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The Empirical Study of Factors Affecting Students' Competence of Fashion Design Education in the Industrial Revolution 4.0 Era

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This study aims at measuring the effects of fashion design education on students' competence in the Industrial Revolution 4.0. It involved 497 students of the Fashion Design Study Program of Universitas Negeri Padang, Indonesia. The data were collected through questionnaire that was developed from the predetermined indicators. The data were analyzed using Structural Equation Model-Partial Least Square (SEM-PLS) with SmartPLS 3.0 software. The results of SEM indicated that outer loading, cronbach alpha, composite reliability, average variance extracted, measurement model assessment criteria and structural model were valid and fit. This also means that the instrument was valid and reliable. The result of the analysis indicates that there is a positive relationship between the structural model predictors; pedagogy, internship, and learning interest affected the student competence. These aspects are positive, significant, and partial predictors of the pedagogy effect on competence. Based on the variables, pedagogy is ranked as the highest aspect. There is a mediating effect of internship and learning interest on the relationship between pedagogy and competence. In order to reach their optimum competencies, the students have to take these three aspects into consideration in fashion design education.

Keywords: industrial revolution 4.0, fashion design education, pedagogy, internship, learning interest

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INTRODUCTION

Student competencies are highly required to face the industrial revolution. Students need to have competence and expertise to meet the world standards to compete and survive in the changing industrial revolution 4.0 (Benešová, 2017; Cabritaet al., 2020; Cydis, 2014). The competencies include logical reasoning cognitive skills, adapt to the industrial environment, teamwork, and emotional control (Falloon, 2020; Tsvetkova et al., 2021). Logical reasoning cognitive skills that are supported by digital literacy for digital competency amongst fashion design education students can be developed through teacher digital competency framework. Further, adapting to the industrial environment and teamwork become important to create working experience for fashion design education students in order to be surviving in working environment. Meanwhile emotional control is important part of learning interest that also should be developed because it has significant effect on competency. As for fashion design education students, they need to adapt to the rapidly growing education and fashion industries in the technologically advanced industrial revolution (IR 4.0) (Kozar& Connell, 2015). The internship experience helps students to identifying learning outcomes in preparing students for facing the real world. To be acknowledged as professional workers, they even have to get certificate of competence to complement their diploma (Shahroom & Hussin, 2018). However, many students do not meet the increasingly complex competency (Arifin et al., 2020; Prasetio et al., 2017; Russanti et al., 2018; Ryan, 2020). This issue has necessitated studies to unveil matters dealing with students' competencies in order to prepare them in facing complexities of workforce (Depaepe & König, 2018; Faerm, 2012; Henri et al., 2017, Lazano et al., 2017; Sopegina et al., 2016). Many students lack of digital skills in the fashion, such as in designing clothes using fashion applications, making basic patterns using Computer Aided Design, using technology in fashion making, and e-commerce in fashion.

Competence can be enhanced through various efforts, including optimizing learning strategies (Arifin et al., 2020; Letina, 2020; Hollweck et al., 2019; Vijayalakshmi & Kanchana, 2020), enhancing student pedagogical concepts (Darling-Hammond et al., 2019; de Troyer et al. 2017; Glaesser, 2019), improving lecturer competence (Long & Gee, 2018; Prasetio et al., 2017; Sudargini & Purwanto, 2020), and integrating technology in education process (Ambassador & Martinez-Rivera, 2015; Sharkova, 2014). However, these strategies only focus on the pedagogical aspect (Alimuddin et al., 2020; Mayorova et al., 2020; Wang & Calvano, 2018), meaning that they are not effective enough to solve the increasing need for competencies, especially in fashion design education in the IR 4.0 era (Chika-James, 2020).

There are some strategies for improving competence such as offering students' internships in industries, using technology, and fostering students' learning interest (Dasuki et al., 2017; Harackiewicz et al., 2018; Nagele et al., 2018; Anjum, 2020; Adeosun et al., 2021). It is known that students should use technology on an industrial scale in the fashion-making process, such as designing, creating basic patterns and pattern-breaking, rolling out, and cutting materials to improve their cloth-making competence (Kozar& Connell, 2015; Ryan, 2020). Unfortunately, most of them are considered incompetent or technologically illiterate (Pratama et al., 2019; Sasnett&

Ross, 2016) which affect their production targets (Hong et al., 2021; Messmann& Mulder, 2015). This is due to the fact that most lecturers do not facilitate them enough information about industries' actual working conditions (Darling-Hammond et al., 2020; Sancho-Gil et al., 2020) and technology use (Beatrice et al., 2018). In effect, the students cannot apply knowledge and skills in industries with complex technology (Haghbin et al., 2012; Molino et al., 2020; Renganathan et al., 2012). Competence is obtained through instructional processor pedagogy and other learning resources, such as e-books and the internet (Falloon, 2020; Salas-Pilco, 2013). Interactive and cooperative pedagogy has an impact on the learning interest (Broadbent & Poon, 2015; Goedhart et al., 2019). Further, the learning interest will motivate student to enhance the knowledge that could be taken from e-books and the internet. Attainment of competence depends on learning interest (Harackiewicz et al., 2018; Rodríguez et al., 2021).

This study measures the effects of pedagogy on learning interest on competence of fashion design education. It is motivated by the fact that research looking at the relationship of these variables and internships simultaneously and thoroughly was less developed. It is expected that the results of this study would provide empirical data dealing with influential factors affecting the competence of fashion design education students to face the challenges of the IR 4.0. It sought to show the direct, indirect, and mediating effects of pedagogy, internship, and learning interest on students' competence.

METHOD

Research Design

This study is a survey method because data were collected using questionnaires (Arkadiusz et al., 2020). As stated by Miswar& Kurniawan (2018), this type of research is suitable for a big number of populations that uses a quantitative approach. This quantitative approach was used to analyse the effect of pedagogy and learning interest and its interaction on students' competence (Sitanggang, 2021).

Population and Sample

The population of this study was 497 students of the Fashion Design Study Program of Universitas Negeri Padang who had taken internship program. As the number of the population was below 500, all population was taken as sample (Hair et al., 2019; Nitzl et al., 2016; Dachlan, 2014). Big number of sample would also reduce the possibility of being bias. The sample consisted of 121 male and 376 female students. Majority of the respondents (326 or 65.6%) were 21-23 years old, 147 of them (29.6%) were under 21 and 24 (4.8%) were above 23. This number is sufficient to be used in the Structural Equation Modelling Path Analysis (Hair et al., 2019) to achieve accurate analysis results and minimum errors. According to Ilker et al., (2016) and Creswell (2014), this technique is suitable to evaluate a variable comprehensively and empirically.

Instrument

A structured questionnaire adapted from the development results of some previous studies is used to collect the primary data (Henri et al., 2017; Hong et al., 2021;

Tsvetkova et al., 2021). The instrument consists of respondents' profiles, pedagogy is adapted from Arifin et al. (2020), students' learning interest is adapted from Hong (2021), internship is adapted from Arifin et al. (2020), and students' competence is adapted from Falloon (2020). The questionnaire contained 83 items developed using a 5-point Likert measurement scale, including (1) strongly disagree/never, (2) disagree/rarely, (3) hesitant/sometimes (4) agree/often, and (5) strongly agree/always (Awang et al., 2016). The questionnaire was distributed, and results were tested based on validity and reliability using the Measurement Model Assessment (MMA). All items met the convergent and discriminatory validity (outer loading > 0.7, Cronbach's alpha > 0.7, composite reliability > 0.7, and Average Variance Extracted (AVE) > 0.5) (Hanseler et al., 2015).

Data Collection and Data Analysis

As mentioned above, the primary data were collected through questionnaire. The secondary data were collected from written sources including relevant book review, and journal articles (Wickham, 2019). The primary data were analyzed using the SmartPLS 3.0 software for some reasons. First, it is suitable to build measurement models from a predictive perspective (Sarstedt & Cheah, 2019). Next, the study has many samples without imposing a normal distribution assumption on the data (Hair et al., 2019). Third, Structural Equation Modelling (SEM) analysis using SmartPLS 3.0 provides a causal explanation of the model by involving mediating factors for empirical results (Nitzl et al., 2016).

This study uses path analysis to determine the direct and indirect effects of exogenous variables on endogenous variables and their mediation, as well as for hypothesis testing. The mediating effect was tested using the procedure by Nitzl et al. (2016) with two stages for significant effect in case the p-value is less than 0.05 ($p < 0.05$) at the 5% confidence stage and two-tailed.

The first stage was testing the indirect effect significance, while the second one was determining the mediation. The indirect effect should be significant to confirm the mediating effect. The significant effect of mediation depends on the indirect effect, which can be full or partial. In case the indirect effect is significant while the direct effect is insignificant, the mediation is full. Partial mediation occurs when the direct and indirect effects are significant. The mediation can be positive (unidirectional) or negative (opposite).

Measurement Model Assessment

Measurement Model Assessment (MMA) is especially used to examine the relationship between latent variables and their indicators or statement items. This study has 4 latent variables with 22 indicators and performed convergent and discriminant validity. Convergent validity reveals how the measurement items of certain variables follow the four criteria. The item is valid when the outer loading is> 0.7, and the data is reliable when cronbach alpha > 0.7; composite reliability > 0.7; Average Variance Extracted (AVE) > 0.5. The result of convergent validity testing is displayed in Table 1 and Figure 1.

Table 1
Convergent validity testing

Predictor	Item	Outer Loading >0.7	Cronbach Alpha	Composite Reliability	AVE >0.5
Pedagogy (X1)	X11	0.749	0.920	0.936	0.678
	X12	0.797			
	X13	0.850			
	X14	0.843			
	X15	0.752			
	X16	0.881			
	X17	0.880			
Internship (Z)	Z11	0.886	0.929	0.944	0.739
	Z12	0.752			
	Z13	0.896			
	Z14	0.874			
	Z15	0.864			
	Z16	0.877			
Learning Interest (X2)	X21	0.917	0.928	0.949	0.823
	X22	0.890			
	X23	0.924			
	X24	0.896			
Competency (Y)	Y11	0.917	0.953	0.964	0.842
	Y12	0.927			
	Y13	0.922			
	Y14	0.918			
	Y15	0.902			

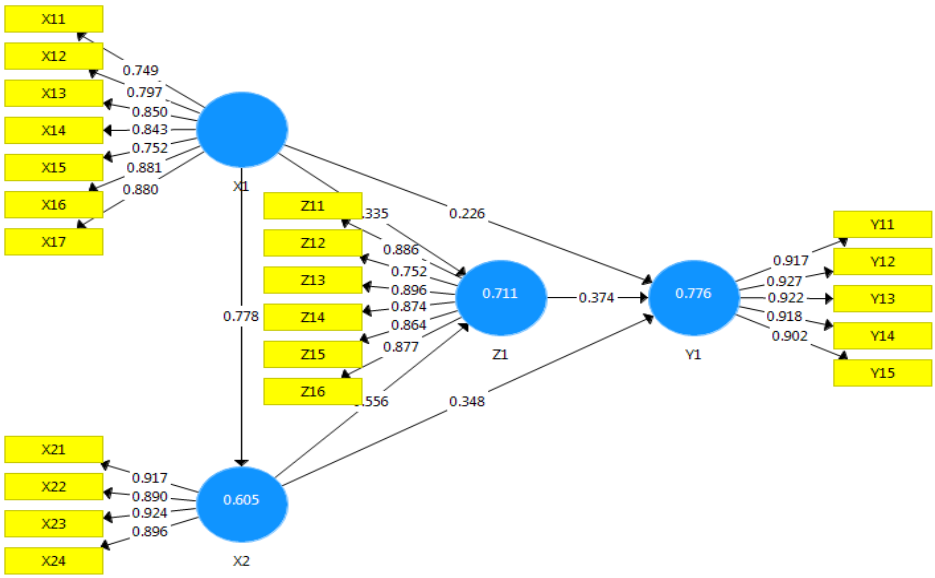

Figure 1
Variable construct model

Based on the results in Figure 1, it shows that all indicators have a loading factor value above 0.7 therefore all indicators meet converging validity and have good validity (Purnomo, 2017). The indicators that stated in Figure 1 as follow:

X1 = Pedagogy
X11 = Shape student character
X12 = Mastery in learning theory
X13 = Curriculum development
X14 = Educational learning activities
X15 = Student potential development
X16 = Student's communication
X17 = Learning evaluation
X2 = Learning interest
X21 = Happy Feeling
X22 = Student engagement
X23 = Interest
X24 = Attention
Z = internship
Z11 = Implementation benefits
Z12 = Internship debriefing
Z13 = Work knowledge
Z14 = Internship facility
Z15 = Work skills
Z16 = Work creativity
Y = Student competence
Y11 = Logical considerations
Y12 = Cognitive mastery and skills
Y13 = Workplace adaptability
Y14 = Ability to work together
Y15 = Emotional control

The convergent validity test in table 1 shows that all predictors, including pedagogy (X1), internship (Z), learning interest (X2), and competence (Y), are valid as an outer loading value > 0.7; cronbach alpha > 0.7; composite reliability > 0.7; and Average Variance Extracted (AVE) > 0.5. This indicates that the predictor's measurement variance is latent and thus SEM path analysis (Hair et al., 2019) can be used. The cronbach alpha and composite reliability tests for each predictor reveals that the model is reliable, and consistent (Hanseler et al., 2015).

Furthermore, discriminant validity testing determines the predictor's uniqueness from others using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (Richter et al. 2016). Discriminant validity testing is shown in Tables 2 and 3.

Table 2
Fornell-larcker criterion

Predictor	Competency (Y)	Pedagogy (X1)	Internship (Z)	Learning interest (X2)
Competency (Y)	0.917			
Pedagogy (X1)	0.783	0.823		
Internship(Z)	0.831	0.767	0.860	
Learning interest (X2)	0.817	0.778	0.829	0.907

The result of the model test using Fornell-Larcker criterion shows high scores of competencies (0.917), pedagogy (0.823), internship (0.860), and learning interest (0.907) than the other predictors. This means that each predictor is unique (Mateos-Aparicio, 2011).

Table 3
Heterotrait-monotrait ratio (HTMT)

Predictor	Competency (Y)	Pedagogy (X1)	Internship (Z)	Learning interest (X2)
Competency (Y)				
Pedagogy (X1)	0.824			
Internship(Z)	0.882	0.822		
Learning interest (X2)	0.880	0.833	0.878	

The standard measurement of a valid discriminant value on the Heterotrait-Monotrait Ratio (HTMT) is less than 0.9 (Henseler et al., 2015). The predictor discriminant validity test is less than 0.9. Therefore, the test model is a valid (good) and has unique discriminant.

Structural Model Assessment

Structural Model Assessment (SMA) examines the model's robustness in predicting causality between latent variables through bootstrapping (Hanseler et al., 2014). The structural model is displayed in Figure 2, and the testing includes NFI, effect size (f^2), SRMR, and Rms Theta, as shown in Table 4 (Hair et al., 2019).

Table 4
Structural model testing

Predictor	NFI	SRMR	Rms Theta <0.12	f^2	Size effect
Competency (Y)	0.913	0.057	0.119	0.181	Medium
Pedagogy (X1)				0.153	Medium
Internship(Z)				0.424	Large
Learning interest (X2)				0.531	Large
Decision	Model fit (91.3%)	Model fit	Model fit		

The structural model test in Table 4 shows that they meet the required criteria (Hair et al., 2019), and therefore has high robustness and can explain predictor relationships (Hanseler et al., 2015).

FINDINGS

Structural Model

The structural model or inner model aims to evaluate the relationship between latent constructs. The structural model in PLS is evaluated by using R-Square for endogenous constructs, the value of the path or t-value coefficients for each path for the interconstructive significance test in the structural model.

Table 5
R-Square Value

Predictor	R-Square (R^2)
Internship	0.711
Learning interest	0.605
Competency	0.776

The results of the R-Square values in table 5 show that the internship has an R^2 of 0.711 which means that the predictor variance can be explained by 71.1 % of the pedagogy predictor, while external predictors 28.9 %. Learning interest has an R^2 of 0.605, meaning that the predictor variance can be explained by 60.5% of the pedagogy predictor, while 39.5% by external predictors. Similarly, competency has an R^2 of 0.776 which means that the predictor variance can be explained by 77.6% of the pedagogy, while 22.4% by external predictors. The results of the analysis indicate that the selected predictor(s) can increase competence. Table 6 summarizes the path analysis and hypothesis testing results.

Table 6
Summary of path analysis results and hypothesis testing

Path analysis	Path coefficient (β)	SD	T statistics	P-value	Hypotheses result (α=0.05)
X1 -> Y	0.226	0.039	5.859	0.000	H1 accepted
X1 ->Z	0.335	0.040	8.409	0.000	H2 accepted
X1 -> X2	0.778	0.026	29.429	0.000	H3 accepted
X2-> Z	0.556	0.039	14.442	0.000	H4 accepted
X2 -> Y	0.348	0.045	7.781	0.000	H5 accepted
Z ->Y	0.374	0.046	8.204	0.000	H6 accepted
X1->Z -> Y	0.125	0.021	5.845	0.000	H7 accepted
X2 ->Z -> Y	0.208	0.030	6.864	0.000	H8 accepted
X1->X2->Y	0.270	0.038	7.207	0.000	H9 accepted
X1 -> X2 ->Z	0.433	0.035	12.356	0.000	H10 accepted
X1->X2 ->Z ->Y	0.162	0.025	6.513	0.000	H11 accepted

SD = standard deviation

Table 6 shows the hypotheses of study. The hypothesis is accepted or rejected by looking at the value of T statistics and its path coefficient. If the value is higher than the value, the hypothesis is supported or accepted and vice versa. Due to all the T statistics are higher than 0.05, thus all the hypotheses are accepted.

DISCUSSION

The Effect of Pedagogy on Competence

The path analysis reveals that the pedagogy effect on competence obtaining a path coefficient of 0.226 at a significant value of less than 5% ($\beta=0.226$, $p<0.05$). Therefore, H1 is accepted as pedagogy positively affected competence. This is in line with previous studies such as Alimuddin et al. (2020), Sopegina et al. (2016), Wang and Calvano (2018). Better pedagogy increases competence and educational learning activities (Arifin et al., 2020), shapes students' characteristics (Faerm, 2020), increases their mastery of learning theory and curriculum development (Sudargini & Purwanto, 2020), develops the potential and communication, and learning evaluation (Wang &Calvano, 2018). This pedagogy is influential on competence in the challenging IR 4.0 era (Chika-James, 2020; Mayorova et al., 2020; Sopegina et al., 2016; Wang &Calvano, 2018). Therefore, it shapes the characteristics of students in education field of study as prospective teachers and workers the fashion industry in facing IR 4.0 (Dandira et al., 2017). As it is known, developing pedagogy in the IR 4.0 era is affected by the student's ability to work practically, think positively, adapt to the environment, and master technology (Faerm, 2012; Russanti et al., 2018).

The results of this study reveals that the better the pedagogy, the higher the students' competence becomes. Pedagogy could improve the students' mastery in learning theory by developing a IR 4.0 demand- based curriculum (Hollweck et al., 2019) and providing educational learning activities (Lozano et al., 2017). Furthermore, effective pedagogy improves students' communication such as using clear language, responding, and respecting peers' opinions (Long et al., 2018; Prasetio et al., 2017).

The Effect of Pedagogy on Internship

The effect of pedagogy on the internship is indicated in a path coefficient of 0.335 at a significant value of less than 5% (β=0.335, $p<0.05$), accepting the H2, which states that pedagogy positively affects the internship implementation. This is in line with previous studies by Dasuku et al. (2017) and Hong et al. (2021), which shows that better pedagogy improves internship results. Internship activities provide students with opportunities to apply knowledge and skills they have learned in schools beforehand (Renganathan et al., 2012). For this reason, students should know the latest technologies (Sasnett & Ross, 2016). This necessitates learning about the industry and technology development in IR 4.0 era (Wells et al., 2014). Unfortunately, college laboratories or workshops do not have such technologies yet. Thus, internship activities are intended to compensate these shortcomings.

The Effect of Pedagogy on Learning Interest

The result of analysis shows that effect of pedagogy on learning interest is 0.778 at a significant value of less than 5% (β=0.778, $p<0.05$). This means that H3 is accepted; pedagogy positively affects learning interests. This is similar with some previous studies such as Abrantes et al. (2007) and Komolafe et al. (2020), which indicate that better pedagogy increases learning interest. Furthermore, the pedagogy effect on learning interest has the highest coefficient (β=0.778, $p<0.05$). This may be inferred that the demands of IR 4.0 era boost students' learning. Students are encouraged to be more active in learning by applying interactive and cooperative pedagogy (Broadbent & Poon, 2015; Goedhart et al., 2019). Therefore, good communication between lecturers and students is essential (Majali, 2020). This leads to increased feelings of pleasure, student involvement, interest, and class and workshops attention.

The Effect of Learning Interest on Internship

The effect of learning interest on internship is indicated by a path coefficient of 0.556 at a significant value of less than 5% (β=0.556, $p<0.05$). Therefore, H4 is accepted, showing that learning interest positively affects the internship. This is in line with the studies conducted by Marniati and Wibawa (2018), Anjum (2020) that reveal the improvement of internship outcomes resulted from learning interest. Dandira et al. (2017) also finds that the students' attention on lecturers depending on their learning interest. The effective increase in interest should focus on feelings of pleasure, student involvement, and attention (Hong, 2021; Majali, 2020; Marniati& Wibawa, 2018; Rodríguez et al., 2021). Students with learning interests can identify learning material problems and find solutions through technological sources (Cabrita et al., 2020; Shahroom&Hussin, 2018). Therefore, students with good learning interests will improve their chances for internship activities as they take the initiative to find learning resources (Dasuki et al., 2017).

The Effect of Learning Interest on Competence

The result reveals that the learning interest effect on competence was indicated by a path coefficient of 0.348 at a significant value of less than 5% (β=0.348, $p<0.05$). Therefore, H5 is accepted showing that learning interest positively affects competence. This is in

line with the studies of Kozar and Connell (2015) and Rodríguez et al. (2021). They observe that the students are eager to start the course program for expertise, read the taught material, and ask questions. Having good competencies (cognitive, affective, and psychomotor) is important in this IR 4.0 era (Renganathan et al., 2012). This is made possible when the centre of learning is the students (Abrantes et al., 2007). This way can increase students' engagement and focus on the learning process and their material understanding (Benešová & Tupa, 2017).

The Effect of Internship on Competence

The effect of internship on competence had a path coefficient of 0.374 at a significant value of less than 5% (β=0.374, $p<0.05$). Therefore, H6 is accepted, showing that internship positively affects competence. Research by Abrantes et al. (2007) and Anjum (2020) also showed that better internship implementation increases competence. As stated by a number of writers, an effective intern benefits from implementing and increasing work knowledge, skills, and creativity with current industrial facilities (e.g. Arifin et al., 2020; Dandira et al., 2017; Hong et al., 2021; Kozar& Connell, 2015).

The interns have the opportunity to use industry technology and facilities in design making, basic patterns, pattern-breaking, and rolling out and cutting materials (Kozar & Connell, 2015; Ryan, 2020). As mentioned earlier, since these technologies are not available in college, effective internships enhance their work skills and competencies in the IR 4.0 era (Maryanti, et al., 2020; Dasuki et al., 2017; Renganathan et al., 2012).

The Effect of Pedagogy on Competence through Internship Mediation

Through internship mediation, the pedagogy competence effect is a path coefficient of 0.125 at a significant value of less than 5% (β=0.125, $p<0.05$). Therefore, H7 is accepted, meaning that the internship mediates the effect of pedagogy on competence positively. The mediation is partial because pedagogy directly affects competence (Nitzl et al., 2016). Effective internship implementation enhances competence with good pedagogy. This is shown by the path coefficient of internship mediation in the pedagogy effect on competence (β= 0.335, $p<0.05$; β= 0.374, $p<0.05$), which is greater than the path coefficient of direct pedagogy effect on competence (β= 0.226, $p< 0.05$). Good pedagogy improves internship implementation and competence. To the researchers' knowledge, there has not been a study looking at the effect of mediation on competence.

The Effect of Learning Interest on Competence through Internship Mediation

The effect of learning interest on competence through internship mediation has a path coefficient of 0.208 at a significant value of less than 5% (β=0.208, $p<0.05$). This shows that H8 is accepted meaning that internship positively mediates the effects of learning interest on competence. The mediation is partial because learning interest directly affecting competence (Nitzl et al., 2016). Therefore, effective internship implementation with good pedagogy enhances competence. The path coefficient of internship mediation in the effect of learning interest on competence (β= 0.556, $p<0.05$; β= 0.374, $p<0.05$) is greater than the path coefficient of the direct effect of learning interest on competence (β= 0.348, $p<0.05$). This means that high learning interest increases the internship implementation and competence.

The Effect of Pedagogy on Competence through Mediation of Learning Interest

The pedagogy effect on competence through the mediation of learning interest has a path coefficient of 0.207 with a significant value of less than 5% (β=0.270, $p<0.05$). Therefore, H9 is accepted meaning that learning interest mediates positively affect pedagogy on competence. The mediation was partial because pedagogy directly affects competence (Nitzl et al., 2016). This means that higher learning interest improves the student's competence with good pedagogy. The path coefficient of mediating learning interest in pedagogy effect on competence (β= 0.778, $p<0.05$; β= 0.348, $p<0.05$) is greater than the path coefficient of direct pedagogic effect on competence (β= 0.226, $p <0.05$). Therefore, better pedagogy increases learning interest and competence.

The Effect of Pedagogy on Internship through Mediation of Learning Interest

The pedagogy effect on an internship through the mediation of learning interest is indicated by a path coefficient of 0.433 with a significant value of less than 5% (β=0.433, $p<0.05$). Therefore, the H10 learning interest mediates the pedagogy effect on the internship positively. Furthermore, the results show that the mediation is partial because pedagogy directly affected the internship (Nitzl et al., 2016). This means that higher learning interest enhances the internship implementation for students with good pedagogy. The path coefficient of mediating learning interest in pedagogic effect on internship (β= 0.778, $p<0.05$; = 0.556, $p<0.05$) is greater than the path coefficient of direct pedagogy effect on internship (β= 0.335, $p< 0.05$). Therefore, better pedagogy increases the learning interest and the implementation of internships.

The Effect of Pedagogy on Competence through Mediation of Learning Interest and Internship

The effect of pedagogy on competence through the mediation of learning interest and internship records a path coefficient of 0.162 at a significant value of less than 5% (β=0.162, $p<0.05$). As a result, H11 is accepted, meaning that learning interest and internship positively mediate the effect of pedagogy on competence. The mediation is partial because pedagogy directly affected competence (Nitzl et al., 2016). This is shown by the path coefficient of mediation of learning interest and PLI in the pedagogical effect on competence (β= 0.778, $p<0.05$; β= 0.556, $p<0.05$; β= 0.374, $p<0.05$), which was greater than the path coefficient of pedagogical influence on competence directly (β= 0.226, $p<0.05$). Therefore, the interest in learning increases the learning pedagogy, internships, and competency (Adeosun et al., 2021; Ryan, 2020; Sasnett & Ross, 2016, Sudargini & Purwanto, 2020; Wells et al., 2014).

CONCLUSION

This study measures the effects of pedagogy, interest in learning and internships on increasing the competence of fashion design education. Pedagogy, internship, and learning interest directly affect the student's competence, while internship and learning interest mediate pedagogy and competence positively and partially. Based on the findings of this study, it can be concluded that the students' competence can be enhanced through pedagogical aspects, increasing learning interest, and improving the internship implementation. Pedagogy will improve their mastery of learning theory,

curriculum development, educational learning activities, developing potential, communication, and learning evaluation. Increasing learning interest improves the feelings of pleasure, involvement, interest, and attention. Universities or colleges should cooperate with industries to implement internships to improve work knowledge and skills, to take advantages of internship facilities, and to foster students' work creativity. In spite of the promising result of this study, there are a few limitations. It employs a quantitative approach with only three predictors.

This study contributes to the students, educators, institutions, and fashion industry. For student, they have to develop their potential, enhance the communication, engagement, work knowledge, work skills, work creativity, competency, logical considerations, cognitive mastery and skills, workplace adaptability, ability to work together and emotional control. For educators, they have to shape student characters, and mastery in learning theory. They also have to create interactive and cooperative learning process, develop curriculum based on current issue and conduct the learning evaluation. Institution should provide learning facilities such as laboratories and learning resources that support the digital learning such as e-book, e-journal, and fashion software. They also have to provide internship facilities and brief the students prior to internship. Institution should revitalize the curriculum, encourage student potential, monitor and evaluate the learning process. This study contributes to fashion industry especially in providing the internship facilities, introducing and guiding the student during internship. Competencies will make the students to be aware of the industrial needs.

Competencies including cognitive skills in logical reasoning enable student to adapt in an industrial environment teamwork and emotional control. Besides, students have cognitive skills of logical reasoning supported by digital skills for fashion design students that can the developed through the teachers' digital skills framework. Some external predictors were not identified. Thus, further studies should evaluate and test the results of internships and student competencies and explore other predictors that can improve competence. In addition, qualitative approach is suggested to discover qualitative data such as perception and experiences.

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