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LATEST TECHNIQUE

"Speedy Biochemistry" As a New Teaching Method in Preclinical Curriculum

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ABSTRAK

Sesi praktikal konvensional sebelum ini telah dilaporkan kurang berkesan dalam mencapai objektif pembelajaran. Oleh itu "Speedy Biochemistry" diperkenalkan untuk membantu pelajar mengaplikasikan pengetahuan yang telah mereka pelajari di dalam kelas. Teknik ini memupuk semangat kerja berpasukan dan penerapan pengetahuan dalam penyelesaian masalah yang dapat dicapai melalui pembelajaran aktif. Pendekatan pembelajaran aktif telah kian diminati oleh para akademik kerana memberikan lebih banyak faedah kepada pelajar. Sesi "Speedy Biochemistry" telah dijalankan di kalangan pelajar perubatan Tahun 1 di Universiti Kebangsaan Malaysia dan maklum balas mereka telah direkodkan. "Speedy Biochemistry" boleh menjadi contoh sesi pembelajaran aktif yang baik dalam meningkatkan minat pelajar perubatan di dalam mata pelajaran Biokimia.

Kata kunci: *"Speedy Biochemistry", pembelajaran aktif, pelajar perubatan, pra-klinikal, UKM*

ABSTRACT

Previous conventional practical session was reported to be less effective in achieving its objectives. Therefore, "Speedy Biochemistry" was introduced to assist students to apply knowledge they have learnt in the classroom. This setting promotes teamwork and application of knowledge in problem solving which can be achieved through active learning. Active learning has piqued the interest of the academic community in giving more benefits to the students. Steps on how to conduct the "Speedy Biochemistry" among Year-1 medical students were illustrated and collection of their feedback was recorded. "Speedy Biochemistry" can be a good active learning session to enhance and improve medical students'

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interest in learning and their self-learning abilities in Biochemistry.

Keywords: "Speedy Biochemistry", active learning, medical students, preclinical, UKM

INTRODUCTION

Laboratory practicals is a platform for students to translate their knowledge into practice. Students may benefit from learning of basic procedures to complement their conceptual basic understanding in science (Hofstein & Lunetta 2004). However, the practical session was reported to be less effective in achieving its objectives. Therefore, there must be an innovative way of assessing the knowledge to suit the present millennial generation's way of learning. Assessment has greatly evolved in the past decades, which includes the utilisation of digital resources. Many educators have implemented these approaches to enhance theoretical understanding of laboratory practical in science especially in Biology (Scott et al. 2017; Jasti et al. 2016; Zafeiropoulos et al. 2016; Kim et al. 2016). In addition, an innovative way is preferred by the students as they can be well prepared before the practical session begins, thus enabling them to perform better (Gopaladesikan 2017). Therefore, the implementation of active learning through gamification is currently adopted in the pre-clinical setting. The previous conventional practicals in Human Genetics subject consists of an introduction to different DNA tools to detect mutation in the laboratory without students being hands-on. In the past, students were disinterested in this type of teaching, leading to the creation of "Speedy Biochemistry". It is a game-based education, consisting of 10 mini station incorporating specific objectives and learning issues pertaining to the practical. The structure of mini stations is based on the Objective Structured Performance Evaluation (OSPE), which has been implemented as one of the assessment tools in the final examination for medical students. OSPE was introduced because it tests different desired components of students' competence and eliminates examiner bias (Kundu et al. 2013). By adopting this concept, 10 mini stations were created which covers the objective of elucidating the role of DNA technologies in determining mutation, involving Polymerase Chain Reaction (PCR), Southern blotting, and DNA sequencing. The innovation of the teaching-learning method has been conducted since 2016, where all first-year medical students studying at University Kebangsaan Malaysia (UKM) are involved in the latest innovation. "Mutation and Mutational Analysis" practical was previously a conventional practical session conducted by the Department of Biochemistry, Faculty of Medicine, UKM. All learning objectives under this topic were revisited by the content

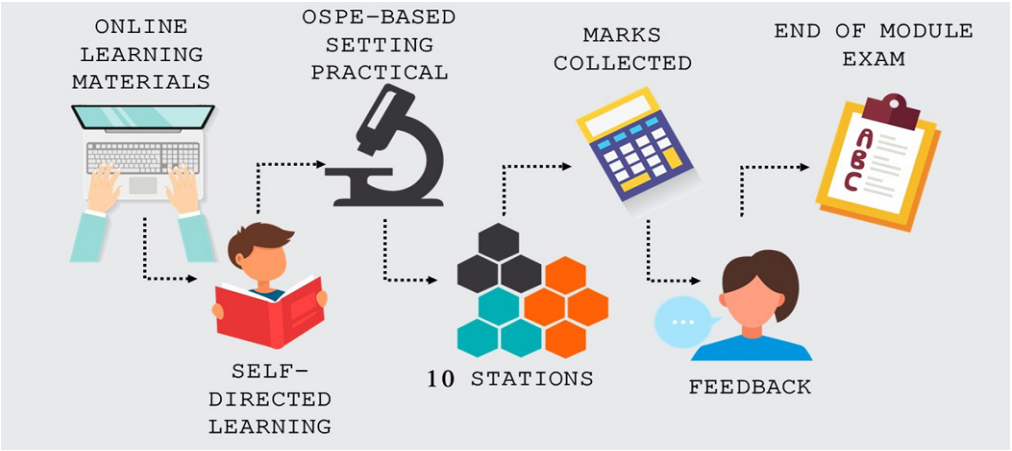

Figure 1: Steps were taken before and after "Speedy Biochemistry". It started with online learning materials uploaded by lecturer, self-directed learning by students, the gamification with 10 stations whilst marks are collected and feedback is given by the content experts, and students are tested through end of module exam

experts and all materials were prepared accordingly.

STEPS TO CONDUCT "SPEEDY BIOCHEMISTRY" SESSION

All teaching materials were uploaded on the UKM learning management system, a week before the gamification session started (Figure 1). Students were required to complete the self-directed learning by watching the suggested videos and read the laboratory practical book to learn step-by-step in determining mutations using DNA technologies, such as DNA extraction, Southern blotting, and DNA sequencing. The session was divided into 10 small stations, which all are manned by a lecturer (content expert) or assisted by a medical laboratory technologist. Students

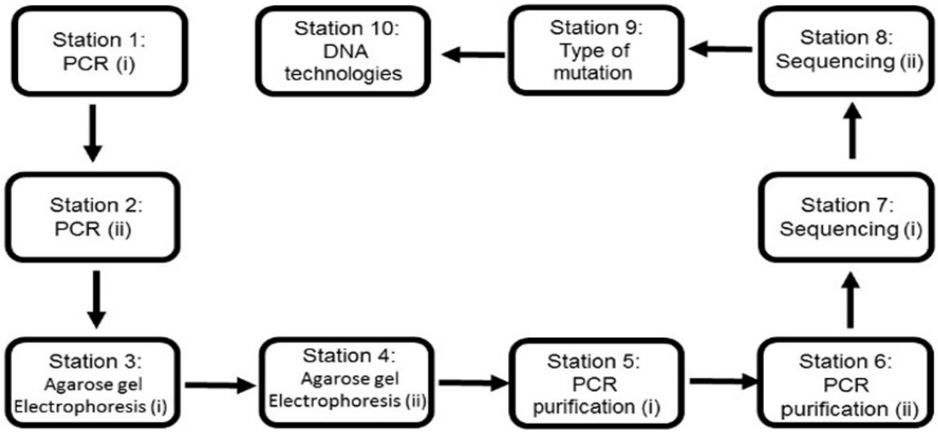

Figure 2: "Speedy Biochemistry" conducted in 10 different stations according to the learning objectives

Figure 3: Feedback was given by the content expert at each station after the students had completed their tasks

were divided into small groups of 3-4 students and they were given 10 minutes to complete the task in each station (Figure 2). The first 7 minutes was allocated for them to discuss and complete the task. The bell was then rung to indicate feedback from the content expert until the 10th minute (Figure 3). Every station required a team-work effort and compulsory questions must be answered before they can proceed to the subsequent station. Each task carried 10 marks totaling to 100 marks when all stations were completed. At the end of the session, students were given feedback on their performance by a course coordinator. Their performance was subsequently assessed at the end of module examination.

STUDENTS' FEEDBACK

A collection of synonymous feedback from the first-year medical students had been collated. They commented this approach has helped to develop their critical thinking prior to a better understanding of DNA technologies and to assimilate each molecular technique to complete the tasks at each station. Learning also can be enjoyable whilst achieving the objectives. Additionally, their comprehension was enhanced by discussing with team members and getting feedback from the lecturers instantaneously on their performance. Students also developed self-esteem by answering the questions and receiving feedback. The interaction with the lecturers gives an insight into complicated techniques of DNA technology and how that can be applied in assisting the diagnosis of multifactorial diseases and forensics.

THE TAKE-HOME MESSAGE

Active learning is important to keep up with the current adaptation towards formative rather than summative assessment, as it increases knowledge

retention (Deterding et al. 2011) and students may get direct feedback from the content experts (Rob van & Bicke 2018). This new innovation of teaching required students to perform a background reading regarding the topic through the materials given prior to the session. When students are in the group before completing the task in each station, they can share their prior knowledge as a team to achieve a structured answer (Singhal et al. 2019). The presence of a content expert to validate their answer, made them more confident and learning was made fun and enjoyable (Lopez et al. 2019). They felt satisfied with this type of learning as in case the answers they provided were incorrect, the content expert would probe for further thinking (Deeley 2017). The tasks were completed within 10 minutes and marks were given according to their achievement, thus, justifying the term "Speedy Biochemistry". Students can enhance their conceptual idea regarding the topic better through active learning. Similar implementation was seen in learning pharmacology (Vishwakarma et al. 2016), histology (Felszeghy et al. 2019), ECG (Ohn et al. 2019), and vascular surgery (Kinio et al. 2019), where they found their students were able to score well in the application of the subject. Whilst the laboratory had been given a central and distinctive role in science education, science educators have suggested that there are rich benefits in learning that accrue from using laboratory activities. Although laboratories have long been recognised for their potential to facilitate the learning of science concepts and skills, this potential has yet to be realized. It also has been emphasized that the principal focus of laboratory activities should not be limited to learning specific scientific methods or particular laboratory techniques; instead, students in the laboratory should use the methods and procedures of science to investigate phenomena, solve problems, and pursue inquiry and interests (Hodson 1993). This innovation can be applied towards any mundane and straight forward practicals in a pre-clinical setting, such as looking slides through a microscope and using a high-end machine to illustrate the application for each concept.

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