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THE EFFECTIVENESS OF APPAREL PATTERN DRAFTING IN MANUAL SYSTEM FOR TVET FASHION PROGRAM

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ABSTRACT

Clothing pattern design is one of the most important components of clothing production from the past to the present. Technological advances in the production of clothing patterns are growing rapidly. The use of computer-aided design (CAD) is very popular in developed nations. Many skill-based educational institutions in Malaysia also use manual systems for TVET fashion programmes. It is also important that the use of a hands-on manual system ensures that students have skills and adepts. This is because the manual system is easier to use and saves costs while improving students' understanding and mastery. Students can understand and apply directly on the go, without the need to use computer application software. The objectives of this study were the use of literature review methods, research knowledge and experience, questionnaires and visual representations of clothing pattern production using a manual system. The methods of research used are observations and interviews with users and design experts to find out the effectiveness of a manual system that is still applicable to skill-based education. The results of this research have shown that the use of the manual method for designing clothing patterns is particularly important for new users. Furthermore, before learning how to create clothing patterns using CAD system software applications, users need to understand the manual method for producing patterns.

INTRODUCTION

Every person needs to be dressed up in his everyday life. Different types of designs are produced based on a region's weather, topography and daily activities. Thus, clothing is a vital necessity in life and represents the identity and culture of world society.

Pattern making begins with the pattern design or the basic block of the pattern (Gill, S. and Chadwick, N., 2009). Blocks are two-dimensional (2D) representations of body measurements with minimum length and width enhancements called 'wearer ease allowance' to enable movement, expansion and comfort of the body (Rosen, 2004). Today, the production of clothing patterns is made using two methods, manually and CAD system (C.H.M. Hardaker et al., 1997). In Malaysia, the use of clothing pattern design systems

still employs manual control, as many of the skills training institutions and small manufacturing sectors, such as boutiques, still use manual systems. This is because it is more cost-effective to use a manual that can be used everywhere without the need for advanced and modern technology. One of the forms of learning media is the tools and materials that are important mediums for the implementation of education in schools. A teacher's manual will make teaching easy and student friendly as well as easy to manage (Rachmawati Sartika Dewi, 2012). In addition, different age groups and societies can also understand and easily use manual patterning methods instead of using software such as CAD systems.

In Malaysia, manual patterns development is still being implemented especially in skill-based education such as TVET skills institutions such as Community College, IKBN, Giat Mara and Kemas. It's important because students understand patterns and can build them easily. Therefore, the method of producing clothing patterns using a manual system is the best foundation and one must master it to learn before mastering the use of technology. Effective management of the manual system can promote indirect learning of different applications by users (Kim, S. dan Kyu Park, C. 2007).

SUSTAINABLE FASHION EDUCATION

The awareness, knowledge and practicality of sustainable development and the growth and advancement of practical training in a broad range of ways enable students to engage effectively in developments in the fashion sector in order to meet existing and relevant needs of this industry (Stahel, 2010). According to Fletcher & Williams, (2013) any industry under a specific government or organization may or should implement the action required to ensure consistency of curriculum and technology in established practice learning without the need to change the needs of industry in order to make established practices 'green' or more ethical, but wider and more innovative. A new model of learning and teaching in contrast to traditional educational pedagogy provided by the skills and standardized learning environments of educational institutions is also the revolutionary development of fashion education. Skills training must be aligned with the industry 's requirements to keep students familiar with the work opportunities offered.

In addition, through wide experiences and observations, researchers may include examples of sustainable fashion design lessons developed as TVET mode programs courses that deal with concerns and ideas posed, such as the use of CAD systems for learning students. Ultimately, TVET mode students must learn how to work through some kind of holistic approach involving environmentally sustainable design that has no detrimental impact on the environment, humans and community. Sustainable design education should be incorporated as a program and not just a novelty course. The belief that universities can be a pioneer in this paradigm shift is that they have the natural and human capital to contribute to the transformative and systemic changes needed to resolve some of the world's worst problems. Graduates who have a degree in creative sustainability are regarded as agents of change, who can be part of the solution and avoid being part of the problem to contribute to satisfying the requirements of an industry which needs competent and flexible professionals.

a) Sustainable Fashion Education Criteria

The sustainability requirements for fashion education are:

- a. Collaborative effort within the textile manufacturing industry in Malaysia to identify the relevance of the syllabus offered to the domestic fashion industry.

- b. Approach to the development of fashion education in all areas of sustainability, centred on processes, activities and innovative participation: social, environmental and economic.
- c. Existent TVET traditional education models or curricula based on products or results, as well as preparing students for economic life should be built in every respect for sustainability of needs.
- d. Bridge epistemological gaps such as the current approach to definition of sustainable approaches and practices for the fashion industry, such as designers working in textile design and production.

The criteria aforementioned are the needs to exist in terms of sustainability and skill-based fashion-based learning and education. This will shift the mindset and ensure sustainability of fashion learning remains relevant to society and the country's current needs. This will increase the level of thought and growth in the learning of skills for the current generation, in particular TVET fashion programs.

RESEARCH ASSESSMENT METHODS

The method of evaluating this study is to use the experience and knowledge (*empirical research*) of researchers who teach at the TVET skill institution. Experience has shown that the use of manual methods for students is more important and easier than the use of technical tools such as CAD systems. The use of manual methods in the teaching and learning process is more effective, and students easily understand and can produce patterns as required. In addition, students can learn more about the problems that arise in the practice of making patterns (Salikin Sidek, 2010). The effectiveness of manually generating patterns is paramount in skill-based learning and teaching (Diagram 1).

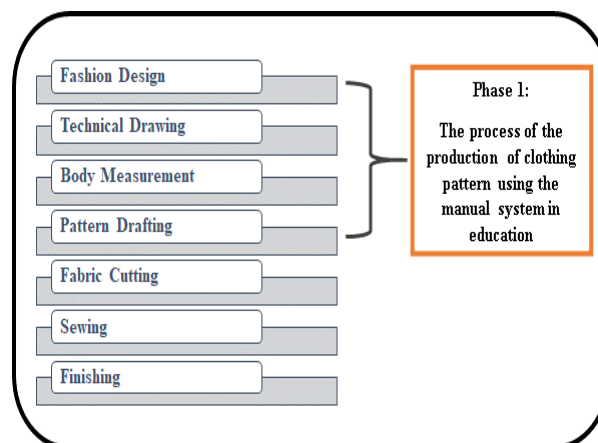


Diagram 1: Process of manual workflow pattern production
(Source: researchers' observations and experiences in the field)

Diagram 1 demonstrates the method of establishing a clothing pattern by means of a manual system, used now in the training program of all TVET institutions. It must be done step by step in order to create a clothing pattern. The design of the apparel, the technical drawing of the clothing, the size of the customer or the correct dimension and ultimately the design of the piece of clothing must be created in order to produce an apparel model. For this the student must go through the process.

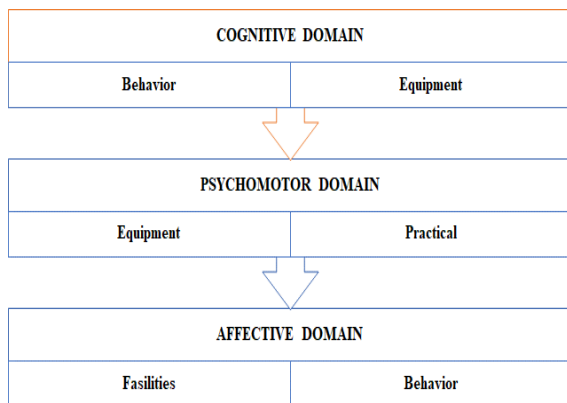


Diagram 2: The process of clothing production in TVET education today
(Source: researchers' observations and experiences in the field)

Diagram 2 shows the process of clothing pattern production involving several key domains when pattern production is produced as well as several other processes related to clothing pattern production. These include:

1. Cognitive Domain:
(Behavior + Equipment)
2. Psychomotor Domain:
(Equipment + Practical)
3. Affective Domain:
(Facility + Behavior)

The cognitive domain methodology is an integral part of the human activity and body involved in the creation of models for the fashion system. This is a passive displacement of the user's intention and behaviour with respect to product (Shaari, N., 2010). The psychomotor domain plays a significant role in mastering the development of manual patterns for students on TVET design and apparel programmes. Students must manually learn and understand the use of equipment so that students can create clear, correct clothing patterns and avoid misuse when forming lines for desired dress patterns. Many errors occur when students do not master the use of pattern-drawing equipment. Students will face major problems and mistakes, especially in difficult areas such as arm wraps, neckline, body shape, skirt shape, waistline, waistline and sleeves as mentioned by McKinney, E. C., Bye, E., & Labat, K. (2012). The affective domain will lead students to be sensitive to the existence of stimuli-awareness, willingness to receive, or respond, valuing, and organised in the design of learning patterns. However, students also need to understand the basic patterns and the divisional calculation in the pattern making process using the manual system. The basics of clothing pattern production are a major pattern making process before students become aware of the more difficult parts of the clothing pattern production process.

Questionnaire instruments were used to collect data from respondents of TVET 's fashion program. A total of 40 students from TVET fashion program consisted of 20 students from the 1st semester and 20 students from the 3rd semester participated in the questionnaire. The aim is to obtain information and data on the use and handling of clothing patterns used by students during practical training. The participation of new and senior students is intended to assess the level of expertise in the use and activity of clothing pattern designing equipment held by both classes at various levels of experience and ability.

Using preliminary evaluation techniques, hands-on testing is often used to determine the student's level of knowledge by using existing patterning equipment. Student mastery of semester 1 and semester 3 was assessed by

observation using existing pattern designing equipment to assess the degree of mastery of pattern drafting equipment.

FINDINGS AND DISCUSSIONS

a) Questionnaire instrument

The questionnaires approach was used in this analysis. The respondents were 30 students of the TVET fashion program. The analysis of questionnaire data using the *Social Sciences Statistics Package (SSPS)* software was used to obtain data from questionnaires distributed to respondents (Ghazali Darusalam et al., 2018).

Table 1: Shows the average value of the psychomotor domain between semester 1 and semester 3

No.	Keyword	Semester 1	Semester 3
1	Practical	3.9	4.3
2	Usage	3.2	4.3
3	Conducive	3.8	4.1
4	Design	3.8	4.1
5	Experience	3.6	4.2
6	Tools	3.9	4.2
7	Skills	3.4	3.9
8	Drafting	3.8	4.2
9	Understanding	3.1	4.1
10	Scale 5 Ruler	3.5	4.1
11	<i>French Curve Ruler</i>	3.4	3.9
12	Curve Ruler	3.3	4.2
13	90° Ruler	3.7	4.1
14	Straight-line Ruler	3.2	4.4
15	Knowledge	2.7	3.9

Table 1 shows the average values between semester 1 and semester 3 in the design of clothing patterns. The highest average values for the psychomotor domain for semester 1 consisted of items 1 and 6 representing the Practical keywords and Equipment average of 3.9. Whereas for semester 3, item 14 represents the Straight-line keyword 4.4 is the highest average value obtained from the psychomotor domain. The second highest average value for semester 1 was followed by items 3, 4 and 8 representing the same Conducive, Design, and Drafting keywords. Subsequent to semester 3 there were 2 items with the same average value of 4.3 between items 1 and 2 covering the Practical and Use keywords. The third highest average value for semester 1 was item 13 involving the keyword 90 ° Ruler with a mean of 3.7 and for semester 3 had 4 equal average values of 4.2 representing items 5, 6, 8 and 12 using the keywords Experience, Tools, Drafting and Curve Ruler.

The lowest average value for the psychomotor domain showed that item 15 for semester 1 represented Knowledge keywords of 2.7 and for semester 3 there were 3 items 7, 11 and 15, with the lowest average values of 3.9 involving the keywords Skills, French Curve and Knowledge keywords. For the second lowest average value followed by item 2 for the Understanding keyword for semester 1 the average value is 3.1. Compared to semester 3, there were 5 items with an average value of 4.1 including items 3, 4, 9, 10 and 13 using the keywords Conditional, Design, Understanding, Scale 5 and 90 ° Ruler. The third lowest mean value in the psychomotor domain for semester 1 had 2 items of the same mean value of 3.2 consisting of items 2 and 14 for the use of the keywords Usage and Straight-line Ruler. The average value for the other keywords is just between the highest and the lowest mean.

Table 1 shows that the students of Semester 1 are still less well-versed in the use of costume design equipment than the average value of Semester 3. Attention should be paid to students from Semester 1 during the practical operation of the use of dress pattern design equipment. Manually producing clothing patterns requires a high level of student understanding, mastery and skills, ranging from equipment handling to mastery and understanding of pattern-making according to the formula prescribed. When students learn the basics well, they can develop more complex patterns and visualize clothing designs with high visibility. Observation and efficiency in the visual design of clothing designs will accelerate the process of student performance in the production of clothing patterns. Psychomotor domains need to be emphasized during the teaching and learning process in order to ensure a high level of student mastery, especially manual training.

b) Tools used for design drafting in the manual system

The use of manual system designing tool is still relevant because most TVET fashion programs in public and private institutions of higher learning still use the traditional patterning system. This is aimed at increasing the level of hands-on skills for students to better understand and master the design techniques rather than using of CAD system software applications. According to Z. Liu et al., (1995), the manual grading process is lengthy and may take a long time depending on the type of clothing design. Each size should be accurately described, enhanced or minimized, and then the process of cutting the dress pattern should be carefully implemented. However, if a student wants to master the production of patterns using the CAD system, students need to master the basics of creating a pattern manually which will make it easier to use the CAD system (Ashdown, S. et al., 2003). If they do not master the basics of pattern making, then students may not be able to understand the production pattern using CAD system. However, the integration of script-based parametric pattern design methods into apparel computerized simulation systems is one of the most useful applications for practical garment design processes for the garment manufacturing sector (Kim, S. 2012). The following are the requirements for tools and equipment using a manual system (Table 2).

Table 2: The tools and equipment needed to produce a clothing pattern using a manual system

No.	Apparel Drafting Tools	Apparel Drafting Equipment
1	Pencil	Straight-Line Ruler
2	Eraser	Curve Ruler
3	Craft Paper	90° Ruler
4	Scissors	<i>French Curve</i> Ruler
5	<i>Masking Tape</i>	Measuring Tape
6	Calculator	Scale 5 Ruler
7	Marker/Pen	

The cost involved in the provision of manual pattern design equipment is lower than the CAD system. However, the drawback of most of the computer systems currently used in construction preparation is that basic cutting patterns that must be incorporated into the computer must be pre-built (Slavenka Petrak et al., 2017). Creating a simple and fast pattern of clothing requires only space, such as a pattern drawing table, to facilitate the design process of the pattern.

Therefore, designs produced using a manual system is still appropriate and relevant in a skill-oriented educational institution due to the high cost required

in order to provide equipment and facilities to lower skilled students and the Ministry of Higher Education (KPT) is able to provide all the facilities for the TVET students.



Figure 1: Lecturer giving her students instruction and guideline during design drafting practical using a manual system.



Figure 2: Students executing their design drafting practical in a fashion studio.

Source: Field researcher participation at Temerloh Community College 2019

Based on the diagram above, it is explained that the use of the manual system is still underway in the classroom design of the Fashion and Clothing Certificate Program at Community College. The use of manual systems is very effective in implementing teaching and learning skills particularly in the manufacture of garments. This is necessary to increase the level of mastery and understanding of students to produce different types of clothing patterns compared to using computer systems such as Computer Aided Design (CAD) systems. Students need to master a manual system that helps students understand in more detail the problems involved in the production of clothing patterns using manual methods compared to the CAD system that students can only see through 2D and do not fully understand the patterns that have been created. As a result, teaching and learning through a manual system can improve students' understanding and mastering of pattern-drawing skills and can solve problems in a lively pattern. Student product results are more detailed on the basis of the experience and skills that students themselves complete while conducting practical training with the help and guidance of lecturers during practical classes.

CONCLUSION

The findings of this study show that the use of manual systems is still relevant to teaching and learning skills-based education for TVET fashion students. The use of more practical and face-to-face interaction assist the

students to comprehend and achieve deeper understanding the gradual design drafting process. In addition to cost savings, the system also facilitates the process of producing more practical clothing patterns. CAD systems require a high cost to apply because each student must use both a computer and a printer to print patterns created using the CAD system. Compared to using a manual method that only requires time and space with the existing pattern-making tools available and easy to find.

Nonetheless, students who intend to upskill, need to learn the CAD systems application in producing clothing patterns in line with the era of the national industries in RI 4.0. The advantages for students who are skilled in the CAD system, are that, they are easily positioned in the highly skilled employment sector. CAD systems also enhance students' knowledge and skills in designing products or designs by simply using CAD systems. Students can explore a wide career path and can easily learn different techniques in the production of 2D and 3D products. The manual system therefore also leads to the main criteria for designing patterns in the fashion design process.

Apart from that, the psychomotor domain is also an important aspect of skills-oriented learning. The psychomotor domain involves the physical movement, coordination and use of students' motor skills in performing all tasks involving direct skills (hand on). Emphasis on the psychomotor domain in skills learning becomes the main focus for students to master skills especially for TVET fashion programs.

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