ORIGINAL ARTICLE

Medical imaging students' perception on outcome-based education (OBE): a study on cognitive, psychomotor and affective domains

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Abstract:

Health sciences tertiary institutions are providing students with academic knowledge, psychomotor and affective skills through clinical placement. Based on the Malaysian Qualification Agency (MQA) Program Standards: Medical and Health Sciences (2016); allocation of 1000 hours of clinical practice are compulsory to develop student's maturity and experience. This study was performed to evaluate students' perception on clinical practice Outcome Based Education (OBE) curriculum in addressing cognitive, psychomotor and affective domains before and after clinical training. A Likert scale self-administered survey provided to fifty (50), year two, Diploma in Medical Imaging students before and after students went for clinical training. Compared with students' perception after-clinical training survey, the percentage has increased to 79% - 87%; from 64% - 74% student's perception before-clinical training survey in all three domains. Before and after students' perception survey on clinical practice OBE curriculum in three domains; cognitive, psychomotor and affective domains offer some insight that the curriculum was able to gain clinical knowledge and develop essential psychomotor and affective skill required.

Keywords: Perception; outcome-based education; cognitive; psychomotor; affective, medical imaging

1. INTRODUCTION

Education and human capital are the primary elements of Malaysia's development. The Ministry of Higher Education of Malaysia (MOHE) has introduced several plans to educate students to face the challenges of the 21st century. One of the approaches is by implementing an Outcome-Based Education (OBE) as one of the new mechanisms to evaluate student's achievement. According to Malaysia Education Blueprint [1], ethics and spirituality, leadership skills, national identity, language proficiency, thinking skills and knowledge; these are six students aspirations are beneficial for both tertiary institutions and industries in a productive win-win symbiotic relationship.

The education system in Malaysia is changing continuously and transform from the informal British colonization education system to formal education system, parallel to other advanced countries. Outcome-Based Education (OBE) refers to an educational system that focuses on student's performance within a specified period and what they are expected to present at the end of their learning involvement [2].Currently, transformation in higher education institutions curriculum design is necessary, to fulfill the demand for holistic and balanced graduates between knowledge and skills; and ethics and morality disciplinary. Three learning domains; cognitive, psychomotor and affective aspects are essential to meet quality and standards of higher education system in Malaysia [3]. Based on Malaysian Qualification Agency (MQA) Program Standards: Medical and Health Sciences [4]; allocation of 1000 hours of clinical training for both diploma and bachelor degree in Medical Imaging are compulsory to develop student's maturity and experiences. Besides, challenges in economic growth nowadays crave for jobs not only focusing on knowledge but also specific skills which affect graduates employability requirement [5].

The cognitive skills is related to mental (thinking) process, acquires processes and utilizes the knowledge [6]. According to Ismail *et al.* [7] and Hanapi *et al.* [8], lacking in critical thinking and problem-solving are the factors of unemployment among Malaysia's graduates. The psychomotor skills; as described by Blooms' Taxonomy as one of three learning domains, as physical skills and these physical skills are typically developed through clinical setting [9]. Furthermore, cognitive and psychomotor domains are incomplete without affective domain as it focuses on motivation, willingness to participate, valuing what is being learned and incorporating the value of the discipline into real life [6]. Therefore, focus of this study was to evaluate students'

perception towards clinical practice curriculum based on three learning domains; cognitive, psychomotor and affective.

2. MATERIALS AND METHODS

2.1 Research Design

A cross-sectional questionnaire survey study design was utilized for data collection in this study to evaluate the level of students' perception on cognitive, psychomotor and affective domains before and after clinical training. The study involved Year One students from Diploma in Medical Imaging, Faculty of Health Sciences, Universiti Teknologi MARA Puncak Alam Campus, Selangor who went for their first clinical training.

2.2 Sample and Sampling Technique

A total of 50 respondents from Diploma in Medical Imaging (Intake 2016), year 2 (Semester 3) students; who registered and completed Clinical Practice courses were participated in this study.

2.3 Instrumentation

A questionnaires adapted and adopted from Outcome-Based Education (OBE) Curriculum Assessment for Industrial Training Program: Based on Students' Perception [10] ICGPA Rubric Learning Outcomes Assessment Guide [11] and The Practice Standards for Medical Imaging and Radiation Therapy [12] was developed to evaluate the level of students' perceptions before and after clinical placement

The 5 Likert scales questionnaires were prepared in both English and Malay to evaluate students' perception from '1: Strongly disagree' to '5: Strongly agree' as following:

Likert Scale	Score
Strongly Disagree / Sangat Tidak Setuju	1
Disagree / Tidak Bersetuju	2
Neutral / Berkecuali	3
Agree / Setuju	4
Strongly Agree / Sangat Bersetuju	5

The survey was categorized into two; Section A: Demographic information and Section B. The section B consists of 33 items and was divided into 5 parts; 1) Practical Skills, 2) Scientific Skills, Critical Thinking & Problem Solving, 3) Communication Skills, 4) Social Skill, Teamwork & Responsibility and 5) Values & Ethics, Moral & Professionalism. The first two parts were to evaluate psychomotor and cognitive domain, respectively, while the others were to assess the affective domain.

The questionnaires were distributed twice; before and after students went for clinical training via Google form. Data collected were tabulated in Microsoft Excel and analyzed with Statistical Package of Social Science (SPSS version 21.0). Descriptive statistic was used to evalute the percentage of students' perception before and after clinical placement.

3. RESULT AND DISCUSSION

3.1 Respondent's Demographic Data

The total number of 50 respondents was divided into male and female with (N=6, 12%) and (N=44, 88%) respectively.

3.2 Students' Perception on Cognitive Domain

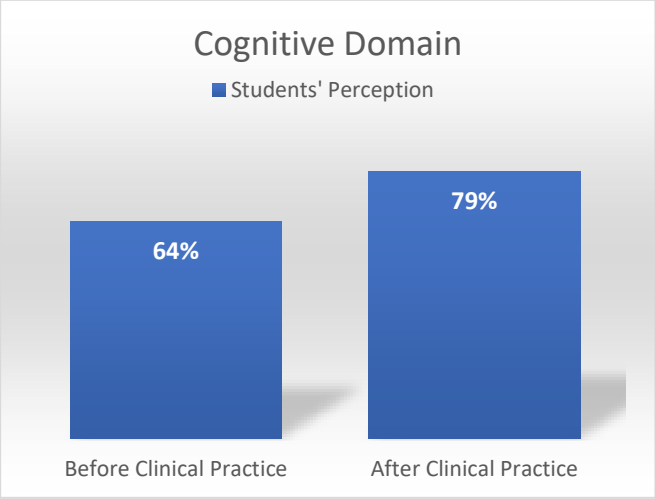

Figure 1: Students' perception on cognitive domain before and after clinical placement

The results presented in Figure 1 reveal the differences of percentage of students' perception on cognitive domain before and after clinical placement. Students' perception before clinical placement was 64% and increased after clinical placement with 79% of total. The items in questionnaires were intended to assess on how students identified, analysed, propose and implemented several modifications techniques or solution based on patient's medical history and patient's condition. From the results, the positive response indicated students able to apply, analyse and evaluate information obtained while critically provide the best problem-solving on related situation during clinical placement. These results suggested that clinical placement was able to nurture problem solving and scientific skill among students

In a real clinical setting, they need to handle actual patients with different conditions while critically evaluate suboptimal radiograph that was rejected and determine the corrective measures to improve the radiograph. Problem solving and scientific skills are an important part during clinical placement in solving clinical environment with problems as well as to apply theoretical knowledge for patient's benefits and helping health care team in working together [13]. However, there was a study from Raby [14] that stated student's ability in critical

thinking is low as they tend to watch over radiographers and follow the instructions given without analyses the clinical situation. In addition, critical thinking is an integrated component between research and evidence-based practice in formulation research questions and providing evidence for research radiography.

Study from Tracey [13], also found that critical thinking skills of radiography students was poor. This is because, radiographers tend to lean over the shoulder by watching other radiographers instead of being given the chance to think themselves. Thus, they follow the rehearsed routine and unable to critically analyse the clinical situations. From the study, it also found that participants were unable to propose justifiable solutions regarding the problem identified due to lack of opportunity given for them to think. It is supported by Popil, [15] that mentioned in busy imaging departments, students tend to step aside when complications arise and allow the qualified radiographer to take the lead. Very often students might continue with another patients, instead of following through the initial patient and assisting the qualified radiographer, thereby inhibiting the development of problem-solving ability. According to Zain & Hamid, [3], they found that the percentage of problem solving skill in Bachelor Medical Imaging students is low due to complex and challenging problems that evolved in response to development of science and technology.

3.3 Students' Perception on Psychomotor Domain

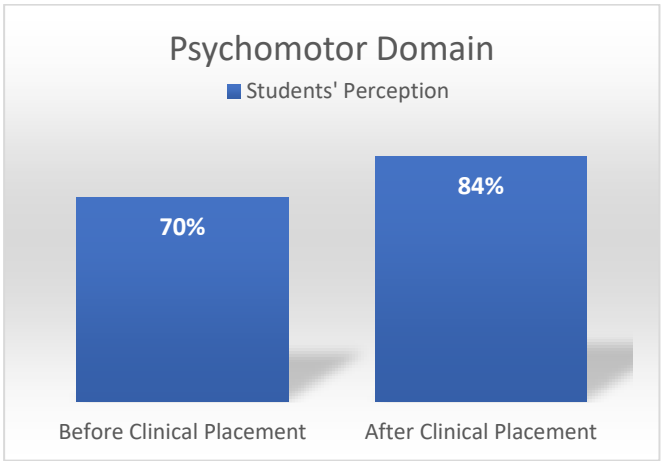

Figure 2: Students' perception on psychomotor domain before and after clinical placement

Figure 2 shows the percentage of students' perception after clinical practice on psychomotor domain had increased up from 70% to 84%. The increment of 14% indicated clinical placement able to improve students' psychomotor skills in practicing their hands-on theory. These positive findings could be coming from several factors, such as lab session during a semester with classes, practical exam, clinical setting environment with the various clinical condition and ongoing experiences. Furthermore, it also met the aim of OBE systems that focuses on student's performance while preparing them to present the outcome at the end of their learning involvement [2].

Based on the findings, students had slowly adapted the situation as their perception on psychomotor skills after clinical placement is higher than before clinical placement. This is because they were placed to the real clinical environment for 14 weeks to learn and gain experiences as much as possible. According to Ahmad & Shariff [16], practical or clinical placement able to measure the effectiveness of a program through student's reaction, behaviour, results and also feedback from a host of clinical placement or practical setting. Medical Imaging based on OBE curriculum provides assessments for students to complete the task before the end of their clinical placement and evaluation form for radiographers, clinical instructor or local preceptor to monitor student's progress. From this set of assessments and evaluation, it can build the confidence level of students to perform well during clinical placement. This is also mentioned by Ahmad & Shariff, [16], evaluation during clinical placement able to measure the improvement of skills, knowledge and attitude. Besides, it is to identify whether the need for clinical is satisfied with the student's need.

3.4 Students' Perception on Affective Domain

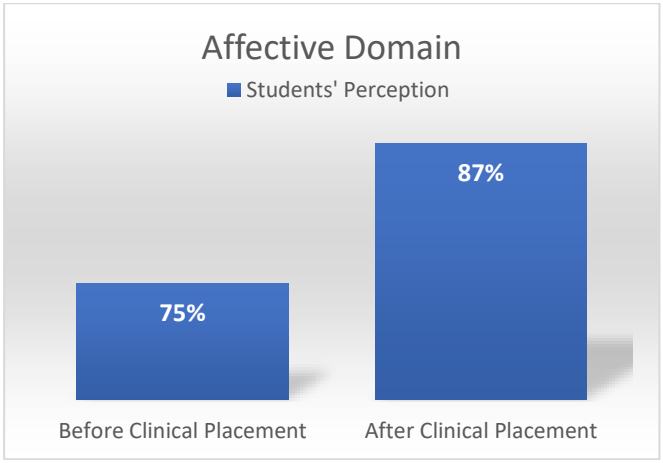

Figure 3: Students' perception on affective domain before and after clinical placement

Figure 3 reveals the percentage of students' perception on affective domain after clinical placement is higher, which is 87% as compared to perception before clinical placement with 75%. It also indicated that there was increased of students' perception on the affective domain after clinical placement. This positive result suggested that students are able to polish their soft skill during clinical placement. Thus, clinical placement was able to help students in practicing their communication skill, social skill while presents good values, ethics and professionalism.

There was also a study from Osman [10], stated that OBE implementation in university syllabus is beneficial for improvement to the engineering education and engineering professional in general. This conclusion is made from their research on the students' perceptions from Civil and Structural Engineering Department who have undergone their industrial training program. Basically, they focused on three main aspects which were personal attitude, communication and work attitude that contribute to the program outcomes based on students' perceptions. The results showed positive response as the percentage after industrial training has increase compared to before industrial training. This proved that students have gained benefits in terms of providing and upgrading their skills.

Patients who comfort during imaging procedures with less anxiety and confidence with radiographer capabilities come from effective communication [17]. The perception of patients is also important as they always expect accurate results from a trusted health care provider. They tend to follow the instructions and cooperate well with the radiographer during the procedure if they received a clear explanation prior to the examination. Thus, it is vital for a clinical practice curriculum to be maintained for students to develop communication skills during clinical placement by having a good rapport with patients and staff. According to Halkett [18], successive clinical placement able to develop students' confidence level to communicate effectively with patients and avoiding medical jargon.

Next, for social skill, teamwork and responsibility, the items focus on how students able to build a good relationship, interact with people who have a different background of culture and able to work effectively together. In addition, it is also to evaluate their perception of the ability to respect and accept an opinion from multi-racial and beliefs among staffs, colleagues and patients. From the results, it showed a positive response after clinical placement as throughout the period, they had to meet many people with a different background, thus, it is good for them adapt to the situation and practice verbal and non-verbal communication skill. According to the Institute of Medicine (IOM) [19], teamwork is an important key for health care professionals. It becomes a strong and successful team if all the members work together and when there is balance within the team. Teamwork stimulates continuity, strengthen patient security and engaging interdisciplinary dialogue [19]. A study from Naylor & Foulkes [20], found that lacking in inter-professional communication during operation theatre procedure can lead to conflict, false negative results and patient safety. They also focused on students' radiography in the operation room as students were unsure about safety procedure radiation and they were neglected as hierarchy presented in the operation theatre environment. Thus, students need to develop communication skill and able to bring themselves forward to be recognized by other staff if needed especially in collaborating work with other disciplinary. Moreover, students should be accompanied and monitored by radiographers or clinical instructor to avoid them from arising unethical issues that can lose trust for students.

Values, attitudes and professionalism are also an important part in the radiography field as it involves people. From the findings, the students' perception on these items was very satisfied as they can present themselves as a good student with bringing the name of the university. Items on questionnaires are related to with the patient's right to privacy and confidentiality, how they are able to deliver patient care and service free from bias or discrimination, always practice good values during work, demonstrate an attitude of willingness to preserve dignity of the nation-state and religion, able to demonstrate positive and active attitude in many situations, present appropriate appearance and always punctual. Mean scores on students' perception from these items contributed high scores, perhaps they already set their mind to have a right attitude and personality during first clinical placement. Furthermore, during the academic semester, there are rules that need to be followed when they attend a lab session, thus it also helps them a bit to prepare themselves before clinical placement.

Professionalism has no specific definition, as it depends on how students perceive their knowledge and understanding of the principle thought during theoretical classes and surrounding environment including peer influence [21]. This also supported by Nortjé & Hoffmann, [22] professionalism is a complex and multifactorial concept which is widely influenced by abundant historical, educational and socio-cultural contexts. According to their study, it also noted that professional development comes from personal features, formal classes, clinical training and environment of clinical placement. Students' perception on professionalism during clinical training give strong impact through several aspects which are a better understanding of formal knowledge, diverse nature of radiographer's task and good role modelling [21].

Further study with greater sample size could further explore the possibility quality of OBE curriculum influences students' results at the end of semester. Based on the students' perception on three main learning domains, a continual improvement can also be carried out to enhance and strategize for a better clinical practice curriculum. The study is notably significant as the Faculty of Health Sciences, UiTM is the pioneer institution that offers Medical Imaging program and had become the benchmark to other public and private institutions. Their perception did not show greater difference of percentage as compared to previous article from Osman [10] due to the small sample size that limiting the generalization of results as it only focused on Year 2 Diploma in Medical Imaging's students. Continued exploration on OBE clinical practice curriculum is justified in order to develop a robust research based and deeper understanding of how current educational system may affect the relationship between three learning domains and learning outcome.

4. CONCLUSION

The findings of this study showed that the percentage of cognitive, psychomotor and affective domain has increased around 12% to 15% after they have completed clinical placement. Positive feedback from students' perceptions after

clinical placement, proved that they perceived better understanding on how to apply knowledge during performing procedures, that included patient care, radiation protection and communication skills. Moreover, as this is their first clinical placement as Diploma students, they are confident on their ability to possess' good attitude and in delivering good works as a trainee radiographer. Thus, it can be concluded that clinical placement is a right place for students to gain knowledge, experiences and develop their skills while interacting with other staff and patients. These findings also indicated OBE implementation through clinical practice curriculum can be evaluated and proven that students' performance at the end of their learning involvement were achieved.

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