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Preface

Pioneering Educational Perspectives: Series 2025 is a collection of thought-provoking insights and research contributions exploring contemporary educational trends and practices. This eBook presents a diverse range of perspectives on innovative teaching methodologies, digital learning strategies, and transformative approaches in education. Designed to serve as a resource for educators, researchers, and practitioners, it aims to inspire meaningful discussions and advancements in the field. Through carefully curated chapters, this publication offers fresh ideas and practical solutions to enhance learning experiences in an ever-evolving educational landscape.

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ENHANCING PHARMACEUTIC EDUCATION WITH DIGITAL TOOLS: LEARNING ABOUT EXCIPIENTS IN MARKETED PRODUCTS THROUGH INFOGRAPHICS

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ABSTRACT

Despite their crucial role in drug formulation, excipients (non-active ingredients) often receive less attention than active ones. The process of teaching and learning through didactic lectures on the wide range of excipients available in the pharmaceutical industry is not favorable nowadays as students cannot visualize the functions and the significance of the use of its in-formulating drug, precisely drugs in liquid dosage forms. Moreover, the appropriateness of excipients in drug formulation is often overlooked in standard pharmaceutics education. The review of existing literature suggests an increasing trend in the use of visual aids in education for various fields, including pharmaceutics. Therefore, this project focuses on developing infographics to improve understanding of excipient choices in the marketed products that are available in Malaysia. Through digital platforms such as Canva, students can creatively design infographics that visually present and assess the excipients from their product of choices, tackling a critical gap in their understanding of the liquid dosage forms course, especially on topics of excipients. The novelty of this project includes the utilization of digital tools to gain a deeper understanding of the use of excipients in drug formulation among students. In addition, this approach helps improve student engagement and develop digital literacy as well as critical thinking skills among pharmacy students. In conclusion, learning about excipients through the development of infographics provides an effective educational tool to enhance pharmaceutic education.

KEYWORDS: Pharmaceutic, Education, Infographics, Excipients, Drug formulation.

PROBLEM AND OBJECTIVE

Understanding the role of active ingredients in marketed pharmaceutical products is not as challenging as leaning on the non-active ingredients known as excipients. This is because one marketed product comes with one or a maximum of three active ingredients compared to the excipients, which can be up to 10 excipients in one product (Reker et al., 2019). As one of the pharmaceutic courses in the syllabus of the Diploma in Pharmacy, the Liquid Dosage Forms course introduces the fundamental knowledge of excipients to help them grasp the concept and the important use of excipients in formulating pharmaceutical products with the hope that these students can apply the knowledge throughout the rest of pharmaceutic courses. Therefore, the

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objective of this project is to enhance students' understanding of liquid dosage forms, focusing on the role of excipients in drug formulation.

DESIGN DESCRIPTION

The primary purpose of this project is to enhance learning in pharmaceutic education through the development of educational infographics. Specifically, it is designed to improve students' understanding of one of the pharmaceutics courses; Liquid Dosage Forms (PHD123) that were taught in Semester 2, Year 1 of the Diploma in Pharmacy. As part of the course requirements for group assignments, students are required to design an educational infographic by choosing three different commercially available liquid dosage form products that are available in Malaysia. Each group of students is required to have products that are different from each other. The content of the infographics is detailed in Table 1. Digital tools such as Canva have been widely used among students to express their creativity (Pedroso et al., 2023). Hence, their use is recommended to aid these students in producing the infographic. The infographic is submitted in PDF format by uploading it to Google Drive. A summary of the process of design is in Figure 1. Overall, pharmacy students produce a tremendous educational infographic (Figure 2-4) concerning the topics of excipients, with an average score of 81 out of 100. In addition, to support the effectiveness of this project, an analysis of related excipient questions in a recent final examination was conducted, reporting an average score of 6.15, concluding that the approach of developing an educational infographic is an effective tool to enhance pharmaceutic learning.

Table 1: Description of the content of the educational infographics

Item	Description
1	Name of the product
2	Name, strength/concentration and function of active ingredients
3	Relevant indication of the product
4	Formulation of the product
	i. Identify excipient/additional ingredients in formulating the product
	ii. Discuss each of the functions
	iii. Provide an opinion on the appropriateness of the choice of the excipient in formulating the product
5	Packaging and storage
6	Relevant references

VISUALS



Figure 1: Summary of design description

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Figure 2: Example of infographic; topic on *Gastro Aid* Syrup.



Figure 3: Example of infographic; topic on *Winofen* Suspension.



Figure 4: Example of infographic; topic on *Allerly* Syrup.

NOVELTY AND UNIQUENESS

The novelty of this study lies in its integration of educational infographics as an educational tool to learn about the choices of excipients used in commercially available products in Malaysia, whereby their appropriate use is rarely discussed and explored in standard pharmaceutic education. This project provides another approach to learning pharmaceutics courses focusing on the excipient topic, as recent findings revealed the implementation of in-class exercises to learn the roles of excipients in fundamental pharmaceutic courses (Klausner, 2023). By implementing digital tools and platforms, students are expected to develop significant critical thinking skills and creativity skills in developing informative and educational infographics on actual marketed products. Next, by integrating digital aspects into the teaching and learning process, pharmacy students can improve their practical skills in drug formulation as they are engaged deeply in each excipient during the development of these infographics. This approach fills the gap between theoretical and practical knowledge, making complex topics such as excipients become more accessible and knowledge retaining.

BENEFITS TO MANKIND

The benefits of this design are expected to be more than just in the educational circles, for the students; there is no doubt that this approach helps in enhancing the knowledge and

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comprehension of the pharmaceutics course with a focus on the roles of excipients in drug formulation as well as its appropriateness in the marketed products. From the pharmaceutical industry's point of view, this approach aids in the development of a future skilled workforce that could contribute to designing safer drug products with the right choices of excipients. Lastly, these educational infographics can be used as communication tools to improve overall pharmaceutical literacy among healthcare providers and the public by conveying information and spreading knowledge on the content of marketed products, especially on the use of excipients.

COMMERCIAL POTENTIAL

The products from this project can be marketed and used as part of training tools by pharmaceutical companies to train their staff (Kai Tomboc, 2020) for professional development or while discussing on developing a similar group of products with different target populations that have been issued with the current product in the market. For example, details provided in infographics present the use of paraben as a preservative in marketed products. However, not all consumers are fit to use it. Hence, this infographic can be used as a guide to produce safer products without the use of paraben. Moreover, the digital skills that students equipped in developing this educational infographic can be a stepping stone in their future careers as there is an increasing trend in the use of technologies (Hamed Taherdoost, 2022) and digital tools in various industries, including the pharmaceutical industry.

CONCLUSION

In conclusion, the development of an educational infographic to learn about excipients in marketed products reflects a cutting-edge approach to pharmaceutic education. It helps improve students' engagement in learning pharmaceutics courses and significantly develop crucial skills among students, like digital and creativity skills, that can be beneficial to them during real working life. Lastly, this design can contribute valuable benefits to the public and pharmaceutical industry in creating a population with improved pharmaceutical literacy and a more informed workforce.

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