Assessing the utility of a digital badge tool to improve students' engagement in research

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Background

- Developing critical thinking and effective communication skills through structured research instruction for student pharmacists is essential for the advancement of the profession[1].
- Despite recommendations from the American College of Clinical Pharmacy (ACCP)[1], the Accreditation Council for Pharmacy Education (ACPE)[2], and the American Association of Colleges of Pharmacy (AACP)[3] to incorporate more research-based scholarship in the pharmacy curricula, survey data report inconsistent research exposure at pharmacy schools[4].
- Students rarely engage in research-based courses as they do not see the direct connection to improving patient care[1].
- Recent literature has shown that student participation in research courses significantly improves their perception of the importance of research and evidence-based practice[5].
- Thus, identifying motivational tools to increase student involvement in research-based curriculum initiatives is crucial to overcome this barrier.
- Digital credentialing has shown to enhance students' motivation to learn[6], but research on the use of digital badges to enhance learning among pharmacy students is limited.

Objectives

The primary purpose of this project was to determine whether the award of a digital badge in a blended learning environment increases pharmacy students' motivation and academic performance in a research-based course.

Materials and Methods

Study participants: Students registered (N=6) in the following Pharmaceutical Sciences Research elective courses: PHRX 460-07, PHRX 460-08, PHAR 475-07, and PHAR 475-08 were included in this study. This study was approved by the Samford University Institutional Review Board (EXMT-P-22-F-2).

Pedagogical Approach: This course included a combination of benchwork research, asynchronous online activities, six synchronous face to face class sessions, seven laboratory meetings, one oral scientific presentation and one written project submission consisting of an annotated bibliography. Students completed anonymous pre- and post-assessments, self-reflections after each class, and an end-of-the-course reflection.

Materials and Methods: Assessments

Pre- and post-assessments: were administered at the beginning and end of the course, respectively. They included the same six content questions and inquired about their confidence level to answer each question using a scale from 1 (no confidence) to 5 (very confident). These questions addressed students' understanding of a literature search, annotated bibliography, predatory publishing, journal club presentation, data analysis and interpretation, and academic integrity.

Self-reflection and end-of-the-course reflection forms: asked about students' perceived learning experiences after each class and at the end of the course. The end-of-the-course self-reflection also inquired about the students' experience with digital badges and their motivation to earn one.

Oral/written projects: Additional faculty were invited as judges of students' oral presentations and students were also requested to evaluate their peers. Course instructors graded the written project. Project evaluations were completed based on a well-established rubric system previously shared with students.

Scientific Communication Badge: was granted by the Samford University Academic Affairs office if students met at least 80% of the following requirements:

- Have a one-hour consultation with the Samford University librarian.
- Review all online tutorials and complete associated knowledge checks.
- Complete two quizzes covering assorted content topics.
- Prepare and lead a journal club or scientific research presentation.
- Communicate their laboratory findings and actively participate in research discussions during lab meetings.
- Correctly cite references using AMA citation formatting.
- Complete and submit an Annotated bibliography assignment: students summarized selected peer-reviewed articles in their own words and provided a critical evaluation and reflection of selected peer-reviewed manuscripts.
- Complete pre- and post-assessment surveys of this course.
- Complete a self-reflection about each content topic at the end of each class session.
- Complete a summative reflection on the nature of their research, and their experiences doing research, and self-assess their research skillset after this course.

Statistical Analysis: Pre- and post-assessment data were compared using a one-tailed paired t-test.

References

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Results

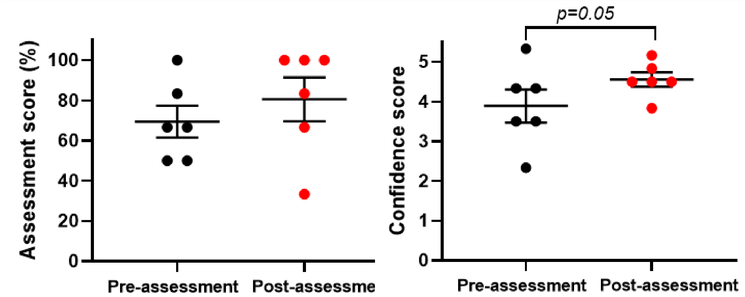

Figure 1. **(A)** Pre- and post-assessment scores evaluating students' knowledge of content questions. Analyses of the pre- and post-assessments reveal that, although not statistically significant, there was a 16% improvement in the students' scores after the completion of the elective course. **(B)** Post-assessment confidence scores increased significantly (~17%) compared to the pre-evaluation administered at the beginning of the course. N=6, data indicates mean ± SEM; *p*-value derived from one tailed paired *t-test*.

What were the top 3 skills you learned?	N	%
How to use zotero	1	5
How to present my research	6	30
Time management	1	5
How to avoid predatory publishing	2	10
How to work in the lab	4	20
How to utilize/analyze data	2	10
Use MeSH terms	1	5
Use Pubmed	1	5
How to prepare an annotated bibliography	1	5
Copyright/Academic integrity	1	5

Activities that help you learn the most	N	%
Scientific research presentation	6	27.27
Benchwork	5	22.73
Lab meetings	5	22.73
Annotated bibliography	3	13.64
Class sessions	2	9.09
Meet the librarian	1	4.55

❖Students' reflections showed that they were able to incorporate what they learned into future student and professional practices.

SELF-REFLECTIONS: Students were prompted to reflect on what they learn at the session and how they can apply what they learned to the activities and assignments in this course
CLASS SESSION: Data Analysis and Interpretation
"I can utlize this when doing my Capstone project and future research projects".
CLASS SESSION: Academic Integrity
"I can apply this througout my time in pharmacy school and when I begin my career".

❖Most students (~83%) had not been given the opportunity to earn a digital badge in the past.

❖All students obtained the digital badge and felt it motivated them to learn.

❖Most agreed (66.7%) that this motivation responded to their desire to illustrate mastery of a skill they could add to their resume.

Conclusion

In summary, our findings suggest that **the award of a digital badge is a strong motivator to improve student engagement and academic performance and, thus, enhance their ability to translate those skills to future professional practices.**