



The effectiveness of SCAMPER techniques on creative thinking skills among fashion design vocational college

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Abstract

The purpose of this study was to explore the effectiveness of SCAMPER technique in the Vocational College students' perspectives. Besides, the study was to survey how helpful is the SCAMPER technique to the students in exploring the skill of coming out with ideas spontaneously in step of enhancing creativity. The research design was qualitative in which interview method was used. Sampling technique was used to select 7 Vocational Certificate Malaysia (SVM) 1st year students in Vocational College in the field of Fashion Design. The data obtained were analyzed and transcribed verbatim. The findings showed that SCAMPER techniques were already been applied by students indirectly, but they were unaware that they are using this technique. As a matter of fact, some of these techniques had been applied by the students however they did not notice it. Overall, this SCAMPER technique shall affect and contribute a great impact on students especially to enhance and develop their thinking and creativity skills in learning. It is proposed that educators in the field of fashion should apply this technique to strengthen students' thinking and creativity in producing designs.

Keywords: SCAMPER, effectiveness, creativity, creative thinking, fashion design

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INTRODUCTION

SCAMPER technique is used towards something that already existed and where modification takes place to become a new thing. SCAMPER is an acronym of each words that depicts different technique to generate new ideas in lesson and learning which are *Substitute, Combine, Adapt, Modify, Put to Other Uses, Eliminate* and *Rearrange*. According to Ang & Yuen (2016) SCAMPER technique is a way that is more interesting and clearer for students to be used in class discussion. Pursuant to observation and experience of former researchers, students commonly encountered disputes when making the drawing process. This is because, the students only depending on teacher's approaches and styles (Pratiwi, Dwijanto & Wijayanti 2019; Majid & Ismail 2017). Students affirmed that they are able to create a new idea but they have problem to generate creative idea (Kim, 2014). According to Radziszewski (2017); Idek, (2016), students have problem in generating variety of idea, producing higher order thinking skills and problem-solving skills. By using of variety of learning methods like brainstorming, application skills of mind

map and SCAMPER technique, students can explore extensively and create original idea in designing (Hamid, Idris & Tapsir 2019; Tajudin, Ali & Idris 2015). Without applying any techniques in the learning process, students have great challenges in generating natural ideas (Yuen, Azam & Ang, 2015).

Fashion Design

Art of Fashion Design is a course that requires high competency. According to Lee (2016), Kamis, Jamaludin, Bakar, Hanapi, (2016), one who expresses creativity in designing will hold successfulness in fashion industry. In the course of art of fashion design, a person needs to retain variety of skills in order to circulate in this field. These skills will affect and run confidence. Businesswomen who are involving in fashion design course possess low confidence than businessmen because the lack of skills in themselves. Additionally, an individual in this course must have high skills in designing and sketching clothes until it could be realised

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perfectly. (Mohamad, Adai & Ahmad 2016; Lee & Jirousak 2015; Kamis, Ahmad Puad, Mohamed, Che Rus, Bujeng, Syamwil & Budiastuti 2018).

SCAMPER Technique

SCAMPER technique is a seven-steps process of *Substitute, Combine, Adapt, Modify, Put to Other Uses, Eliminate* and *Rearrange*. Students are able to explore ideas extensively through these sub-techniques. According to McKenney dan Reeves (2015), exploration and mind-mapping are the great resolution in comprehending problems. The entire findings of the study on creative thinking skills in relation to Mathematics subject is better with application of SCAMPER than the non-application (Cahyati, Muin & Musyrifah, 2018). Consequently, it can be seen that this technique is effective for numerous types of subject. Besides, SCAMPER technique has become a significant attempt in trainings as a means to escalate creativity in learning model, (Idek, 2016); Lindmark & Nilsson, 2014); Puccio, Wheeler, & Cassandro, 2004); Hsiao, Liang & Lin, 2004). The students also can generate multiple ideas inferred from the combination of elements in the SCAMPER technique (Serrat, 2017; Moran, Armbruster & Vosel, 2014). This SCAMPER is a technique that acts as a MEDIATION method because it can produce idea and analysing problems. SCAMPER technique is not only providing framework for students to freely use their creative thinking skills, but to promote systematic and practical approach to ensure a diverge, creative and original thinking too Çelikler dan Harman (2015); Glenn (1997). By pursuant to Hussain dan Carignan (2016), they stated that the SCAMPER technique implements creative operation systematically against problems that can encourage both creative thinking and engineering experience process among the students.

Effectiveness of SCAMPER Technique

SCAMPER technique is depending on the acceptance of students. Nonetheless, a modification always gives better affect and has its own advantages if compared with former technique. According to Wulandari dan Santoso (2019), the result of application of SCAMPER can attract students' attention in preponderance. According to Idek (2016), SCAMPER technique can effectively educate students for developing and demonstrating the creative thinking among them. Furthermore, SCAMPER is a technique that connotes as alternative resolution towards problems, possibility and idea expansion. Besides, according to Choi and Kim (2014), if SCAMPER technique is actively used over the process of designing in future, it may positively result towards the expansion in the field of fashion design. Celikler and Harman (2015) were in opinion that SCAMPER technique is not only furnishing students to use the creative thinking with their own will, but also gives them vital elements of idea which diversity, creativity and original. Additionally, according

to Kwon and Song (2013), students who are lacking of motivation or learning advantages can utilise this SCAMPER technique. Secondary students who participated in creative thinking workshop have found an increasement in knowledge of creativity and confidence, so that it is possible to create interesting sketching through this SCAMPER technique (Poon, Au, Tong & Lau, 2014). SCAMPER also poslutated its effectiveness in the augmentation of creativity Moreno et al. (2014); Mijares-Colmenares et al. (1993). Thus, Vocational College is under a compulsion to introduce this SCAMPER technique to students as to increase their technique in designing clothes (Bujeng, Kamis, Mohammad Hussain, Rahim & Soenarto 2019).

Creativity

Creativity is an original idea derived to create something new, and creativity acts as ability to produce creative impulse. According to Iskandar (2018), creativity is an indispensable aspect that affect the expansion of knowledge and technology. Creativity is a salient factor to scrutinize the value of products (Valgeirsdottir, Onarheim & Gabrielsen, 2015; Lee & Jirousek, 2015). Meanwhile, Pratiwi, Dwijanto dan Wijayanti (2019) mentioned that act of designing is an arduos process, so that creativity also can be inferred by any combination of existed idea. This is because, an individual will create an amazing creativity when he uses combination element in his work or product. Indeed, the most challenging part for teachers is to bring forth creativity among students in school. The introduction of creativity is necessary in teaching and learning process as to attract the students' interest (Pratiwi, Dwijanto & Wijayanti, 2019; Suryandari, Sajidan, Sentot Budi Rahardjo, Zuhdan Kun Prasetyo & Siti Fatimah, 2018; Majid & Ismail, 2017). Moreover, creativity is able to increase one's problem-solving skills specifically art and design students (Im, Bhat & Lee, 2015). Creativity is an important aspect that must be practiced by future students that pursuing fashion industry careers. (Kamis, Bakar, Hamzah, Asimiran & Halim, 2013; Kamis, Bakar, Hamzah & Asimiran, 2014; Kamis, Bakar, Hamzah, Asimiran & Hanapi, 2015; Fitrihana, 2005).

Theories

Cognitive skill is a capability of an individual to think, giving opinion, understanding and memorizing. This is including mental activities like memory, creating, problem-solving, planning, and others. According to Piaget's Theory of Cognitive developed by Jean Piaget, one that created this theory, children will face similar development stages but at the different age. Piaget looked learning as the creation and innovation process. According to Wardi *et al.*, (2017), Piaget believed that thinking and learning process need four processes which 1) Scheme: cognitive structure that is changing to adapt with new information; 2) Assimilation: combining new information into existed scheme;

3) Accommodation: mental process to rearrange existed scheme so that new information is easier to understand; 4) Balance: a process that acquire mental balance. This theory encourages students to think creatively and critically as a fact it focuses on cognitive skills as conforming to Beghetto (2016), creativity is a cognition and an attitude that should be considered. Meanwhile, Sternberg Creativity Theory (Sternberg & Lubart, 1991) is a scientific base where it is derived from researches that carried out more than 20 years. This theory requires six variables as prerequisite of creativity. All of these six variables must be obliged to prevent any flaw in one's creative paradigm. The six variables are; 1) intelligence that can be divided into three which synthetically; an ability to combine existed information with the new approach, analytical; an ability to differentiate new idea that is potential to be developed over the impotent and difficult idea and practical intelligence; an ability of selling and marketing; 2) knowledge gives advantage towards a creative person to identify the new and original idea; 3) thinking skills of each individual is different; 4) personality of a creative person is open towards critics, be conscious with risks and old; 5) motivation also incorporate of two division which intrinsic or personal which individual creative possess clear vision and great interest in his works and extrinsic or external factor of an individual such as reward, promotion, gift and others; 6) surrounding condition can affect creativity directly. This theory is suitable to be used in this research because the variables mentioned help to increase creativity since the second objective is to increase creativity in the process of designing clothes.

METHODOLOGY

The design of study was used qualitative approach by using interview and observation method. According to Gunawan (2013), qualitative study is to comprehend and interpret such particular issues by one perspective. Cresswell (2012) stated that target sample is the one who possess similar characteristics to be studied by researcher. Pursuant to Halim et al., (2010), requirements and objectives of a study will determine the selection of research instruments. Besides, along with Noraini (2013), he highlighted that the method of triangulation is divided into three methods in order to obtain information or data, which are interview, observation and document analysis. Interview method is used to obtain accuracy of data given by respondents, and here researcher used semi-structured interview method that involved face-to-face semi structured. The semi-structured interview method is a method to acquire data as the questions provided in this method are more systematic and connotes towards the research objectives (Ismail & Talip, 2010). Next, observation method is to ensure the identified and perceived information are align with the answers given by

respondents. Observation is executed in respondents' class for period of 2 weeks. Then, document analysis is on the clothing style sketches in which respondents need to sketch wedding dress but they encountered situation while producing it. The thematic analysis method was used to analyse the interview data collected. The thematic analysis is a method of identifying, analysing and reporting patterns (themes) in the qualitative data. Data were analysed using the NVIVO software version 8.0.

Sampling Techniques

Sampling technique is used with intention to choose seven respondents. According to Merriam (2009) sampling technique is aimed to get the primary information. The criteria to be chosen as a respondent was undergraduate degree in Fashion Design; students from first year students and they took certificate on SVM. Merriam (2009) stated that for selection of respondent must be in consideration of criteria such as background, age, subject, great interest and skills to obtain information that lead to answers the research questions.

Data Analyses

According to Noraini (2012), the collection of real data will create high credibility data. The collection of data process is executed by triangulation method which interview, observation and document analysis. Obtained data is raw data that need to undergo further process to see the research findings that was conducted. Merriam (2009) in qualitative study, data analysis needs to be prolonged throughout the research process is conducted. Researcher had interpreted each word that has been recorded via voice and video during the interview session. Then, researcher had used the obtained data for transcriptions, creating coding and theme.

Validity and Reliability

The validity method that has been used was external validity where it used member check strategy. Merriam (2009) stated that the member check is requisite as to ensure the accuracy of construct and clarity of content which interview question instruments is given to expertise who possess skills in the tested field. Meanwhile, reliability is referring to consistency or stability of the information obtained. Reliability could be elevated by using strategy of recording all the conversations and transcript verbatimly. This strategy can be done by using electronic and digital equipment's such as sound and video recording

FINDINGS

The findings of the study showed that SCAMPER technique can be applied by students indirectly, where they were not aware of it while using this technique. This is because the students were ignorant of SCAMPER's existence while using some of SCAMPER sub-

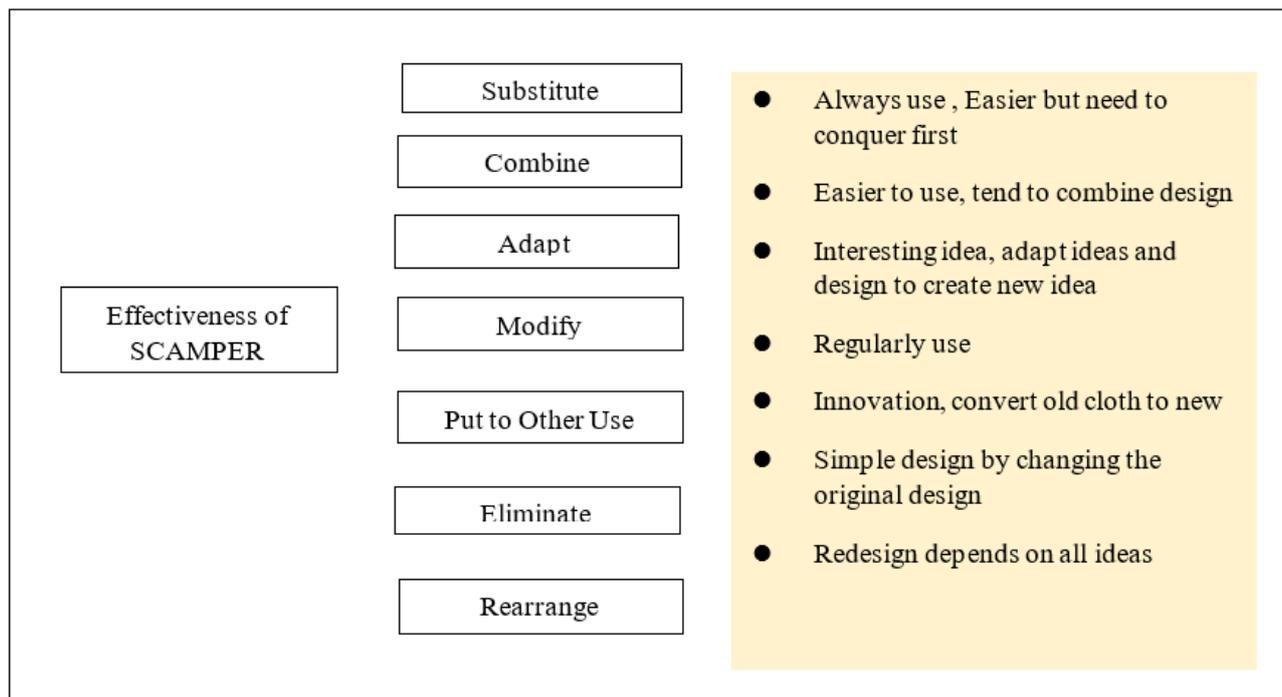


Fig. 1. The effectiveness of SCAMPER technique based on students' perspective

techniques during the designs process. Overall, SCAMPER technique gave positive effects and impacts on students explicitly in increasing and expanding their creative thinking skills. All teachers in fashion design course should apply this technique to increase students' creative thinking skills while creating designs.

First Objective: To study the effectiveness of SCAMPER technique according to students' perspective.

The finding of this study for the first objective is to create themes of *substitute*, *combine*, *adapt*, *modify*, *put to other use*, *eliminate* and *rearrange*. These themes are the elements under SCAMPER techniques itself (Figure 1).

Substitute

"substitute because I am always use substitution and I feel like it helps." (Wani)

"Emm.. substitute." (Ama)

"Because it's easier. When we conquer this techniques, it is easily to know that we can switch old clothes to new ones." (Yaya)

Combine

"combine because it is easier than the others" (Han)

"Yes, combine." (Wani)

"Combine because a lot of sketches I have done need to combine several elements such as beads and lace. Yes, something like that" (Yaya)

Adapt

"Hmm.. adapting all the design and ides ..emm..then create other design." (Yaya)

"...I prefer to adapting all the design which one very interesting ...adapt it." (Fit)

Modify

"I choose modify." (Lia)

"Hmm modify." (Fit)

"I have used it. I'm using modify regularly." (Sya)

Put to other use

"it could be put on the list to be applied, however it's a bit arduos." (Yaya)

"creating clothes are different thing. Let says the old clothes are untouchable, we can convert it into something else like pillow or kids attires." (Fit)

"Erm we can try it but yeah like transform it to other things like completely change it into a new kind of product. I think this technique is relevant as we are doing innovation here." (Sya)

Eliminate

"yes eliminate. I think we should use it sometimes." (Yaya)

"sure because sometimes teachers asked us to make and I think it is more simple if I change the original design. Then, just change the sleeve into and this same goes to the usual sleeve." (Fit)

Rearrange

"rearrange... all the ideas and then try to redesign it." (Ama)

"I always put together the parts of design, make it more interesting and try to rearrange then redesign." (Sya)

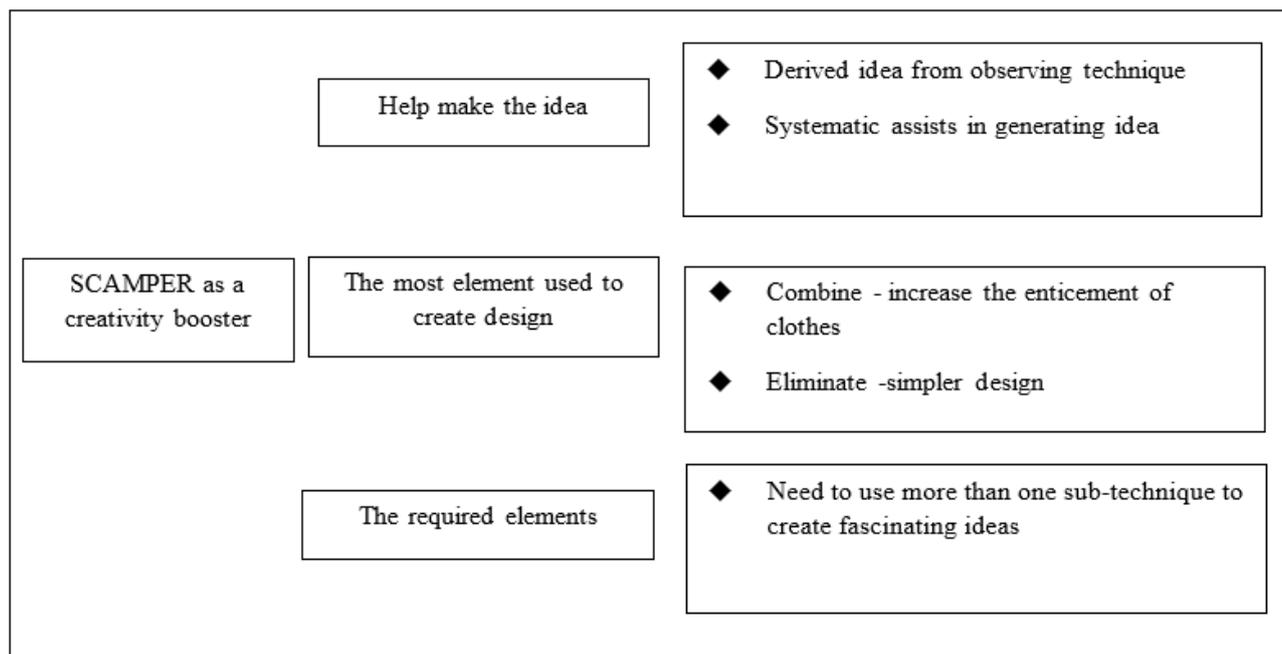


Fig. 2. SCAMPER technique increase the students' creativity

Second Objective: to investigate SCAMPER technique in helping students to explore deeper and create original idea in order to increase creativity.

The second objective of the study is to create theme like converting idea, the required elements in creating designs and other required elements (Figure 2).

Help Make the Idea

"it worked for me, but I don't sure it went well to others or not." (Wani)

"I think idea can be derived by observing these techniques." (Lia)

"easy. My sketches are done in shorter period when I relied on this technique." (Yaya)

"it helped. I'm referring this technique and fortunately it helped on my drawing process." (Fit)

"its easy because this technique is systematic so we know what we should do next and also it assists in generating idea." (Sya).

Element to create designs

"combine as there are many sketches that I do need to combine so much things like beads and lace. Yeah, something like that." (Yaya)

"eliminate because sometimes teachers asked us to make and I think it is simpler if I change the original design. Then, just change the puff sleeve into and this same goes to the usual sleeve." (Fit)

"hmm.. combine because usually if there is a need to increase the enticement of clothes, teachers or I will ask to add beads,, gather, wrinkles or other." (Sya)

The required elements

"it may be enough for certain designs, but I may need more techniques on other designs." (Wani)

"abundant of techniques." (Lia)

"I need more." (Ama)

"no. I used more than one technique in the process of sketching when I need to finish clothes. However, little techniques may be enough for previous time." (Yaya)

"its inadequate. I need more than one technique to create fascinating clothes." (Fit)

"I need numerous elements." (Sya)

DISCUSSION

The findings of this study found that SCAMPER technique gave positive effects to students in designing clothing style process. SCAMPER help student to create newly fresh idea by adapting idea and design and redesign depends on ideas. Hence, this study is commensurate with the study conducted by Celikler dan Harman (2015) that mentioned SCAMPER technique could expand students' thinking in creating more of creative idea. Moreover, the findings found that students affirmed the SCAMPER sub-techniques is easily used because it helped them in designing better and innovative sketches. Students tend to innovate the old clothes or design to make it more fresh and follow the current fashion trend. Other than that, most of the student agreed that SCAMPER technique easily to use by combining and substituting the original ideas or design. Therefore, this proved that SCAMPER technique can ease students in designing process of particular clothe design. Students were able to use all the techniques under SCAMPER which *Substitute, Combine, Adapt, Modify, Put to Other Uses, Eliminate and Rearrange* to cultivate idea in a way to achieve innovative and creative designs. Next, this study is in consonance with the study conducted by Black et al.,

(2015) where it promoted that skills to cultivate idea is very important especially in nowadays fashion industry. Cultivation of idea is not an easy thing to do especially to the people who just entered into this fashion field. Kwon and Song (2013) suggested that students who have lesser motivation can utilise this SCAMPER technique. The learning process of converting idea into another form takes lengthy period of time. Students can convert idea in better way by using this technique and also throughout the forming of theme.

There are seven elements under SCAMPER technique that can be used in the learning process. The idea was derived from observation technique by observing the current fashion style and matches with a few design. Besides, SCAMPER also provide a systematic assist in generating idea that help student in generating idea. The findings accelerate with Çelikler dan Harman (2015); Glenn (1997) stated that SCAMPER is not only providing framework for students to freely use their creative thinking skills, but to promote systematic and practical approach to ensure a diverge, creative and original thinking. Students also can think deeper as a way to deliver creative idea in designing sketches.

Moreover, each student has different level of creativity and ability. There is a student who only needs some of the elements under this technique to create a good sketch. The most dominant sub-technique use to create design in this study are combine and eliminate where the combine technique increase the enticement of clothes wheres the eliminate technique give the simple yet fascinating look for the design. Otherwise, there is a student who needs all of the elements to create a high quality design. This is consistent with Irwansyah Iskandar (2018), creativity is indispensable component in today era to develop an individual that dominate high quality especially in fashion field. Students that do not have skills in designing clothes style can apply SCAMPER technique as Kwon and Song (2013) affirmed that students that have lesser motivation or learning advantages can utilise SCAMPER technique. In this present time, technology is very important aspect, so SCAMPER technique is highly recommended especially in the process of increasing creativity. This is commensurate with statement by Irwansyah Iskandar (2018) where creativity is indispensable for thrive of knowledge and technology. Then, creativity also important in this era because creativity is a significant factor in the creation of clothing styles, referring to the statement of Valgeirsdottir, Onarheim & Gabrielsen, (2015); Lee & Jirousek, (2015) which creativity is an essential factor to be valued. This denotes with the statement by Pratiwi, Dwijanto & Wijayanti (2019); Majid & Ismail (2017) where teachers need to do creativity teaching so that the teaching and learning process can attract student's attention. Jean Piaget is the person who created this theory that children go through the same

developmental stages but at different ages. Respondents also stated that they need to innovate on clothing style sketches. Thus, it is related to Piaget's cognitive theory which views learning as a process of creation and innovation. This theory is applicable to the findings of this study to encourage students to think creatively and critically as it focuses on cognitive skills in line with the study by Beghetto (2016). Creativity can be enhanced through variables such as intelligence, knowledge, thinking style, personality, motivation and environmental conditions. This theory is particularly suitable in this study because the variables mentioned help in enhancing creativity since the second objective of this study is to increase creativity in the process of designing clothing.

Therefore, in the process of teaching, teachers plays a role in developing students' creativity skills in various subjects including design process as stated by Idek (2016); Lindmark and Nilsson (2014). Creativity is often associated with the development of various ideas and most effective if combined with SCAMPER techniques as suggested by Serrat (2017); Moran, Armbruster and Vosel (2014). This SCAMPER technique gives students an opportunity to practice their creative thinking. Therefore, lecturers should be smart in recommending a systematic and practical approach to ensure that diverse, creative and authentic thoughts are generated from students (Hussain & Carignan, 2016; Çelikler & Harman, 2015; Glenn, 1997). It is recommended that, lecturers always give exposure to the SCAMPER technique in theory. Then students will know about this technique, they be able to apply the SCAMPER sub-techniques to their students to create a creative and innovative sketch as the fashion world progresses. Besides, all the SCAMPER sub-techniques are used to generate sketches through the processing of ideas. In addition, respondent were more likely to use more than one of the most dominant of SCAMPER sub-techniques to create fascinating ideas to sketch. By using this technique, more sketches can be created as SCAMPER technique help an individual to develop better ideas. Plus, the generated ideas can stimulate creativity while also enhancing the respondents' innovative level at once.

IMPLICATION

The findings of this study can be utilised by students, teachers and vocational college. SCAMPER technique was able to encourage students to think creatively. Based on this study, students were able to think more creatively in order to produce interesting designs in compliance with the tasks given by their teachers. This technique can ease teachers' works to teach and deliver knowledge to students in skills and expertise course distinctively. This is because teachers should teach students with techniques that are easy to understand in

the learning process. Subsequently, vocational college will be better known as an institution that producing intelligent students with high creativity. Besides, it can attract students' interest in further count to choose vocational college to pursue their study.

CONCLUSION

In conclusion, respondents agreed that SCAMPER is a technique which can be applied in clothes designing process. Respondents also stated that they had used more than one element under SCAMPER technique to create creative and innovative clothing styles. They mentioned that SCAMPER technique was initially

applied in indirect way without them realise during the designing process. Besides, in general, this technique helped them to explore in deep over the invention and convention of idea in order to increase creativity.

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REFERENCES

- Ab Majid, M. R. B., & Ismail, Z. (2017). Kreativiti Pengajaran Guru Bahasa Arab Di Malaysia. *JuPiDi: Jurnal Kepimpinan Pendidikan*, 4(4), 27-38.
- Abdullah, M. F. N. L. (2019). Kesahan dan kebolehpercayaan instrumen penilaian sendiri pembelajaran geometri tingkatan satu. *Malaysian Journal of Learning and Instruction*, 14(1), 211-265.
- Agusta, I. (2003). Teknik Pengumpulan dan Analisis Data Kualitatif. Pusat Penelitian Sosial Ekonomi. Litbang Pertanian, Bogor, 27.
- Ang, K. Y., & Yuen, M. C. (2016). A Student's Perspective of Scamper Technique Used for Multimedia Asset Creation. *Conference Proceeding: 2nd International Conference on Creative Media, Design, and Technology (REKA 2016)*. Penang: Malaysia.
- Arasinah Kamis, Farah Najwa Ahmad Puad, Suriani Mohamed, Ridzwan Che Rus, Baity Bujeng, Rodia Syamwil, Emy Budiastuti. (2018). Items' Validity and Reliability Using Rasch Measurement Model for Factors that Influence Clothing Disposal Behaviour. *Indian Journal of Public Health Research and Development*, 9(11), 1344-1353. ISSN 0976-5506
- Armstrong, A. E., Parsons, S., & Barker, P. J. (2000). An inquiry into moral virtues, especially compassion, in psychiatric nurses: findings from a Delphi study. *Journal of Psychiatric and Mental Health Nursing*, 7(4), 297-306.
- Azizi Ahmad. (2010). Pentaksiran pembelajaran. Kuala Lumpur. Dewan Bahasa dan Pustaka.
- Baity Bujeng, Arasinah Kamis, Mohd Azlan Mohammad Hussain, Mohd Bekri Rahim & Sunaryo Soenarto. (June 2019). Validity and Reliability of Multimedia Interactive Making Clothes (MIMP) Module for Home Science Subjects. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, 8(8S), 593-596. ISSN: 2278-3075.
- Black, C., Freeman, C., & Stumpo, G. (2015). Conceptual model and strategies for creative thinking in apparel design. *International Journal of Fashion Design, Technology and Education*, 8(2), 131-138.
- Cahyati, H., Muin, A., & Musyrifah, E. (2018). Efektivitas Teknik SCAMPER dalam Mengembangkan Kemampuan Berpikir Kreatif Matematis Siswa. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, 2(2), 173-182.
- Çelikler, D., & Harman, G. (2015). The Effect of the SCAMPER Technique in Raising Awareness Regarding the Collection and Utilization of Solid Waste. *Journal of Education and Practice*, 6(10), 149-159.
- Choi, S. Y., & Kim, M. J. (2014). Creative idea and an analysis of fashion design on Korean image through the SCAMPER technique. *Journal of the Korean Society of Costume*, 64(1), 1-17.
- Creswell, J.W. (2012). *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research* (4th ed.). Boston, MA: Pearson Education.
- Fitrihana, Noor. (2005). Pemberdayaan pendidikan teknik busana di perguruan tinggi untuk pengembangan industri garmen di pasar global. *Jurnal Cakrawala Pendidikan*, Th. XXIV, (1), 125-148.
- Gunawan, I. (2013). Metode penelitian kualitatif. Jakarta: Bumi Aksara.
- Halim, A., Halim, L., Meerah, T. S. M., & Osman, K. (2010). Pembangunan Instrumen Penyelesaian Masalah Sains. *Jurnal Pendidikan Malaysia*, 35(1), 35-39.

- Hamid, H. A., Idris, N., & Tapsir, R. (2019). The Functions of Graphics and Visual Reasoning Demand in Mathematical Problems in the Malaysian National Examination. *Asian Journal of Assessment in Teaching and Learning*, 3, 31-45.
- Hussain, M., & Carignan, A. (2016). Fourth graders make inventions using SCAMPER and animal adaptation ideas. *Journal of STEM Arts, Crafts, and Constructions*, 1(2), 6.
- Idek, M. (2016). Measuring the Application of SCAMPER Technique in Facilitating Creative and Critical Thinking in Composing Short Stories and Poems. *Malaysian Journal of Higher Order Thinking Skills in Education*, (2), 30-53.
- Iskandar, I. (2018). *Proses Berpikir Kreatif Dalam Pengajaran Masalah Ditinjau Dari Kemampuan Awal Siswa Smp Negeri 3 Makassar* (Doctoral dissertation, Universitas Negeri Makassar).
- Ismail, S., & Talip, F. A. (2010). *Kepuasan bekerja staf akademik jabatan pendidikan teknikal dan kejuruteraan, Fakulti Pendidikan, Universiti Teknologi Malaysia*, Skudai. Jabatan Pendidikan Teknikal dan Kejuruteraan, Fakulti Pendidikan, Universiti Teknologi Malaysia, Skudai, 1-7.
- Kamis, A., Ab Rahim Bakar, R. H., & Asimiran, S. (2014). Validity and Reliability of Clothing Fashion Design (CFaDC) Competency Instrument. *Middle-East Journal of Scientific Research*, 19, 89-97.
- Kamis, A., Bakar, A. R., Hamzah, R., & Asimiran, S. (2013). Keperluan Kompetensi Rekaan Fesyen Pakaian (Refp) dalam Industri Fesyen. *Perspektif: Jurnal Sains Sosial dan Kemanusiaan*, 5(2), 60-74.
- Kamis, A., Jamaludin, R., Bakar, A. R., Hanapi, Z. (2016). Clothing Fashion Design Competency Instrument: An Application of Rasch Measurement Model. *Advance Science Letters*, 22(5-6), 1343-1347.
- Kim, Y. K. (2014). Study on characteristics of the development process of fashion design thinking through the lexicon. *Journal of the Korean Society of Costume*, 64(2), 113-125.
- Kwon, O. H., & Song, K. S. (2013). *Enhancement Idea Conception and Creative Expression in Vocational High Schools*. In EDULEARN13 Proceedings (pp. 6425-6430). IATED.
- Lee, B. D. (2006). A study on fashion design pedagogy for the development of creativity-With emphasis on intuition. *Journal of the Korean Society of Clothing and Textiles*, 30(3), 487-496.
- Lee, J. S., & Jirousek, C. (2015). The development of design ideas in the early apparel design process: a pilot study. *International Journal of Fashion Design, Technology and Education*, 8(2), 151-161.
- Lindmark, O., & Nilsson, A. (2014). *A Method for Turning Needs to Ideas and Requirements for Innovative Products*.
- McKenney, S., & Reeves, T. C. (2016). *Educational design and construction: Processes and technologies*. In *The Future of Ubiquitous Learning*, (pp. 131-151). Springer, Berlin, Heidelberg.
- Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implementation*. San Francisco: Jossey-Bass Publisher.
- Mijares-Colmenares, B. E., Masten, W. G., & Underwood, J. R. (1993). Effects of trait anxiety and the Scamper technique on creative thinking of intellectually gifted students. *Psychological reports*, 72(3), 907-912.
- Mohamad, M. M., Adai, S., & Ahmad, A. (2016). Kemahiran keusahawanan pelatih wanita kursus rekaan fesyen pakaian di Institut Latihan Kemahiran. *Jurnal Pemikir Pendidikan*, 7, 137-151.
- Moreno, D. P., & Yang, M. C. (2014). *Creativity in Transactional Design Problems: Non-Intuitive Findings of an Expert Study Using Scamper*. In DS 77: Proceedings of the DESIGN 2014 13th International Design Conference (pp. 569-578).
- Noraini Idris. (2013). *Penyelidikan dalam Pendidikan*. Kuala Lumpur: McGraw-Hill Education.
- Poon, J. C., Au, A. C., Tong, T. M., & Lau, S. (2014). The feasibility of enhancement of knowledge and self-confidence in creativity: A pilot study of a three-hour SCAMPER workshop on secondary students. *Thinking Skills and Creativity*, 14, 32-40.
- Poon, J. C., Au, A. C., Tong, T. M., & Lau, S. (2014). *Thinking Skills and Creativity*.
- Pratiwi, L. A., Dwijanto, D., & Wijayanti, K. (2019, February). Analisis Kemampuan Berpikir Kreatif Matematis pada Pembelajaran Read, Think, Talk, Write Ditinjau dari Kecemasan Matematika. In PRISMA, *Prosiding Seminar Nasional Matematika*, 2, 576-582.
- Puccio, G. J., Wheeler, R. A., & Cassandro, V. J. (2004). Reactions to creative problem solving training: Does cognitive style make a difference?. *The Journal of Creative Behavior*, 38(3), 192-216.
- Radziszewski, E. (2017). SCAMPER and Creative Problem Solving in Political Science: Insights from Classroom Observation. *Journal of Political Science Education*, 13(3), 308-316.
- Serrat, O. (2017). *The SCAMPER technique*. In *Knowledge Solutions*. (pp. 311-314). Springer, Singapore.

- Suryandari, Sajidan, et al. (2018). Project-Based Science Learning and Pre-Service Teachers' Science Literacy Skill and Creative Thinking. *Jurnal Cakrawala Pendidikan, Th. XXXVII*, (3), 345- 355.
- Tajudin, N. M., Ali, S. R., & Idris, N. (2015). Assessing Numeracy Thinking Strategy for Year Four Primary School Pupils. *Asian Journal of Assessment in Teaching and Learning*, 5, 1-12.
- Valgeirsdottir, D., Onarheim, B., & Gabrielsen, G. (2015). Product creativity assessment of innovations: Considering the creative process. *International Journal of Design Creativity and Innovation*, 3(2), 95-106.
- Wardi, R. H., Basaree, R. O., Hanafi, J., & Ramli, M. F. (2017). Penggunaan Sumbang Saran Berkategori Sebagai Pendekatan Dalam Pembangunan Kemahiran Pemikiran Kreatif Pelajar Reka Bentuk Tekstil Di Universiti Teknologi Mara Malaysia. *JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik*, 4(4), 1- 11.
- Wulandari, R., & Santoso, R. E. (2019, January). *Measurement of Student's Learning Interests in Fluid Mechanics Subject through Project Based Learning Model Using SCAMPER Strategies*. In 2nd International Conference on Vocational Education and Training (ICOVET 2018). Atlantis Press.
- Yuen, M. C., Azam, N. T., & Ang, K. Y. (2015). *SCAMPER for Character Design Unique Zoo Creature*. In *International Colloquium of Art and Design Education Research (i-CADER 2014)* (pp. 345-358). Springer, Singapore.