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Using Exam Wrappers in a Self-Directed First-Year Learning Strategies Course



Abigail T. Stephan, Laurel Whisler, Elizabeth A. Stephan, & Bridget G. Trogden

Background

- The **General Engineering Learning Community (GELC)** is a program designed to support first-year engineering students entering Clemson University with weak calculus skills.
- A critical feature of the GELC program is a 2 credit hour **learning strategies course** focused on equipping students with skills and techniques to optimize their learning in STEM courses (i.e. engineering, math, chemistry) through short instructor-led activities followed by structured “lab time” for students to apply concepts. This course was pedagogically informed by **Entangled Learning** (Treuer & Whisler, 2019).
- The Fall 2018 GELC course included a **series of exam wrapper activities** following the first round of exams, culminating in an exam wrapper learning journal after the second round of exams.
- Exam wrappers are a tool used to scaffold student self-evaluation of their preparation and performance on graded assignments and promote metacognitive awareness (Gezer-Templeton et al., 2017; Trogden & Royal, 2019).
- Our series of exam wrapper activities went beyond other implementations documented in the literature in that **multiple iterations** of the activity provided students with numerous opportunities for **formative feedback**.

Sample

A **convergent mixed methods design** was used to answer the research questions presented on the right

Students enrolled in a GELC section of the learning strategies course were eligible to participate

Quantitative Sample (n=80) → students who took all 6 exams

- ENGR 1 & 2, MATH 1 & 2, CH 1 & 2

Qualitative Sample (n=78) → students who submitted exam wrapper learning journal

Research Questions

1. What is the impact of using exam wrapper activities after the first round of exams on first-year engineering students’ second exam scores?

2. How does engagement with the exam wrapper activities contribute to first-year engineering students’ knowledge of how to effectively learn in STEM courses?

3. How does engagement with the exam wrapper activities sharpen first-year engineering students’ metacognitive processes?

Exam Wrapper Activities

One Week Prior to First Round of Exams

- 1. Daily Reflection** – students reflected on perceived confidence level and preparation for exams
- 2. Time Tracking Learning Journal** – students tracked time spent on studying, class sessions, meals, sleep, extracurriculars, etc. and noted their most effective study session

One Week Following First Round of Exams

- 3. Exam Wrapper Survey** – students evaluated their understanding of learning outcomes seen on the exams and their preparation for the exams
- 4. Learning Strategies Survey** – students identified their primary study behaviors based on a list of strategies within five categories (based on Skillful Learning Study Behaviors Survey; Cunningham, Matusovich, & Blackowski, 2019)
- 5. Action Plan for Improvement** – students created an action plan for the second round of exams with 2 SMART goals based results of the learning strategies survey

TABLE 1
DESCRIPTIVE STATISTICS FOR EXAM SCORES

EXAM	N	MINIMUM	MAXIMUM	MEAN	STD. DEV.
CHEM 1	80	0.0	102.0	74.83	17.47
CHEM 2	80	32.0	104.0	69.95	15.88
ENGR 1	80	21.0	95.5	72.09	16.83
ENGR 2	80	10.0	100.0	75.54	18.38
MATH 1	80	20.5	92.0	60.61	16.16
MATH 2	80	28.0	95.0	69.30	17.09
EXAM 1 Total	80	101.0	270.0	207.52	40.10
EXAM 2 Total	80	86.5	292.5	214.79	41.34

One Week Following Second Round of Exams

- 6. Exam Wrapper Learning Journal** – students documented their engagement with their action plan, evaluated their performance on the second exam, and reflected on their experience

Results

TABLE 2
DEPENDENT T-TEST OUTPUT

	MEAN	STD. DEV.	t	df (n-1)	SIG. (2 TAILED) (p<.01)
EXAM 2 Total - EXAM 1 Total	7.2688	24.2837	2.677	79	.009

Increased Preparation - “I believe I prepared 100 times better for this exam than any other class. I felt very comfortable while taking it. I studied for hours and did countless practice exams, so when it came time to take the exam it was like déjà vu.”

Enhanced Confidence - “I felt a lot better going into the second exam. I had a clear head and felt like I had a good grasp of the knowledge. I was in a much better state of mind and a lot less stressed then [sic] when I went into the first exam.”

Recognition of Insufficient Study Practices - “The way that I study needs to change as well. Most of my ‘studying’ is just reading over notes passively and not doing anything with them once I read them.”

Increased Understanding of Oneself as a Learner - “This [exam wrapper activity] helped me understand how I learn better. I realized that I need to do more practice based learning because that is where the real connections are made for me.”

Discussion & Implications

Preliminary results suggest that the exam wrapper activities were effective in improving second exam scores, knowledge of effective learning strategies, and metacognitive awareness.

The learning strategies course included a number of activities to increase students’ learning effectiveness, therefore additional research is needed to determine if the exam wrapper activities were the most significant contribution.

Additional research must be conducted to understand how exam wrapper activities can be translated to other contexts.