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Faculty of Pharmacy Shares Experience Transitioning from Traditional Lab Practicals to Objective Structured Pharmacy Assessment (OSPA)

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Abstract

The Faculty of Pharmacy revamped its curriculum for the Bachelor of Pharmacy (Honours) 2019 cohort due to the Covid-19 pandemic. The Nutraceutical (PHC560) course transitioned its hands-on tablet formulation practical to a virtual format with recorded demonstrations. The third cohort's reassessment led to redesigning the lab component into an Objective Structured Pharmacy Assessment (OSPA), focusing on Ethics, Regulatory Aspects, Quality Assurance, and Case Study with Role Play. Positive outcomes have sparked optimism for continued OSPA implementation and potential extension to other courses.

Keywords: Covid-19 pandemic; nutraceutical; pharmacy education

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1.0 Introduction

1.1 Background of the Academic Program

The Faculty of Pharmacy implemented a new curriculum for the Bachelor of Pharmacy (Honours) 2019 cohort, resulting in significant changes to the offered courses. The previous curriculum encompassed of 159 credits for graduation and the current curriculum was tailored down to 134 credits. The first cohort of the new curriculum was tested with the emergence of the Covid-19 pandemic during their second semester. Along with all education institution (Ahmed et al., 2021; Almaghaslah et al., 2018), this prompted the faculty to innovate its teaching and learning approaches. The immediate approach was for the classes and practical session to be conducted virtually (Coman et al., 2020; Gamage et al., 2020; Jandrić et al., 2020). Lecturers and laboratory recorded the practical demonstration, and students subsequently completed the assessment process based on these videos. In the second semester of the second year, semester Mac-August 2021, one of the courses available for students to enrol in was Nutraceuticals (PHC560). This was the first time;

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this course was being offered to the first cohort of students. This course was designed to provide students with a comprehensive understanding of the fundamental aspects, legislations, and development of nutraceutical products in Malaysia and other countries. This course discussed classification of nutraceutical products, quality testing, and stability evaluation. In addition, the principle of packaging, factors related to selection of a suitable packaging material, regulation of marketing, and consumer issues was also covered. To assess students' knowledge and skills in this subject, the course utilised a diverse range of evaluation methods, which included a mid-semester test, problem-based learning (PBL) exercises, laboratory practical, and a final examination.

1.2 Earlier Assessment Method Due to Pandemic Challenges

One of the notable challenges that we faced during this semester was the need to adapt and modify the course format to accommodate the unexpected circumstances, due to the global pandemic. Specifically, we encountered the task of transitioning two laboratory practical sessions into a virtual format. These two-laboratory practical were focused on the formulation of herbs effervescent tablets and quality assurance processes.

Formulation of Herbs Effervescent Tablet: With the need for remote learning, we created video demonstrations, to guide students through the effervescent tablet formulation process step by step ensuring they were able to grasp the fundamental concepts and techniques.

Quality Assurance: Quality assurance is a vital aspect of pharmaceutical and related industry. We integrated case studies, and the students analysed virtual data sets and make decisions based on quality control criteria outlined in the standard reference.

Overall, the adaptation of these laboratory practical to a virtual format required a combination of creativity, technology integration, long recording hours, and effective communication to ensure that students continued to receive a practical experience despite the limitations. This experience also highlighted the importance of adaptability and innovation, as it demonstrated how we, the educators were able to overcome challenges to deliver valuable content to the students. The students were assessed through an individual report submitted based on both virtual laboratories practical.

1.3 Transitioning to Hybrid Model

In the case of the second cohort for semester March-August 2022, which was structured as a hybrid model encompassing both online and face-to-face components, we made the decision to align our assessment strategy with the most recent guidelines from Universiti Teknologi MARA (UiTM)'s Academic Assessment and Evaluation Division. As part of this adjustment, we opted to eliminate the laboratory practical component and instead integrated the practical aspects into PBL exercises and increased the percentage distribution. During this phase, we conducted a series of three PBL sessions that placed significant emphasis on case studies related to various aspects of the nutraceutical industry, including formulation, quality assurance, registration processes, halal certification, and the requirement for products claims health benefits.

For the third cohort, the following year, 2023, we have reverted to the original structure, which comprises of four assessments, a mid-semester test, problem-based learning (PBL) exercises, laboratory practical, and a final examination. The marks contribution for the three cohort were adjusted accordingly (Table 1).

Table 1. Assessment types and Marks Contribution (%) for cohort 2021, 2022 and 2023

Assessment types and Marks Contribution (%)				
Year	Mid-Semester Test	Problem Based Learning	Laboratory Practical	Final exam
2021	20	20	20[#]	40
2022	30	30	-	40
2023	20	10	10[*]	60

[#]Individual report prepared based on the virtual laboratory practical

[*]Objective structured Pharmacy Assessment

After implementing the new curriculum, we observed that there were resemblances between the laboratory practical components of this course and another one offered in the first semester of the second year, namely Dosage Form Design (PHC510). These similarities were particularly noticeable in the practical skills related to manufacturing tablet dosage forms and ensuring quality assurance. Subsequent discussions with our teaching team prompted us to develop an Objective Structured Pharmacy Assessment (OSPA) with the aim of improving the hands-on experience and enhancing soft skills for the students.

Hence, we prompted a re-evaluation of the assessments, leading to the redesign of the laboratory practical component. The aim was to enhance and expand students' comprehension of the subject matter. This redesign resulted in the creation of an OSPA incorporating three domains which are ethics and regulatory aspects, quality assurance and case study with role play.

In the redesigned OSPA, a significant emphasis is placed on understanding the ethics and regulatory aspects that govern the nutraceutical industry. This component of the assessment is specifically designed to focus on products that are currently available in the market, challenging students to navigate and apply the complex web of ethical considerations and regulatory frameworks that ensure the safety and efficacy of nutraceutical products. Additionally, the quality assurance segment underscores the importance of stringent quality control measures. By investigating into the intricacies of ensuring the consistent quality of nutraceutical products, students are taught to critically evaluate and uphold the standards that safeguard public health. Moreover, the case study with role play introduces a dynamic aspect of learning, encouraging students to engage in practical application through scenario-based learning. This approach not only fosters a deeper understanding of theoretical concepts but also enhances students' problem-solving and decision-making skills

by simulating real-world challenges and solutions within a controlled learning environment. To ensure alignment with learning objectives, rubrics were developed for each of these three domains.

2.0 Methodology

The design of OSPA for PHC560 was initiated by mapping the course learning outcome with the possible assessment approach. The three finalised domains are i) Ethics and Regulatory Aspects ii) Quality Assurance and iii) Case Study with Role Play.

2.1 The Design of the Circuit

There was a total of six groups registered for this course, specifically labeled as PH2404A, B, C, D, E, and F. To efficiently manage this course, students were organised into two larger groups, each assigned to different sessions. Within Session 1, students were further divided into smaller groups, each consisting of a minimum of five students. We arranged four separate laboratories, each equipped with preset stations for various activities. We labelled it as circuits.

During each session, four of these laboratories accommodated two groups of students, while the remaining students were in a designated holding room. A lab technician was present in the holding room to oversee and assist students as they moved between stations. At Station 1, students were instructed not to use their personal electronic devices. Instead, a laptop was provided with the Quest 3+ website readily accessible for product searches. Quest 3+ serves as the official online platform for tasks such as product registration, cosmetic notifications, licensing, and market sampling, all managed by the National Pharmaceutical Regulatory Agency.

At Station 2, a standard reference source was made available, which included either the United States Pharmacopoeia (USP) or the British Pharmacopoeia (BP).

Conversely, at Station 3, students were permitted to bring their own Medicines Information Manuals (MIMs) as reference materials. Monitoring duties for Station 1 and Station 2 were handled by the lab technician. However, at Station 3, two lecturers were present to assess the role plays conducted by the students. These circuits were replicated four times across four different laboratories. In a single cycle, a total of eight groups participated. Two distinct product sets were assigned to Station 1, quality assurance-related cases to Station 2, and case study scenarios to Station 3 for two separate sessions. A simplified summary of this process is in Fig. 1.

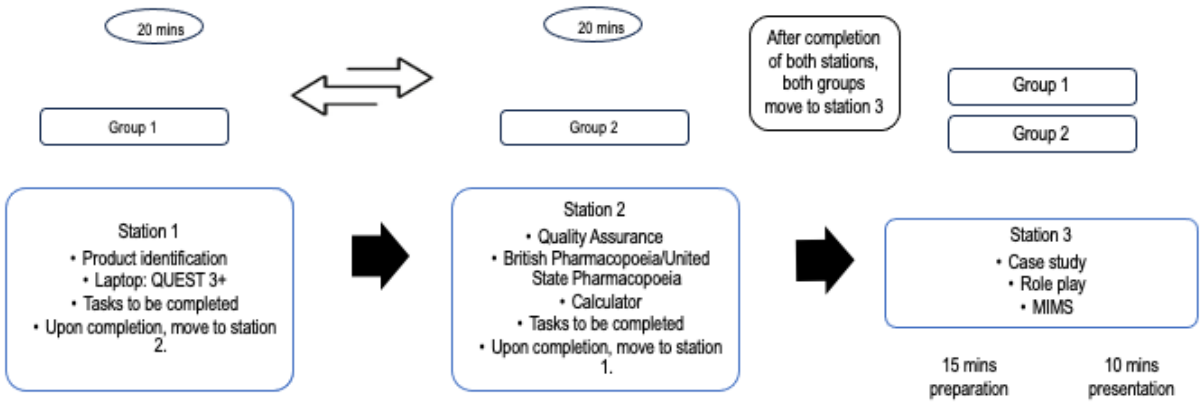

Fig. 1: Process Flow of OSPA for two (2) groups in a circuit.

2.2 Types of Products.

Supplements and herbal-based products were obtained from community pharmacy and from our mock community pharmacy. Students were required to categorise these products by entering their registration numbers into the QUEST 3+ system. Students then had 20 minutes to complete the necessary product information in the provided forms.

2.3 Quality Assurance

At Station 2, a set of quality assurance data was made available. These data were tailored specifically for oral dosage forms, which included tablets and capsules. Students were tasked with evaluating whether these products met the quality assurance criteria outlined in the standard reference materials provided, either the USP or BP standards within 20 minutes.

2.4 Case Study

Station 3 featured a case study scenario. Here, students were allocated 15 minutes to discuss and develop a role-play scenario based on the provided case study. Subsequently, they presented their role-play to be assessed by two lecturers using the rubric. The assessment criteria included factors such as originality and innovation, problem-solving abilities, expressiveness and delivery, adaptability and flexibility, and an overall assessment of the group presentation. Each group was given 10 minutes to present.

3.0 Results and Discussion

The OSPA was successfully conducted for 175 students enrolled for this course. Comparing to the first cohort with 158 students which did the virtual laboratory practical, we observed a different trend in results. Table 2 displays the mean scores for the first and third cohorts. Notable modifications were implemented in the assessment process between these two cohorts. In the initial cohort, assessments were conducted individually, whereas in the third cohort, they were carried out by groups with a minimum of five students. Furthermore, there was a discrepancy in the percentage allocated for the overall assessment, with the first and third cohort receiving 20 percent and 10 percent respectively. A noteworthy trend emerged in terms of students' overall achievements in this group-based assessment compared to the individual report based on the virtual laboratory practical conducted during the first cohort. It is notable that the data for the year 2021 did not follow a normal distribution considering that the minimum mark was zero. Moreover, the standard deviation for this cohort was greater than the following cohort, which recorded higher minimum marks.

Table 2: The Mean Scores for the First and Third Cohorts for Laboratory-Based Assessment

Year	Full marks	Average	Min	Max
2021	100	63 ± 26	0	87
2023	100	73 ± 9	55	88

Upon the re-evaluation of the assessments, it became evident that there was a need to enhance the students' soft skills, learning agility, and critical thinking.

We noticed a significant gap in their interpersonal skills when all classes were conducted in a face-to face format from online setup during the pandemic, which undiscovered the importance of nurturing personal attributes and interpersonal skills for the students, who are also addressed as pharmacists-in-training. Online learning proves to be a proficient means for refining hard skills, but it demonstrates comparatively limited effectiveness in enhancing soft skills (Kamysbayeva et al., 2021). The observed gap in interpersonal skills when transitioning from online to face-to-face learning underscores the importance of interactive and experiential learning. Face-to-face interactions provide rich, real-world contexts that are essential for developing interpersonal skills, aligning with the principles of constructivism.

Another critical facet we aimed to enhance within the OSPA is learning agility. Learning agility is a multifaceted ability that goes beyond traditional knowledge acquisition which include mental agility, people agility, change agility, results agility, and self-awareness (Ghosh et al., 2021; Novianti et al., 2023). It encapsulates several key dimensions that we consider important for pharmacist-in-training which includes learning from experience, adapting to new circumstances, acting on ideas swiftly, flexibility and spontaneity and high self-reflection (Ghosh et al., 2021).

OSPA provides students with opportunity to learn from practical experiences. They have access to marketed supplements and herbal-based products and classified the products and obtained information from QUEST 3+. Some of the products were unregistered products but available in the market, these products were purposely seeded to see their ability to identify and responding to the situation.

OSPA also encourages students to adapt and stay current, mirroring the dynamic nature of rapidly changing healthcare landscapes, evolving treatment, and new regulations. The assessment fosters an immediate environment where students can ideate, innovate, and apply their ideas promptly. This is very much applicable during the role-play responding to the case study provided. This agility in decision-making and implementation is important in the everchanging pharmacy profession.

OSPA promotes flexibility in thinking and problem solving. It challenges students to think on their feet and adjust strategies as the situation changes. This was reflected during the role play at station 3, when the role players responded differently from the crafted scripts during the 15 minutes presentation. Some groups showed the ability to respond spontaneously and were able to successfully pull through the presentation and some groups failed to do so and were not managed to occupy the 10 minutes provided. This also measured their creativity and level of knowledge on the topics.

Self-reflection is a critical aspects of learning agility. OSPA encourages students to analyse their actions, identify areas of improvement, and provide logical and spontaneous responds.

The final enhancement aspect is critical thinking. Critical thinking is a mental process that involves analysing, evaluating, and making decisions based on evidence, reason, and logical judgement (Brudvig et al., 2013). Critical thinking ability is not a skill that can be learned as observed in a study for students at Wingate Pharmacy School, following the completion of a critical thinking course delivered in the the first professional year of a pharmacy program. The findings showed that there were no statistically significant differences between the overall and percentile pre-test and post-test Health Sciences Reasoning Test-Numeracy (HSRT-N) scores (Smith et al., 2019). Critical thinking is required for all stations in the circuit for the OSPA. With the implementation of assessment in a team of five students, this may have impact on the increase of critical thinking ability for the students as supported by a study which provides evidence that team-based learning improves critical thinking skills (Silberman et al., 2021).

Enhanced soft skills improve personal attributes and interpersonal abilities, while learning agility and critical thinking enhance decision-making and problem-solving. These improvements will also benefit pharmacy curricula, professional development, interdisciplinary learning, and policy updates, leading to better healthcare outcomes.

4.0 Conclusion& Recommendations

Indeed, an interesting and noteworthy trend emerged in terms of students' overall achievements in this assessment compared to the laboratory practical conducted during the first cohort of the course. This trend suggests that the adoption of the OSPA has yielded positive outcomes that merit attention and consideration with the potential for extending this approach to other courses within the faculty. Considering the possibility of the expanding the use of OSPA to additional courses within the faculty, the subsequent phase involves soliciting feedback from the students who have enrolled for the course and have participated in the OSPA experience. However, it is important to note that the observed trend is based on a limited sample size and specific cohort. Therefore, further research involving a larger and more diverse group of students across different courses is necessary to validate the generalizability and long-term effectiveness of the OSPA approach.

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Paper Contribution to Related Field of Study

In the realm of pharmacy education, traditional laboratory practical has long stood as a cornerstone of student assessment and skill development. However, the evolving dynamics of healthcare and pharmacy practice necessitate equally progressive educational methodologies. The Objective Structured Pharmacy Assessment (OSPA) represents one such innovation, promising a more holistic evaluation of competencies.

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