Student Assessment of a Math and Medications Course for First Year College Honors Students

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Objectives

- To describe the course and student assessment of a unique one credit math and medications course delivered to first year college honors students.

Methods

- A course based on the use of mathematical principles to calculate does of medications was developed.
- 15 students enrolled in the course; 6 teams of students were created via random assignment.
- The course was delivered live for 50 minutes a week over a 15-week semester.
- Topics covered are listed in table 1.
- Instructional theory used is demonstrated in table 2.
- Course assessed at mid and end of semester.

Table 1: Topics Covered

Apothecary, Avoirdupois, and Metric Units
Weight/Volume, Volume/Volume, and Weight/Weight
Weight based dosing
Infusion rates
Moles and equivalents
Elemental iron and calcium
Radiopharmaceuticals and the exponential decay equation
Alligation medial and alligation alternate
Osmolarity
Bioavailability, fraction unbound, volume of distribution, half-life
Total Parenteral Nutrition (TPN), enteral nutrition, and macronutrients

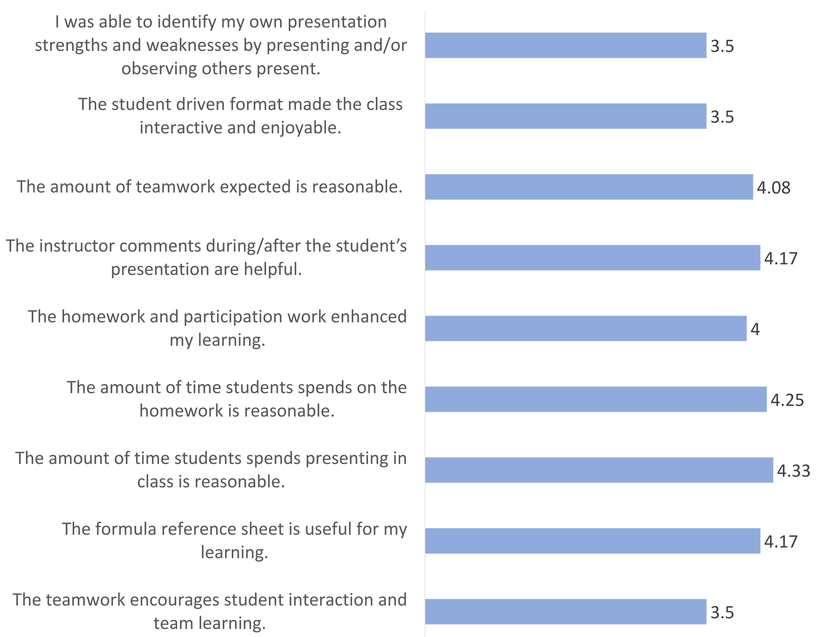
Table 2: Gagne's Instructional Events

	Example Activity Used in Class
Gain student's attention	Discuss iron dosing "error" published in ISMP. Using the word error in healthcare activities alerts the student to a problem they may not have thought about. Learning objectives were verbally spoken before solving problems on whiteboard.
Stimulate recall of prior learning	Students were reminded of their algebra and chemistry knowledge from high school and how it applies to the current course.
Present stimulus	New content was delivered in class via a whiteboard. Patient based dosing problems were used in class, for the homework and student presentations.
Provide learner guidance	Expected learning was repetitively provided to the students in handouts and in class presentations and discussions.
Elicit performance Provide Feedback	Written and verbal feedback was provided in response to student presentations, homework, and tests.
Assess performance	Student presentations and homework focused on formative feedback and tests were summative.
Enhance Retention and Transfer	Repetition of content throughout course. Dimensional analysis techniques and converting units throughout the course. Percent weight/volume and volume/volume used in dosing and infusion problems. Noting similarity of radioisotope decay formula and first order kinetics formula, deriving elimination constants and half-life.

Results

Figure 1: Student Assessment-Mid-Semester

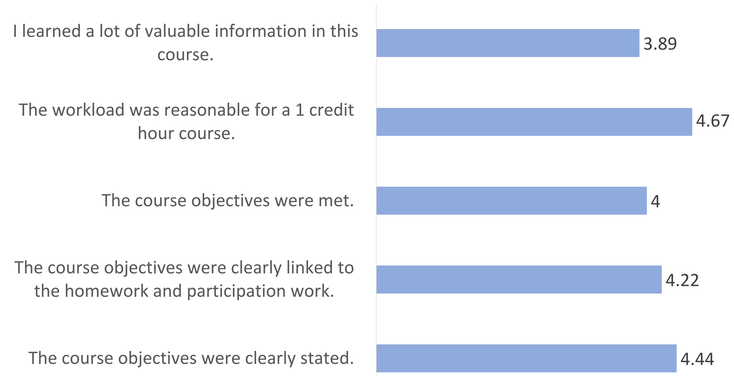
N=12/15 (80%)



Rubric: 5=strongly agree 4=agree 3=neutral 2=disagree 1=strongly disagree

Figure 2: Student Assessment-End of Semester

N=9/15 (60%)



Rubric: 5=strongly agree 4=agree 3=neutral 2=disagree 1=strongly disagree

Table 3: Free Text Comments

1. It was intriguing, to say the least. More than expected to know but could still be useful in the future.
2. This course may be beneficial to pre-med, nursing, or biology majors, but it is not very useful to most other majors.
3. I enjoyed taking this course as it was well-taught and interesting.

Conclusions

- All 15 students were successful in the course.
- Figure's 1 and 2 show the student survey data at mid-semester and end of semester, respectively.
- Free text comments indicate more relevancy needed.
- Successful as a pilot, more iterations of the course needed to fine tune.
- Potential IPE activity if healthcare professionals enrolled.

References

1. Accreditation Council for Pharmacy Education. Guidance for the accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree. https://www.acpe-accredit.org/pdf/GuidanceforStandards2016FINAL.pdf. Accessed April 2, 2023.
2. Grimes TC, Guinan EM. Interprofessional Education focused on Medication Safety: A systematic review. *Journal of Interprofessional Care*. 2022;37(1):131-149. doi:10.1080/13561820.2021.2015301.
3. Problem that still needs "ironed" out: Label improvements needed for iron products. https://www.ismp.org/sites/default/files/attachments/2018-03/community201802_0.pdf. Accessed April 7, 2023.
4. Miner A, Mallow J, Theeke L, Barnes E. Using Gagne's 9 Events of Instruction to Enhance Student Performance and Course Evaluations in Undergraduate Nursing Course. *Nurse Educator*. 2015;40(3):152-4.
5. Brown MC, Hanggi A. Pharmaceutical calculations instruction and assessment in US colleges and schools of pharmacy. Am J Pharm Educ. 2007 Oct 15;71(5):87. doi: 10.5688/aj710587. PMID: 17998984; PMCID: PMC2064885.