1728101>
- Sholihah, N. K. (2019). Management of Education Facilities and Infrastructure. *3rd International Conference on Education Innovation (ICEI 2019)*, 183â, 186.
- Sleem, M. M. R., & Elwan, N. A. A. (2018). The Effectiveness of the Flipped Learning Strategy in pattern making and grading of women's clothing Using Gemini CAD System. *International Design Journal*, 8(2), 357–369.
- Utama, I. T., Sukmanasa, E., & Wijaya, A. (2021). The Effect Of Learning Discipline On Mathematics Learning Outcomes. *JHSS (Journal Of Humanities And Social Studies)*, 5(1), 88–90.

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- Widodo, A., Nursaptini, N., Novitasari, S., Sutisna, D., & Umar, U. (2020). From face-to-face learning to web base learning: How are student readiness. *Premiere Educoulddum: Jurnal Pendidikan Dasar Dan Pembelajaran*, 10(2), 149–160.
- Yuan, Y., & Huh, J.-H. (2018). Customized CAD Modeling and design of production process for one-person one-clothing mass production system. *Electronics*, 7(11), 270.
- Zhang, N., Hedayat, A., Sosa, H. G. B., Cárdenas, J. J. G., Álvarez, G. E. S., & Rivera, V. B. A. (2021). Specimen size effects on the mechanical behaviors and failure patterns of the mine tailings-based geopolymer under uniaxial compression. *Construction and Building Materials*, 281, 122525.
- Zhang, S., & Liu, Y. (2018). *Improving the Innovative Ability of Local University Students by Using the Discipline Competition as a Link*. 234–240.
- Zhang, X., & Yang, C. (2021). Application of Fashion Garment Model Making Concept of European Windbreaker in Computer Software. *Journal of Physics: Conference Series*, 1915(4), 42011.