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Numeracy to drug calculation: A study to measure the effectiveness of using different modes of learning for formative and summative assessment for drug calculation

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Introduction

The delivery of numeracy skills for nurses may not always reflect real-life scenarios accurately. First year nursing students tend to struggle to connect theoretical knowledge with the practical application of drug calculations in clinical settings. Nurses considered knowledge of drug calculation relevant to decrease medication errors (Di Muzio, Tartaglini, De Vito, La Torre, 2016; McMullan, Jones, & Lea, 2012). The results show that using learning platforms such as safeMedicate can reduce nursing students' medication errors, however, this may also have limited impacts in developing their numeracy skills (Stake-Nilsson et al., 2022). In addition to pedagogy, integrating online platforms such as safeMedicate can enhance maths performance with better retention, increased confidence, and enhanced student satisfaction for active engagement (Revell and McCurry, 2013).

Rationale

Drug calculations require a strong foundation of basic mathematical concepts such as fractions, decimals, basic operations, and conversion, some students may develop Maths anxieties whilst some may have learning difficulties (Jordan, McGladdery and Dyer, 2014). Most learners may vary between two extremes of learning styles known as 'inchworm' and 'grasshopper' which requires flexibility in teaching (Weeks, Clochesy, Hutton and Moseley, 2013). Understanding the learning styles of students and evaluating the effectiveness of teaching materials and how these reflect on their assessment results are critical to all educators. Therefore, it is essential to assess a spectrum of cognitive styles by testing the students. To address these challenges, nursing programmes usually provide practice opportunities and numeracy support to help them build confidence and improve their drug calculation abilities over time.

Aim of the study

(a) to evaluate the effectiveness of both traditional and online learning modes as tools to learning and assessment,
(b) to identify learning difficulties emerging from both types of assessment, and
(c) to propose solutions in addressing students' needs in developing confidence in solving drug calculation problems.

Research design

A mixed-method approach has been adopted for this study. The rationale for using a mixed approach is to ensure that we are in a better position to capture data on students' performance as well as on their perceptions. We aim to capture students' experiences of undertaking their assessments using two different formats (namely, online SafeMedicate and paper-based assessments). These findings will help the researchers to deduce the causal relationship of using different formats while teaching on students' learning outcomes. The study will use a non-experimental design. Participants: Undergraduate nursing students enrolled through the UCAS route from the Uxbridge and Aylesbury: September 2023 and February 2024 cohorts in the School of Nursing and Midwifery. Participants from all the 3 fields of nursing have been invited (Adult, Child, and Mental Health).

First round of data collection:
The study involves a combination of 2 sampling techniques. In stage 1 Purposive sampling has been used to select participants who have completed their mock, both on the SafeMedicate platform and on paper. In stage 2 a simple random sampling technique had been proposed to draw 20% of participants from the sampled participants in stage 1.
Although students provided consent to using their safeMedicate scores and mock scores for the study, only 2 students agreed to being interviewed.
Since the students are not being assessed using the online platform, they seemed to be discouraged to use for practice based on the engagement report generated from safeMedicate.

Preliminary Results of round 1

Correlation co-efficient is 0.22 indicating a weak correlation between the test scores from SafeMedicate and Paper based mock.

z-Test: Two Sample for Means

	100	*89*
Mean	70.625	52.84101
Known Variance	545.44	619.49
Observations	48	48
Hypothesized Mean Difference	0	
z	3.60994	
P(Z<=z) one-tail	0.000153	
z Critical one-tail	1.644854	
P(Z<=z) two-tail	0.000306	
z Critical two-tail	1.959964	

We can reject the null hypothesis if **Z < – Z Critical Two-Tailed Z > Z Critical Two Tail**
In this case the null hypothesis cannot be rejected so means from the 2 methods of assessment do not differ significantly. We have run this for a sample size of 49 in round 1. We are yet to assess the results from round 2 from the next cohort.

Next course of action: The tests scores from the mock assessment on SafeMedicate will be compared to the test scores from the paper-based mock for the next cohort. We can then determine whether a digital platform like SafeMedicate is effective or not to learn drug calculation.

P1: SafeMedicate is quite straight forward and you can keep practising. Since I have practised on SafeMedicate, Blackboard becomes easier.

P2: I did not like using SafeMedicate because you had to do it on your own. I enjoyed Blackboard because it was taught in class

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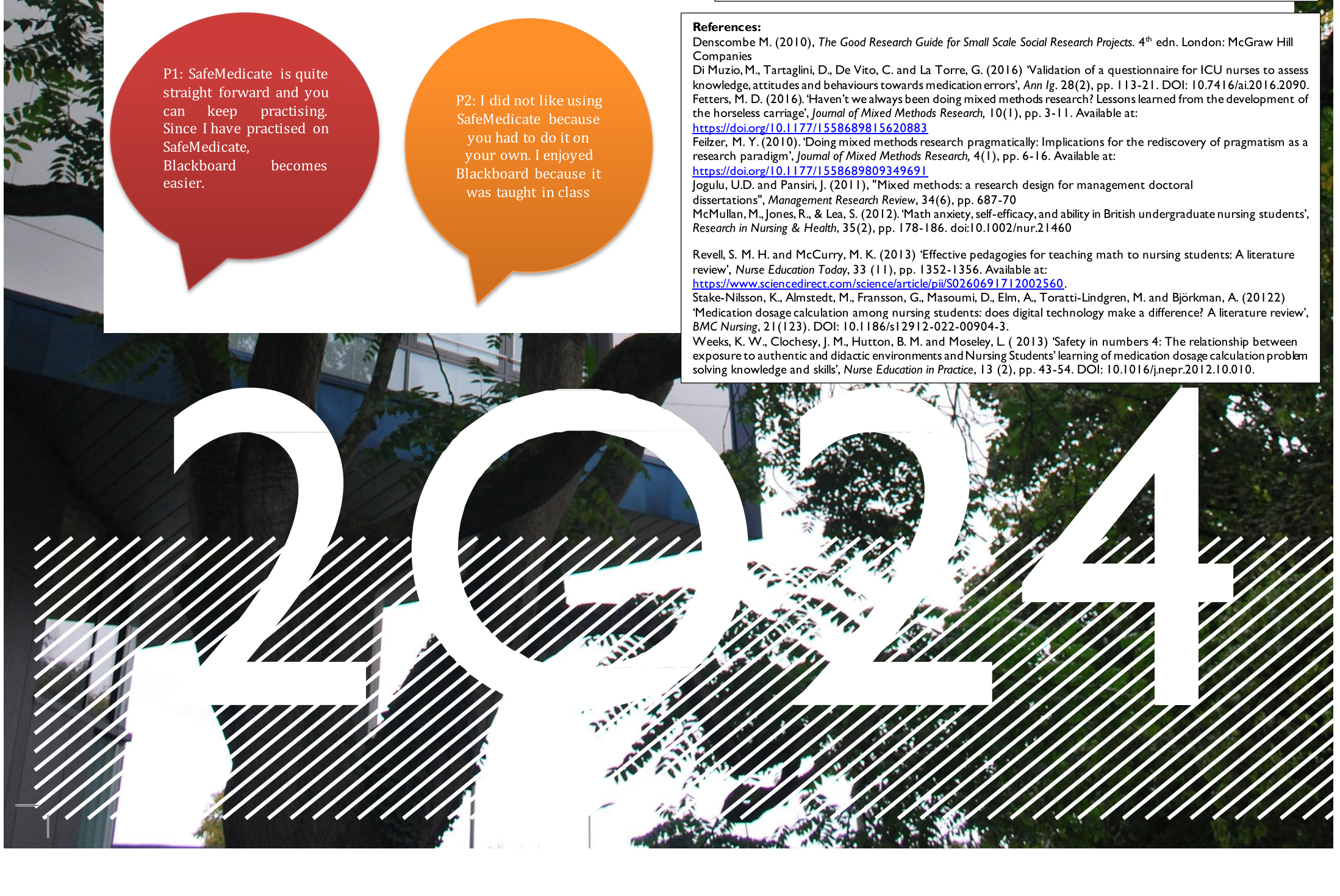

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