



Psychomotor Skills in Pedagogical Context for Technology Courses

Mohamad, M. M.^{1*}, Yee, M. H.¹, Tee, T. K.¹ and Ahmad, A.²

¹Department of Engineering Education, Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

²Department of Technical and Engineering Education, Faculty of Education, University Technology Malaysia, Malaysia

ABSTRACT

Teaching is a process of disseminating knowledge and specific skills (cognitive, affective and psychomotor) that combines teaching strategies and practices. Teaching strategies revolve around planning, implementation and evaluation of pedagogical context. This study focusses on the psychomotor domain of skills. The Simpson Psychomotor Domain was applied as main objective of this research to investigate the teaching strategies in practical courses implemented by instructors. The survey research design was applied using the quantitative approaches and observation method as supporting data to identify implementation of strategies that develop the psychomotor domain. This research involved 301 instructors from vocational colleges who participated in the questionnaire survey and four heads of department who participated in the observation. The results indicate that the most dominant teaching strategies applied in skill-based pedagogical context are throwback, questioning, demonstration, discussion and video screening. Observation of the four heads of department showed that they laid emphasis on implementation of the psychomotor domain through use of observation, inventory, motion control, special movement and adjustment. The results may provide new ideas for instructors to plan teaching strategies to improve the skill-based pedagogical context.

Keywords: Pedagogical context, practical classes, psychomotor skills, teaching strategies

ARTICLE INFO

Article history:

Received: 01 November 2016

Accepted: 15 April 2017

E-mail addresses:

mimi@uthm.edu.my (Mohamad, M. M.),

mhyee@uthm.edu.my (Yee, M. H.),

tktee@uthm.edu.my (Tee, T. K.),

a-adnan@utm.my (Ahmad, A.)

* Corresponding author

INTRODUCTION

The psychomotor domain can be defined as the domain of skills involving motor ability such as handling equipment, handwriting, completing procedure, walking and

demonstrating. The coordination of motor skills requires practice and techniques, all of which are taught in the vocational education curriculum. The psychomotor domain developed by Simpson (as cited in Snowman, McCown, & Beihler, 2011), Harrow (1972) and Dave (1970) is used to develop teaching strategies to achieve learning outcomes. The hierarchy of the psychomotor domain has been described by Ferris and Aziz (2005) as recognition of tools and materials, handling tools and materials, basic operation tools, component operation tools, expert operation of tool, planning work operations and evaluation of outputs and planning means for improvement. The hierarchy begins with recognition of tools and ends with improvement of outputs of procedure. Dawson (1998) provided hierarchies for several aspects: observation, trial, repetition, refinement, consolidation and mastery. In vocational education, especially in practical classes, students are required to assemble, measure and solve problems using practical equipment to comply with students' competencies. Mahajan (1999) explained that instructors need to not only master technical skills but also teaching skills as well as practical skills to ensure the content delivered is accurate and correct. Explanation with demonstration in practical classes will impact on student understanding and performance in the final examination. Effectiveness of learning based on teaching delivery uses a variety of methods on the part of instructors. Since practical classes need more equipment and tools and is costly, clear understanding of

what should be planned and learnt from teaching activities should inform the design of teaching strategies, beginning with basic knowledge in taxonomies and psychomotor skills. Bloom's taxonomy of educational objectives has been a popular method to set goals for particular teaching activities and whole educational programmes (Ferris & Aziz, 2005). However, Bloom discussed the cognitive domain in detail but omitted discussion of psychomotor skills (Bloom, 1979). When teaching psychomotor skills, instructors need to separate the principles of the cognitive component from psychomotor skill development because different skills and functions are required for both. Practising psychomotor skills requires students to be competent in the tasks given. The design of teaching strategies must match the three domains i.e. cognitive teaching must be topic-centred, affective teaching, feeling-centred and psychomotor teaching, performance-centred (Bastable & Dood, 2008).

Psychomotor Skills

The psychomotor hierarchy requires elaboration of several factors as discussed by Ferris and Aziz (2005) The most basic of practical skills is recognition of tools and materials to ensure effectiveness in completing tasks and competence. How to handle the tools and materials is second in the hierarchy of mastering psychomotor skills. The process of picking up and moving tools is necessary for workshop activities. The next step is the basic operation of tools, which requires the ability to use tools

appropriately to perform elementary tasks up to a certain specified level. Competence in operation tools allows smooth and correct use of tools so that tasks are completed step by step using the proper procedure or assembling based on proper sequence. After achieving competence in the operation of tools, the next step would be to become expert at the operation i.e. complete the work with ease, efficiency, effectiveness and safety. Planning of work requires students to consider the specifications of work output before beginning the task in order to complete it well and with purpose. This process requires clear understanding of the particular work operation. At this level students should be able to achieve the desired outcome and complete the task intended. The last stage in the hierarchy of psychomotor skills proposed by Ferris and Aziz (2005) is evaluation of output and planning for improvement. At this level, the review of output is intended for future improvement. Simpson (as cited in Snowman et al., 2011) classified the psychomotor domain into seven descriptions, as shown in Figure 1 (as cited in Gronlund, 1991) and combined the psychomotor domain with

teaching methodology in practical classes (planning, implementation and evaluation) applied as research conceptual framework. The first level makes use of activities that require physical movement. At this level, students perform sensory stimulation through cue selection of the action. This indicates the students' readiness to perform a particular type of action, either mental or physical. The response level is the early stage in learning complex skills with guided response. This level requires repetition and demonstration from instructors, and students learn through trial and error while their performance is judged based on suitable criteria. The mechanism is concerned with whether learners act with confidence and proficiency. The learning outcome at this level is concerned with skills of various type to perform tasks at the next level. Complex overt response is the skilful performance of tasks using complex movement. The adaption level develops the learners' ability for problem solving. The last level of the psychomotor domain is origination, which refers to creating new patterns to deal with specific problems in order to develop higher order skills.

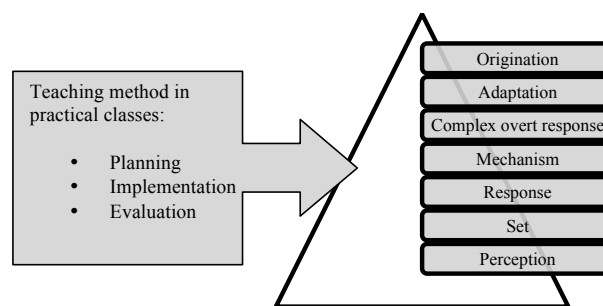


Figure 1. Conceptual framework

RESEARCH OBJECTIVES

The research objectives of this study were:

1. Identifying the teaching method employed in practical classes in vocational colleges.
2. Identifying the application of psychomotor skills in practical classes in vocational colleges.

METHODOLOGY

This research applied the survey design and used the quantitative approach based on questionnaires. The responses and observation method were supported by data related to the psychomotor skills. Three hundred and one instructors teaching technology courses participated in this research. Four heads of department were selected for observation.

RESULTS

Three aspects were identified in identifying teaching method in practical classes i.e. planning, implementation and evaluation. In the planning stage, the instructors' agreement based on items in the questionnaire received a mean of 3.72. In the implementation stage, the mean was 3.54, while in the evaluation stage, it was 3.50. Table 1 shows the detailed results for Research Objective 1, 'Identifying the teaching method employed in practical classes in vocational colleges'.

Table 1
Dominant teaching method

Teaching method	Mean
Planning	3.72
Implementation:	3.54
- Throwback	4.06
- Lecture	3.50
- Learn in group	3.67
- Demonstration	4.05
- Previous model	2.70
- Video screening	3.99
- Drilling exercise	2.60
- Notes	3.40
- Presentation	2.92
- Discussion	4.03
- Questioning	4.05
Evaluation	3.50

The study also included observation, which was conducted based on psychomotor skills applied and teaching method used in practical classes. Table 2 presents the summary of the results of the observation sessions derived from a matrix of teaching methods and the psychomotor domain. The instructors stressed on perception level, set, response, complex overt response, adaptation and mechanism. However, they did not focus on origination in teaching sessions. In implementation, they preferred throwback, questioning, demonstration, discussions and video screening.

Table 2
Observation matrix

Practical Classes		Psychomotor Domain						
Teaching Method	Teaching Strategies	Perception	Set	Response	Mechanism	Complex overt response	Adaptation	Origination
Planning		/	/					
Implementation	Throwback	/				/		
	Questioning	/			/			/
	Demonstration	/			/	/	/	
	Discussion	/	/	/			/	
	Video Screening						/	
Evaluation			/	/			/	

DISCUSSION AND CONCLUSION

The teaching method practised by instructors received a high mean for planning, moderate for implementation and low for evaluation. All aspects of teaching methods applied in practical classes was based on the competency assessment required by vocational colleges as determined by the Malaysia Examination Board in 2013 (Mohamad, Abu Bakar, Sulaiman, Mohd. Salleh, & Sern, 2015). Daniel (2010) mentioned that teaching in skill-based subjects should use demonstration, project work, simulation and discussion as strategies. This research investigated all the aspects needed in the implementation stage of teaching methods matched to the principle of conducting the practical classes. Assessment of competency in vocational colleges focusses on producing skilled workers, and various teaching strategies are needed to ensure that evaluation of competency complies with the pedagogical context of practical classes (Mohamad.

et al., 2015). In observation sessions, the participants stated that they relied on teaching experience and their expertise in technology courses. The results showed that they applied both factors in teaching methods and psychomotor skills; however, they did not apply origination in all stages. They states that limited time to complete the syllabus and having to complete a lot of practical tasks was why they were not capable of planning a structured teaching method even though they wanted to do. They applied five teaching strategies in the implementation stage, relying most commonly on perception in developing psychomotor skills. Damon, Ahmad and Rajuddin (2008) suggested the practical classes should apply a mentoring system and focus on exercises to develop skills. Guney (2012) recommended that the mastery of teaching content should give more opportunity to instructors to develop various effective teaching strategies.

REFERENCES

- Bastable, S. B., & Doody, J. A. (2008). Behavioral objectives. In S. Bastable (Ed.), *Nurse as educator*. MA: Jones and Bartlett.
- Bloom, B. (Ed.). (1979). *Taxonomy of educational objectives, the classification of educational goals – Handbook I: Cognitive domain*. New York: McKay.
- Damon, C., Ahmad, A., & Rajuddin, M. R. (2008). *Vocational education and training (VET) practices: Issues and challenges in a vocational secondary school*. Retrieved from amazonaws.com/academia.edu.documents/34901246/EDUPRES
- Daniel, M. (2010). *Effective teaching evidence and practice*. London: Sage Publication Asia Pte. Ltd.
- Dawson, W. R. (1998). *Extension to Bloom's taxonomy of educational objectives*. Sydney, Australia: Putney Publishing.
- Dave, R. H. (1970). Psychomotor levels. In R. J. Armstrong (Ed.), *Developing and writing behavioral objectives*. Tucson, AZ: Educational Innovators Press.
- Ferris, T. L. J., & Aziz, S. M. (2005). A psychomotor skills extension to Bloom's taxonomy of education objectives for engineering education. In *Exploring innovation in education and research*, 1–5. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.471.1302>
- Guney, H. (2012). *Enriching a pre-service teacher's classroom experiences through cycles of teaching and reflection*. Turkey: Canakkale Onsekiz Mart University.
- Gronlund, N. E. (1991). *How to write and use instructional objectives* (4th ed.). New York: Macmillan.
- Harrow, A. J. (1972). *A taxonomy of psychomotor domain*. New York: David McKay Co.
- Mahajan, S. (1999). *Principles of growth and processing*. University of Michigan: MacGraw-Hill.
- Mohamad, M. M., Abu Bakar, N., Sulaiman, N. L., Mohd Salleh, K., & Sern, L. C. (2015). Applying standard competency assessment in vocational teaching practices (2015). *Asian Social Science Journal*, 11(24), 216–223. doi: org/10.5539/ass.v11n24p216
- Snowman, J., McCown, R., & Beihler, R. (2011). *Psychology applied to teaching* (13th ed.). Canada: Wardworth Cengage Learning.