Applying Psychomotor Domain for Competency Based Teaching in Vocational Education

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Abstract. Teaching is a teaching–learning activity between two different parties, namely, students and instructors. Teaching strategies are used by instructors in teaching sessions. Practical teaching requires paying attention to the application of all teaching strategies in the psychomotor domain. Psychomotor domains that need to be emphasized in teaching and learning processes should include seven elements, namely, perception, setup, controlled movement, mechanism, specific movement, settlement, and originality. This study aims to discuss the application of psychomotor domain practical teaching strategies adopted by teachers in vocational colleges. This study involves the observation of vocational college teachers who are experts in practical technology work. This study is expected to provide new ideas to develop instructors’ skills in applying psychomotor elements in teaching methods in the form of demonstrations for teaching practical workshops.

1. Introduction

Technical and vocational secondary schools, which have been upgraded to vocational colleges, are assets that are enabling the technological advancement of Malaysia. Vocational curricula are changed and reviewed to adapt to the working environment. Vocational college curricula should consider every teaching need \cite{1}. The teaching process should meet established standards. \cite{2} explained that vocational trainers must be professional when selecting teaching strategies to realize learning goals. The selected teaching strategies must enhance knowledge (cognitive), skills (psychomotor), and attitudes (affective). Additional emphasis should be given to teaching psychomotor skills, specifically practical skills in workshops.

1.1. Background of study

Vocational subjects focus on facilitating learning through practical workshops rather than only through theoretical knowledge \cite{3}. Practical teaching method is an effective classroom learning strategy \cite{2}. Trainers need teaching and practical skills to ensure quality delivery of accurate information to students. Ethically, trainers should be accurate. Their teaching strategies should help students accurately apply all theories, teaching techniques, and program elements in workshops \cite{4}. The selected teaching methods must also be suitable for the lessons to be taught. \cite{5} stated that appropriate teaching strategies are needed to develop skills in giving presentations and demonstrations, recalling, training, and performing practical projects, as well as improving students’ performance. Teaching
skills must involve the application of all aspects of psychomotor skills [6]. Methods for teaching psychomotor skills are required, especially for teaching workshops on practical skills [2]. Psychomotor domains that are emphasized in teaching and learning processes include perception, setup, response, controlled movement, mechanism, movement, settlement, and originality. Teaching and learning involving these psychomotor domains are coordinated and elevated by instructors by selecting proper teaching strategies. Selecting an effective teaching method can help improve the efficiency of the students in mastering practical skills in workshops. Practical teaching method is an effective form of demonstration [7]. The psychomotor domains of perception, setup, response, controlled movement, mechanism, specific movement, settlement, and originality should be applied in all teaching methods, teaching strategies, and practical workshops.

1.2. Simpson’s Psychomotor Domain
Psychomotor in learning is present in physical skill with demonstrations of equipment or tools in the classroom, workshop, and laboratory. Figure 1 illustrates Simpson’s psychomotor domain.

![Educational Objective Level](image)

Figure 1 Simpson’s psychomotor domain.

Seven categories in Simpson’s domain are applied in this research [8]. Perception is the ability to use sensory cues to guide skills or motor activity. The range is from sensory stimulation, cue selection, until translation. A set level is readiness to act, which includes mental, physical, and emotional aspects. This disposition is predetermined for different situations or mindsets. Guided response is the early stage in complex skill learning and includes imitation and trial and error. The performance will be achieved with practice. Mechanism is an intermediate skill, in which a learned response has become habitual and the movements can be performed with some confidence and proficiency. A complex overt response indicates that skillful performance involves complex movement patterns. This level includes performing without hesitation and automatic performance. The next level is adaptation, in which skills are well developed and individuals can modify movement patterns to meet special
requirements. The final level is origination, which involves creating new movements to fit particular situations or problems. This level emphasizes learning outcome based on highly developed skills.

2. Methodology

This study investigates how teachers apply the psychomotor domains in teaching practical workshops on the basis of Simpson's domain [8]. The method used in this study is a type of unstructured observation; observation is made freely, and all aspects are considered important [9]. The application of the psychomotor domains is analyzed through structured observation. The structured observation is more likely conducted through a survey, and respondents are asked the same set of questions. Researchers use purposive sampling to implement this observation method. Four teachers who teach automotive technology are selected for observation [10].

The application of the psychomotor domains is analyzed through structured observation. The structured observation is more likely conducted through a survey, and respondents are asked the same set of questions. Researchers use purposive sampling to implement this observation method. Peer structured observation was conducted (two observers participated) to make sure that the checklist is not biased to one observer. Observers stay in a teaching session conducted in a workshop, and all time allocated in each session for all teachers is the same because it is based on the time allocated for skill-based subjects. The aim of observation was to gain a better understanding of the teaching environment and the teaching method that was applied. The observers prepared a checklist based on the psychomotor domain criteria.

3. Results

The results on application of psychomotor domain in teaching strategies starting with respondents’ responses in perception, set up, controlled movement, mechanism, specific movement, settlement and originality.

3.1. Perception (P1)

On the basis of observation, the psychomotor domain of perception (P1) is used in an observational strategy teaching method that involves memorizing the previous lesson and demonstration. When applying this strategy, teachers list the tools needed to perform practical tasks and ask students to classify and distinguish the use of each tool for practical sessions. Learning techniques for scan back are associated with the current situation that occurs in the environment and in the workshop. Students are asked to list the things that were taught in the classroom on that day and compare their practical performance with other specified manufacturing work. Instructors prefer the demonstration method in the perception (P1) aspect so that students will understand the procedure of the given task. Teachers initially show the cleaning of the equipment and machinery in workshops. Once a demonstration is completed, instructors ask all members of the class to perform the demonstrated practice. Teachers use methods to demonstrate the application of perception (P1) in teaching. Discussion is a teaching strategy in which instructors apply the psychomotor domain of perception (P1). Teachers ask students to discuss the relationship between the practical teaching implemented and other specified manufacturing work. The students who are asked to share with other students are selected from the discussions agreed between group members. Students can ask the trainers questions with regard to future concerns about practical workshops. Students and instructors discuss the problems jointly in the teaching and learning sessions.

3.2. Set up (P2)

A teaching strategy (i.e., discussions in applying the psychomotor domain setup) is chosen. For the application of the setup domain (P2), instructors ensure their mastery of practice prior to starting teaching and learning session involving practical questions. All existing problems are discussed jointly with teachers who teach other practical workshops. The students are ensured to fully focus on the things that are presented during the description of instructor practice. Students are asked to discuss existing problems if problems in the use of tools and machinery occur. This strategy prevents the occurrence of errors in handling machines and tools in pandemonium workshops.
3.3. Controlled movement (P3)
To develop competence in controlled movement (P3) in teaching strategies that shapes previous lesson is also applied in teaching sessions and learning workshops. Instructors ensure that students can prepare the workplace correctly without their assistance. Instructors remotely observe selected work of students. They remind students to revisit the preparation procedure of materials they have performed in the past. Controlled movement (P3) in teaching is also applied in the form of demonstration, wherein instructors show students the wrong way to use the machine and tells them the consequences of working without following the correct procedures and specifications. Instructors demonstrate the method by providing material specifications and showing the correct usage of the machine. This demonstration gives students an overview of practical learning beyond the applicability of controlled movement (P3).

3.4. Mechanism (P4)
To develop competence at the level of mechanism teachers, before starting a practical workshop, teachers ask students about setting and maintaining the correct tools. The trainers ensure that students can maintain the equipment safely and properly while performing without supervision. A teaching strategy is used by educators to apply mechanism as a psychomotor domain (P4). Trainers carry out teaching strategies in groups as they demonstrate to students during practical sessions. This process is only conducted with weak students during teaching sessions before a practice run. The instructors show students in advance and then ask students to open and install back the project when they have extra time during the practice run to increase student competency. For the application of mechanism (P4), trainers use video presentations. In the vocational college, instructors show an overview of the visual manufacturing process in the industry and associate the knowledge with practical workshops. Trainers also show students examples of right and wrong practices using techniques and procedures as guide during the practice run.

3.5. Specific movement (P5)
To achieve competence of specific movement (P5) also occurs in practical teaching strategies shaping scan back. Instructors highlight different criteria in each step in the workshops on the basis of the past experiences of practical students. Teaching strategies for demonstrations are conducted by trainers. Instructors show the use of each button on the machine so that the students become focused, incrementally upgraded to the machine, and cautious. The functions of each button are also described to the students. The application of a specific movement (P5) is included in teaching strategies involving demonstration.

3.6. Settlement (P6)
To achieve competence of (P6) teachers show variations that can be applied while performing practical work. Prior to practical sessions, instructors demonstrate techniques in installing and testing matches correctly. The practical sessions are carried out after instructors ask all the students gathered at the venue for updates. Teachers ask students to explain and demonstrate the return procedure implemented on the basis of tasks performed in actual projects. Instructors demonstrate techniques in installment and test if the work is correctly performed. The instructors demonstrate how to update the work to students in groups if the work material is inaccurate. Instructors request weak students to explain and demonstrate the return procedure implemented from start to finish to increase their understanding and skills. These efforts aid in the inculcation of adapted strategies for teaching demonstrations. The teaching strategies in the form of discussion and adaptation (P6) are also applied by instructors in teaching and learning practices in workshops. The teachers ask students to discuss and explain return procedures in implementing the practice that has been carried out. Instructors show
students through media how to install and match materials correctly. The trainers also show variations of art that can be applied while developing the practice.

3.7. Originality (P7)
Lastly, to achieve the highest level of competence in the psychomotor domain teachers also occurs the originality (P7) is one of the domains in the question and answer session during learning activities. Teachers ask students to list the materials or other hand tools that can be used in practice if students lack handheld materials in the workshop.

4. Discussions
Observation or perception is applied in three teaching strategies, namely, scan back, demonstrations, and discussions. The setup domain is only applied in discussions. Controlled movement is applied in memorizing previous lesson, demonstrations, and video workshops. Mechanism is applied in teaching strategies such as question and answer sessions, demonstrations, and video workshops. Specific movement is applied in scan back and demonstrations. Adaptation is applied in teaching strategies such as discussions and demonstrations, particularly video demonstrations. Originality is applied in the question and answer sessions in workshops. [7] and [11] stated that teaching strategies involving demonstrations are effective for practical subjects. In the present study, demonstration-oriented teaching strategies adopted by teachers do not use all the psychomotor domains. Instructors do not apply setup and originality when using teaching strategies involving demonstrations. The curriculum structure contains four fundamental questions: What should be taught? How should it be taught? How should learning be measured? Who are the learners? [12] stated the components of a curriculum structure for students to know the standards and objectives, activities and experiences, test and assessments, and materials and equipment. Hence, this research focused on a related issues of curriculum structure and a proposed match with teaching delivery to achieve educational objectives. The revised Bloom’s taxonomy also clarifies the intended outcome for educational objectives.

5. Conclusions
The contribution of this research focuses more in the vocational field. Experts’ views were discussed based on aspects in the psychomotor domain, and the quality of teaching will be enhanced when teachers design their teaching strategies. Usually, teachers prepare their lesson plan based on the syllabus and taxonomy level to achieve their teaching goals. However, they do not emphasize the psychomotor domain even when teaching skill-based subjects. Therefore, the application of perception, setup, controlled movement, mechanism, specific movement, settlement, and originality require more focus and clarification in preparing lesson plans for skill-based subjects. The investigated psychomotor domain is based on the nature of automotive technology courses in vocational colleges. However, the methodology is also suitable for other skill-based subjects and laboratory modes as long the teaching and learning session involves more physical activities. When teachers plan how they should assess learning, the intersection of cognitive, psychomotor, and affective processes can facilitate the selection of learning activities to provide modeling and practices to others.

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