



CASE STUDY

PebblePad workbooks for self-regulated learning: Study plans, learning strategies and reflection to promote success in first year

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PEBBLEPAD CASE STUDIES

STORIES OF INNOVATION TOLD BY THOSE CHARTING NEW COURSES IN LEARNING, TEACHING AND ASSESSMENT.

THE CONTEXT

This study is focused on improving student success by embedding effective study strategies into a large first year course. Fundamentals of Biochemistry has a class size approaching 400, consisting of a diverse range of students with a large variation in ability and education background. In recent years the fail rates of 37-38% (2017-2018) have prompted a re-development of this course to support student learning and student success. This was achieved by introducing students to effective learning strategies and ultimately, promoting self-regulated learning through self-evaluation and reflection. This approach is based on recent studies of science, technology, engineering and mathematics (STEM) courses which highlighted the need for effective study strategies for optimal learning (Hora & Oleson, 2017) and identified learning strategies that improve student success (Dunlosky, Rawson, Marsh, Nathan & Willingham, 2013; Sebesta & Speth, 2017). This case study will outline the use of PebblePad to highlight effective study strategies, to develop study plans by incorporating these strategies, and to provide a safe space for students to evaluate and reflect on their performance.

THE PROBLEM

The challenge in Biochemistry, like many STEM disciplines, involves understanding complex concepts and navigating a high level of content. In recent years there has been a decline in student success in Biochemistry which may be attributed to several changes to accommodate university priorities and current trends in student behavior. These include a lowering of university entry requirements, the removal of small tutorial classes, a shortening of semester length, and a decline in student attendance at lectures and tutorials. The student demographic for this course reveals a high percentage of 'first in family' (>50%) and students with English as a second language (32%). It is possible that many students are entering university without the necessary skills (such as metacognition) to successfully complete difficult STEM courses such as Biochemistry. In addition to the lowering of entry requirements, the high fail rates in this course in previous years prompted changes to provide students with the opportunity to develop learning skills and ultimately regulate their own learning.

THE APPROACH

Faced with the challenge of improving student success, our approach involved developing study plans to maintain and improve grades over the length of the course. However, the study plans developed by students needed to include learning strategies that have shown to improve performance (Dunlosky et al., 2013; Hora & Oleson, 2017; Sebesta & Speth, 2017), as well as self-evaluation of their performance and reflection on their study plan to promote self-regulated learning.

PebblePad was an ideal personal learning platform for several reasons, including that the majority of students were already familiar with the platform having used it in Trimester 1 and it was flexible for students unable to attend classes. In addition, the platform has the capacity to incorporate evaluation tools, upload documents (study plans) and provide a safe space for students to self-evaluate and reflect on their performance.

A PebblePad workbook was designed for the development of study plans and students' self-performance evaluation and contained three parts, aligned with three assessment items: a low stakes online quiz (5%); a second online quiz (15%); and preparation for the end of trimester exam (40%).

On completion of the first low stakes assessment, a multiple-choice online quiz, students were required to evaluate their performance and develop a study plan to maintain or improve their grade in the second online multiple-choice quiz [Part 1: Self-evaluation of online quiz 1 and development of a study plan]. The effectiveness of their study plans on their performance on the second quiz was addressed in Part 2 [Online quiz 2 and study plan evaluation]. This section included development/alteration of their study plans for the end of trimester exam which covered all aspects of the course and included written short answer questions as well as multiple-choice questions. The final section of the workbook was designed for overall reflection and evaluation of this strategy [Part3: Reflection and evaluation of study plans].

THE RESULTS

Improvements in student success

Embedding study plan development into first year Biochemistry has been successful based on the multitude of positive reflections, the elaborate and detailed study plans produced, improvements in quiz results, and an increase in the overall success rates in the course. However, the student evaluation and reflections unearthed some very surprising findings with respect to the study strategies used by students as well as issues related to student wellbeing. This case study aims to discuss these findings by analysing student reflections and evaluation data obtained from the PebblePad workbooks (GU Ethics Application Reference Number 2017/1023).

A reduction in the fail rates from 37% and 38% in 2017 and 2018, to 27% in 2019 is a measure of the success of this strategy. However, there was a change in the assessment for the course with the study plan workbook in PebblePad (10% non-graded assessment) replacing a graded quiz (10%) which makes it difficult to directly compare the success rates from previous years. With a high percentage of 'first in family' and shorter trimesters (14 weeks including exams) we felt that developing learning skills for students outweighed the need for three graded quizzes over the trimester.

Effectiveness of learning strategies

In order to gain an insight into study habits, students were asked about the learning strategies they used to prepare for the first quiz. Reviewing lecture notes was the highest (94.9%) followed by completing the online practice quiz (83.5%), while 76.2% indicated that they attended lectures and 72.7% stated that they reviewed the online lecture recordings. Students also indicated that they formed study groups (35.9%) and many students mentioned that they attended Peer Assisted Study Sessions (PASS, 17.1%). Interestingly, the number of students attending lectures was never as high as indicated in the results, except for the introductory lecture (week 1). With respect to the lecture recordings, the number of unique views was less than 72.7% with very few views of the full recordings. However, students may have selected these strategies from the list in their workbooks if they attended a single lecture or viewed a single recording. In hindsight, asking students to list their study methods and how many times they used these techniques would provide a more accurate insight into student study habits. The most surprising finding was that more than half of students (60.9%) had never developed a study plan prior to this course. Such a high percentage is concerning as only 9% of students were new students to the university (i.e. 91% of the cohort were continuing students).

Our innovative use of PebblePad as a platform for study plan development, performance evaluation and self-reflection has led to improved student success. Our initial findings revealed that this strategy was successful with 71.4% of students improving (30.2%) or maintaining (41.1%) their grades from Quiz 1 to Quiz 2. In addition, 72.4% indicated that developing and using a study plan was useful (52.3%) or very useful (20.1%) in preparation for assessment, and 66.1% stating that the study plan contributed to maintaining or improving their grade. This data suggests that developing study strategies can lead to improvements in performance, and this is supported by comments provided in student reflections.

Insights on student reflections

The study plans themselves were not only effective but were also elaborate, creative and extensive. They provided a safe space for students to reflect honestly on their experiences and provided insight to their perspective (see Figure 1), particularly when reflections are kept to a minimum of 20 words (approximately one sentence) as previously observed (Love & Crough, 2019; Crough & Love, 2019). Many of the students' reflections indicated that the study plans were helpful, supportive and beneficial in improving grades; being accountable, organised and improving time management; as well as staying motivated, committed and focused.

The majority of student reflections on developing study plans were positive with many students self-regulating their own learning:

"My experience with creating a study plan allowed me to identify my own strengths and weakness, strategies that work for me in learning and revising work and also making sure I stay on top of my work and being responsible of sticking to what I planned out."

"Creating a study plan helps me understand what content needs to be focused on and gives my study more direction. It also helped me learn about new ways and methods of studying and revising."

However, some students indicated that the study plans were not useful:

"The study planner, while some might find helpful, making it a forced assignment item did not seem helpful. I personally don't find this that helpful but it is a good suggestion for students."

"I do feel that the study plan on pebble pad, although it was not graded, I felt that it was a bit of a time waster."

Interestingly, the majority of students indicated that they were unable to fully follow their plan. For example, when asked "How well did you stick to your study plan?", only 7.7% of students indicated completely adhering to their study plans. Students indicated many reasons for failing to enact their plans, including workload from other courses (16.1%), assessment (15.3%), and work commitments (14.5%). More concerning were responses that related to student wellbeing which included time management issues (12.9%), sickness (8.8%), no motivation (7.2%), mental health issues (2.8%) and unspecified personal issues (12.9%).

These issues were portrayed in many student reflections:

"Work, mental health, burnout and some procrastination all contributed to lowering my results and the overall lowering of my marks."

"I didn't balance my studies well, and let other work overtake the priority of my study plan."

In contrast, there were examples indicating that study plans reduced stress:

"Developing a study plan helped me get 100% for the 2nd online quiz. It also has made me more organized. And I feel like I can get through the final exam without stressing."

Other students indicated that their study plans were far too complex and they didn't consider their other studies when developing their plan for Biochemistry:

"In hindsight, my study plan was perhaps a little too ambitious and difficult to follow given my contact hours and other commitments."

Based on this information, emphasis will be placed on developing feasible study plans for students that consider both the time required for other courses and extracurricular activities. Pleasingly, 88.2% of students commented that they would be capable (34.2%) or very capable (54.0%) of developing study plans for future courses. Clearly these studies have shown that not all students are equipped with the necessary skills for entering university, highlighting a requirement to embed study skills and develop learning strategies in order for undergraduates to successfully transition through university.

A

Biochemistry					
Study Plan					
1. Self Evaluation					
2. Goal Setting & Planning					
Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
GOAL(s): <input checked="" type="checkbox"/> do well on quiz. ↓ ★ reflect on result and make sure I understand the questions I got wrong. ★ highlight parts of module 1 that I do not understand. ★ make sure to complete module 1 tutorial a's.	GOAL(s): <input type="checkbox"/> make timeline to prioritize study. <input type="checkbox"/> start study earlier. <input type="checkbox"/> set aside 30 mins a day to revise study material ↓ ★ complete/attempt tutorial questions. ★ brush up on module 1-2 concepts.			GOAL(s): <input type="checkbox"/> Attempt one practice quiz every day of this week. <input type="checkbox"/> two one hour revision sessions on material that's going to be in quiz 2. ↓ ★ clarify gaps in knowledge ★ reflect on my own understanding of concepts.	

B

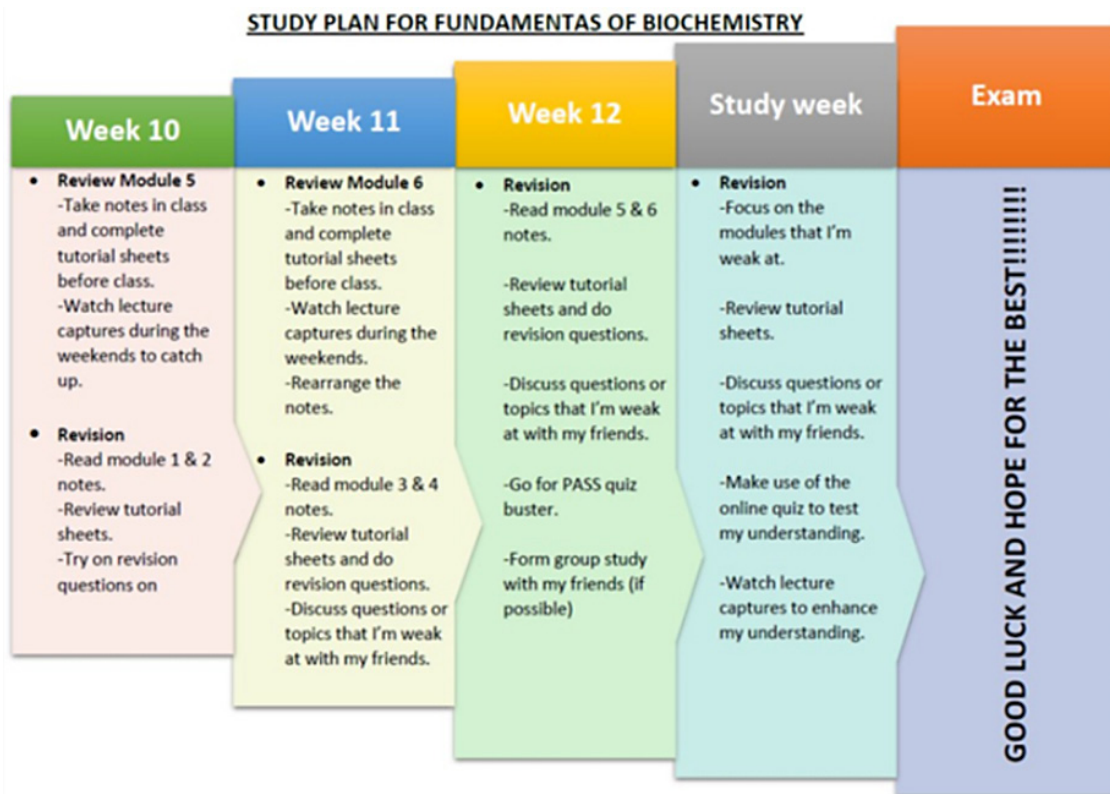


Figure 1. Examples of study plans developed by students for the second online quiz (A) and the end of semester exam (B).

LESSONS LEARNT

The findings of this study suggest that there is a significant proportion of students entering higher education without the necessary skills to be successful. Therefore, developing students' metacognitive skills (including developing study plans) should be a key strategy as they transition through university. With greater than 60% of this cohort having never developed a study plan before, it is imperative that more detailed information regarding developing study plans is offered to future student cohorts, providing a range of examples and exemplar study plans (from simple to elaborate and creative) to demonstrate possibilities. We need to ensure that students consider the impact of course work and assessment from other courses as well as manage their time between study, work and extracurricular activities, and even incorporate these activities in their plans. We also need to communicate the advantages of study plans with respect to improving student wellbeing and stress reduction. For example, encouraging students to adjust or manage their university commitments and extracurricular activities (including work) appropriately, and improve their time management and organizational skills through study plans which can help reduce stress.

IN BRIEF

- Include student reflections on any new initiatives as this provides a direct insight into student perceptions and potential barriers to student success.
- Ensure that students have a safe space for reflecting on their performance and/or activities.
- Use a small minimum word length (20 words) for reflections to ensure simplicity and student engagement.
- Provide appropriate assessment weighting to activities to ensure they are valued by students.
- Key benefits to study plans: improved grades (and reduced fail rates).

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