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Eliciting Academic Help-Seeking in a Hybrid Human Anatomy & Physiology Course Using Muddiest Point Assignments

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Abstract

Academic help-seeking can allow students to moderate their anxiety in difficult academic contexts, but students often shy away from asking for needed assistance. Muddiest point assignments in a hybrid human anatomy and physiology (A&P) course can address student struggles with academic help-seeking by making it an activity in which all students are expected to participate. The purpose of this pilot study was to investigate the use of a muddiest point reflection as a regular, mandatory component of a hybrid A&P course to determine if it could increase students' academic self-efficacy and reduce their anxiety around asking for assistance. Data was collected through pre-and post-course surveys to compare students' self-assessed self-efficacy and anxiety scores before and after using muddiest point reflections over the whole term. There was no significant difference between student self-efficacy or anxiety between the start and end of term. This pilot study suggests that further investigations into which factors influence and are influenced by academic help-seeking will clarify the development of effective help-seeking interventions. This study was supported as part of the Community College Anatomy and Physiology Education Research (CAPER) project (2111119). https://doi.org/10.21692/haps.2024.013

Key words: help-seeking, muddiest point, anxiety, evidence-based instructional practice

Introduction

Human anatomy and physiology (A&P) courses are extremely challenging and are often considered gatekeeper courses to healthcare and allied health disciplines such as nursing and physical therapy due to the high failure and attrition rates (Lunsford & Diviney, 2020; Vitali et al., 2020). Therefore, A&P courses represent a critical area for the study of evidence-based instructional practices (EBIPs) that have a record of classroom effectiveness (Entezari & Javdan, 2016; Hood et al., 2021). Moreover, investigations into mechanisms to support students' self-regulated learning (SRL), which can be described as students' self-directed, proactive learning approaches (Dunn-Lewis et al., 2016; Eleazer & Scopa Kelso, 2018; Farr et al., 2020), are important for determining how to best support the success of A&P students in these important courses. As pressure to increase the health care workforce grows, so will the need for A&P courses to improve student success rates (Forgey et al., 2020; Hull et al., 2016; Slominski et al., 2019; Sturges & Maurer, 2013; Sturges et al., 2016).

One promising avenue toward supporting students' self-efficacy and their success in the higher education classroom is the SRL strategy of help-seeking. According to Chu and colleagues (2018), asking for academic help is the result of a student's metacognition: the student asks for help following self-reflection of their thinking, learning, and performance. Richards (2020) suggested that supporting students' development of help-seeking behaviors can be a method for developing their ability to mitigate anxiety in difficult educational contexts such as the ones found in A&P classrooms. Some research has also suggested correlations between effective help-seeking and strong academic self-efficacy, which is defined as a student's belief that they can achieve the academic task at hand (Ding & Er, 2018).

While there is little research on help-seeking as an SRL approach in the higher education A&P classroom, one recent study has shown that SRL study approaches, in general,

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support student learning in A&P courses (Eleazer & Scopa Kelso, 2018). In this study, more successful A&P students reported using social components of SRL, including asking questions of the instructor and quizzing their peers, at a significantly greater rate than less successful A&P students. In the specific area of the SRL behaviors of help-seeking and peer learning, research by Hebert and Guenther (2020) found that A&P students were not likely to take advantage of optional study sessions with their peers without the incentive of extra credit. Moreover, the students in that study reported that, even though they felt the peer study sessions helped them prepare for exams, they did not find that the help from their peers translated into improved course grades. In another recent study using think-pair-share activities in an A&P class, researchers found that students reported they would be more likely to collaborate with their fellow students after the intervention. This suggests that repeated practice in both engaging with fellow students and seeking help from one's peers are effective methods for supporting further engagement with the SRL behavior of help-seeking specifically in an A&P course (Farr et al., 2020).

Help-seeking in the context of education can be separated into two general forms: executive help-seeking and instrumental help-seeking (Nelson-LeGall, 1985). Executive help-seeking is defined as actions in which a student seeks an answer to reduce their own effort or time on the learning task. This form of help-seeking is also sometimes called maladaptive, dependent, expedient, or inappropriate help-seeking (Chowdhury & Halder, 2019). In contrast, instrumental help-seeking behaviors include asking for direction, clarification, or hints that help improve the student's own work and that do not directly request an answer or solution to the given academic task (Karabenick, 2003). Instrumental help-seeking is adaptive and supports increasing autonomy on the part of the student as it aids the student in deeper levels of understanding of the content (Finney et al., 2018). As such, instrumental help-seeking is the type of help-seeking identified as a critical sub-strategy of SRL (Karabenick, 2003).

Several studies have demonstrated that students choose to employ maladaptive help-seeking behaviors such as help-avoidance or executive help-seeking in some educational contexts. For example, a recent study found negative correlations between a lack of prior knowledge, high cognitive load, and decreased engagement in instrumental help-seeking behaviors (Dong et al., 2020), suggesting that students who are struggling to learn new content back away from asking for assistance. In addition, students who are less familiar with the material being addressed in a course may be overconfident in their abilities and less likely to ask for help when they need it, as demonstrated by first-year pharmacy students when presented with questions about novel content (Chu et al., 2018). Other research has shown that when students focused on their performance, especially as compared to their peers, they were less likely to seek help (Karabenick, 2003, 2004).

This performative focus, at the expense of instrumental help-seeking, can also be inadvertently prompted by the instructor in a course. Ryan and Shim (2012) found that instructional contexts in which the instructor emphasized performative goals and public comparisons between students' success prompted maladaptive executive help-seeking in those students. Finally, there may be a disconnect between students' feelings about which kinds of help-seeking pose the most threat and their intentions to use various modes of help-seeking. Students in a study by Reeves and Sperling (2015) reported greater anxiety about using face-to-face modes of asking for assistance, such as after class and through office hours, but expressed greater intention to use these modalities over digital help-seeking avenues such as discussion boards or online office hours.

Just as context may inhibit students from help-seeking, some sub-groups of learners experience anxiety that inhibits asking for help. In a study by Gonida et al. (2019), high-achieving students who focused on others' perceptions of them as having already mastered the material were less likely to perceive the benefits of help-seeking and were less likely to seek help when needed. Inhibition of help-seeking due to concern over others' social perceptions is not unique to high performing students. First-generation college students are also affected by concern about others' judgments of their academic abilities and may reduce help-seeking behaviors as a result (Chang et al., 2020). Similarly, anxiety about an ability to effectively communicate with others, either due to language barriers or other issues with speaking or writing, can hinder a student's academic help-seeking actions (Sobotka & Raman, 2020). Furthermore, research has shown that students of color who experience identity threat may also avoid seeking help as they struggle with anxiety about how they will be perceived by others if they ask for assistance (Qayyum, 2018; Thompson et al., 2019).

A simple approach to encouraging students to engage more readily in academic help-seeking may be by reducing students' anxiety about asking for help and increasing their self-efficacy in the course. This may be achievable through the regular use of a muddiest point reflection. This EBIP asks students to consider what component of their recent learning is confusing (a.k.a. "muddy") (Carberry et al., 2013; Waters et al., 2016). According to Carberry and colleagues (2013), this practice is effective because it gives students time to actively and intentionally reflect on what they have recently been learning as they ask for help. In addition, this approach directly prompts student metacognition as they consider where they may be struggling with their thinking

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and learning. These reflections provide insight for instructors, too, as they see what material is most difficult for the class. Various approaches to solicitation of the muddiest point reflection include requesting written feedback during class time (Carberry et al., 2013; Mansson, 2013; Waters et al., 2016), using clickers or other digital survey tools where students could select their muddiest point from offered choices (Keeler & Koretsky, 2016; Onodipe & Ayadi, 2020; Perez et al., 2020; Srivastava et al., 2018), and asking students to share their muddiest point in a discussion forum in the course learning management system (LMS) (Hudson, 2014).

Results of research examining the muddiest point reflection practice have been promising. Akhtar and Saeed (2020) determined that students who engaged in muddiest point reflections achieved significantly higher scores than their peers who did not. In other research, students found muddiest point reflections to be motivating and valuable to their learning (Carberry et al., 2013; Hood et al., 2021). Research with computer science students who used a digital tool for reporting their muddiest points demonstrated a significant positive correlation between the number of times they engaged with the tool and their self-efficacy (Menekse et al., 2018). When students were asked to rate student-centered teaching practices for the level of anxiety they felt, muddiest point reflections were rated as some of the least anxiety-inducing of the EBIPs and that their anxiety regarding using muddiest point reflections decreased significantly with their use during a term (Hood et al., 2021). Interestingly, while many instructors have reported using the muddiest point reflection as a component of a flipped classroom or an active learning classroom (Entezari & Javdan, 2016; Srivastava et al., 2018), few have investigated the effectiveness of this intervention on its own. Therefore, it is difficult to tease out student gains, whether in course success, self-efficacy, or other areas, that can be directly attributed to the inclusion of this particular EBIP within a course.

Instructor perspectives regarding muddiest point reflections have been examined more thoroughly and instructors generally find them to be a positive addition to their teaching repertoire. Faculty reported that the muddiest point practice was easy to implement with just a small amount of careful attention to the details of the practice, as it does not need to take up much class time (Carberry et al., 2013; Waters et al., 2016). Instructors have also reported that a key benefit to the use of the muddiest point intervention was that it immediately illuminated where students were struggling so that difficult material could be re-addressed in the next class time (He, 2019; Keeler & Koretsky, 2016; Srivastava et al., 2018; Waters et al., 2016). Student misconceptions, which can be difficult to catch, are also revealed by the use of this EBIP (Waters et al., 2016). Carberry et al. (2013) reported that qualitative data from instructors demonstrated that muddiest point reflections were a "catalyst for change in pedagogical practice" by opening new opportunities for trust and communication between students and instructor.

In some hybrid A&P classrooms, the lecture content is addressed through the online LMS, while the laboratory component is delivered face-to-face. It is possible that the use of a muddiest point EBIP in this format is even more valuable than in a face-to-face format, as students have fewer opportunities to see their fellow students asking for help or to engage with their peers and instructor to work through difficult points with the content of the course. Using the muddiest point reflection as a regular, mandatory component of a hybrid A&P course could be an effective help-seeking intervention by normalizing it as an activity in which all students are expected to engage. By normalizing help-seeking, students may increase their academic self-efficacy and reduce their anxiety around asking for assistance.

This pilot study addressed the following research questions:

1. To what extent does the use of a recurring muddiest point assignment in an A&P classroom affect academic self-efficacy?
2. To what extent does the use of a recurring muddiest point assignment in an A&P classroom affect anxiety about engaging in this EBIP?

Methods

Participants

The study population was comprised of college students in the first of two terms of hybrid A&P courses offered at a mid-sized community college in Washington State that offers face-to-face and hybrid A&P courses. The first term of these paired A&P courses, Human Anatomy and Physiology I (HAP I), addresses the structure and function of cells, bones, muscles, and the nervous system. Approximately 200 students enroll in HAP I each year at this institution. The students enrolled in A&P courses at this college are predominantly white (70%), and female (73%). Most students enrolled in HAP I are taking it as a prerequisite for application to a nursing program. This population was an appropriate choice for this study because a significant number of A&P students in the United States complete their A&P courses at a community college (McFarland & Pape-Lindstrom, 2016).

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The study sample consisted of students enrolled in two sections of a hybrid HAP I course taught by one of the authors during the fall 2022 term. The course consists of both the lecture and lab components; the lecture component was delivered online asynchronously while the lab component was delivered through two 2-hour, face-to-face sessions per week. The project was approved by the Institutional Review Board of Whatcom Community College and informed consent was obtained from all participants. A total of 39 students began the study with 21 students completing all aspects of the study. The decrease in students included 15 students who dropped out of the course by the end of the term and 4 students who completed the initial survey but chose to not complete the final survey.

Procedure

The muddiest point reflection was used similarly to its use in flipped classroom approaches reported in previous publications (Keeler & Koretsky, 2016; Onodipe & Ayadi, 2020; Perez et al., 2020; Srivastava et al., 2018). Twice a week, after students had engaged with their online lecture content, they were required to complete an online quiz called a Muddiest Point Report. The first question stated, "The thing(s) I need the most help on right now is/are:" and students were able to choose one or more common difficulties with the associated content. Students were also provided an "other" option to choose. The common difficulties for each quiz were determined by the instructor based on often-asked questions and commonly missed areas on exams during previous terms. The second open-ended quiz question stated: "Explain, specifically, what you need help on: Are you having trouble understanding a process, when or why something would happen, what something looks like, etc? If you need help with a particular study guide prompt, address what part of the prompt is giving your trouble and why. If you answered "other", clearly describe what concept is giving you trouble.". Students were required to complete 18 muddiest point quizzes over the span of the 12-week term. These quizzes were valued at 3 points per quiz, matching the total point value of low stakes in-class assignments usually given in face-to-face sections of the same course.

A critical component of the muddiest point reflection was explicit instructor review of muddiest points at the start of each two-hour face-to-face lab session, which typically occurred twice a week unless a lab test was being given. In the face-to-face lab session that followed each online lecture assignment and muddiest point quiz, the instructor shared muddiest points reported by students in an anonymous manner by summarizing what students had written in the muddiest point quiz. The class then engaged in an approximately 30-minute discussion to help clarify these areas of content. The instructor consistently framed the purpose of these reviews as covering where students had asked for help.

Because this course was in a hybrid format, students did not experience traditional lecture sessions. Nor were students exposed to other common instructional approaches such as clicker questions, being asked to volunteer answers to questions, or being cold called to answer questions in a classroom. Therefore, these other instructional strategies (lecture, clickers, clickers with a partner, volunteer, and cold calling) can be considered as other possible approaches to gaining content help in the course that were not available to students during this hybrid format course.

Measures

Students completed an initial survey during the first week of the course and the same survey during the last week of the course. This survey included questions evaluating how much anxiety students experienced in using common instructional practices including lecture, clicker questions, volunteering to answer a question, cold-calling by the instructor, and muddiest point assignments. These instructional practices were chosen to represent the types of classroom activities that students might engage in during the span of an A&P course to gain help with course content; only muddiest point assignments were used within the context of the course in this study. Students rated their anxiety on a Likert-type scale from 1 (no anxiety) to 5 (extreme anxiety). This questionnaire also measured students' self-reported academic self-efficacy using ten Likert scale questions developed by McIlroy and colleagues (2000). Students also completed questions regarding their gender, ethnicity/race, and first-generation as a college student status. Table 1 shows the survey questions and the scales used.

One of the two authors of this pilot study was the instructor for the course and did not see the anonymized questionnaire responses or any other data until after the end of the term. Therefore, as the pre- and post-surveys were linked for each student using a personal identifier, the second author (not the course instructor) independently performed the data analyses. Statistical analyses were carried out using SPSS statistical software (Version 28; IBM Corp., 2021), and an alpha value of 0.05 was established *a priori* for analyses.

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Part 1: Six questions using a 5-point Likert-style scale of no anxiety (1) to extreme anxiety (5)
Evaluate the following classroom activities based on how much anxiety they cause you to feel. 1. Listening/watching the instructor deliver a PowerPoint lecture 2. Working alone to answer a question using an anonymous student response system (e.g., clicker) or an app (e.g., Top Hat, Socrative) 3. Working with another student to answer a question using an anonymous student response system (e.g., clicker) or an app (e.g., Top Hat, Socrative) 4. Volunteering to answer a question posed by the instructor 5. Being asked a question by the instructor without volunteering (cold calling) 6. Completing a muddiest point assignment
Part 2: Ten questions using a 7-point Likert-style scale of strongly disagree (1) to strongly agree (5)
Please indicate how strongly you agree with each of the following statements. Note that the statement 'give a good account of myself' here means 'to perform well. 1. I am confident that I can achieve good exam results if I really put my mind to it 2. If I don't understand an academic problem, I persevere until I do 3. When I hear of others who have failed their exams, this makes me all the more determined to succeed 4. I am confident that I will be adequately prepared for the exams by the time they come around 5. I tend to put off trying to master difficult academic problems whenever they arise 6. No matter how hard I try, I can't seem to come to terms with many of the issues in my academic curriculum 7. I am convinced that I will eventually master those items in my academic course which I do not currently understand 8. I expect to give a good account of myself in my end-of-semester exams 9. I fear that I may do poorly in my end-of-semester exams 10. I have no serious doubts about my own ability to perform successfully on my exams

Table 1. *Survey questions administered at the start and end of the course term and their scales.*

Results

Figure 1 shows that the use of a recurring muddiest point assignment in the A&P classroom did not significantly affect students' academic self-efficacy over the term. The distributions of academic self-efficacy scores were found to be normal (Shapiro-Wilk test, W = 0.976, p = 0.863) and so a paired samples t-test was used to compare these scores from the start and end of the term. This test indicated that there was no statistically significant difference between students' self-efficacy score from the start of the term (M=41.48, SD=6.385) to the end of the term (M=43.24, SD=6.804, t(20) = -1.247, p = 0.227).

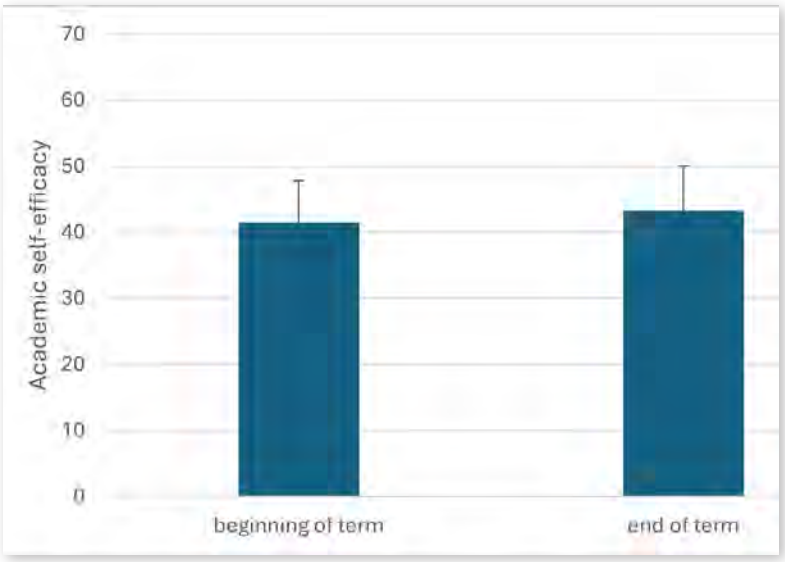

Figure 1. *Student self-assigned academic self-efficacy score at the beginning and end of term (n=21). Scores can range from a minimum of 0 to a maximum of 70.*

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Furthermore, the use of a recurring muddiest point assignment in the A&P classroom did not significantly affect students' anxiety about engaging in this active-learning approach (Figure 2). A Wilcoxon signed-ranks test indicated that there was no statistically significant difference between students' rating of anxiety about muddiest point reflections from the start of the term (median rating = 2) to the end of the term (median rating = 1) ($p = 0.869$).

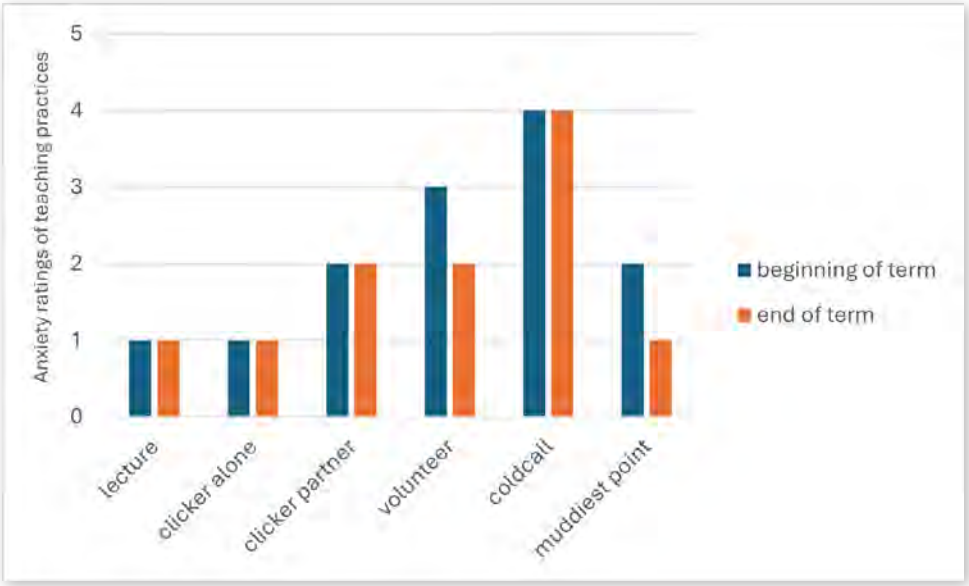

Figure 2. *Comparison of teaching-practice-related student ratings for anxiety (0-5) between the beginning and end of term (n=21).*

Discussion

The lack of a significant difference in students' self-efficacy scores suggests that weekly use of the muddiest point reflection in this pilot study had no appreciable effect on students' confidence or perceived capabilities in this A&P course. These results contrast with the results of Menekse and colleagues (2018) who found that computer science students who regularly reflected on difficult course content through digital muddiest point assignments experienced an increase in their self-efficacy over the term. It is possible that student approaches in computer science differ significantly from those in A&P courses such that muddiest point assignments were not as effective in this pilot study. It is also possible that the small sample size of the current study reduced the ability for the researcher to measure changes to students' self-efficacy during the course.

Similarly, there was no significant difference in students' rating of their anxiety in using muddiest point assignments between the start and end of the term. As can be seen in Figure 2, it should be noted that students generally did not find the muddiest point assignments anxiety-inducing at either the start or end of the term. As such, their anxiety might have been at a low enough level at the start of term that further reductions in anxiety would not have been driven by an intervention. Again, the small sample size decreased the statistical power of the study, which made it difficult to determine whether student anxiety around muddiest points was significantly affected at the end of the term. As there was a slight drop in their perceived anxiety over the term, it is possible that some students experienced a shift in their anxiety about the muddiest point assignments as they repeatedly engaged in them over that time period.

Students also reported that muddiest point assignments generated less anxiety than engaging in either volunteering or being cold called to speak during class, while clicker questions generated similar anxiety levels. This may be due to the more anonymous nature of muddiest point assignments and clicker questions as compared to engaging in question-and-answer activities during class. The supposition that students' anxiety was less due to anonymity aligns with previous research by Reeves and Sperling (2015) and Li et al. (2023). As such, while the muddiest point assignments in this course were mandatory, help-seeking supports that allow students to anonymously explore where they need help might lead to greater engagement due to this reduced anxiety.

This pilot study appears to suggest that even a regular, required muddiest point assignment throughout a term may not be an effective intervention to change students' self-efficacy or anxiety about this teaching approach. However, these are only two factors that can be measured in relation to students' academic approaches in an A&P classroom. Moreover, because the assignment generated little anxiety, it suggests that assignments such as these are not great contributors to the academic stress that students are prone to encounter in an A&P classroom (Lunsford & Diviney, 2020; Vitali et al., 2020). Therefore, it is worth further investigation to determine if such low-anxiety approaches to improve student help-seeking have other unmeasured effects that were not explored in this study. As such, this pilot study opens the door for possible avenues for future research into how help-seeking prompts like muddiest point assignments can be used as interventions to effectively support student success in the A&P classroom.

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The authors suggest that further research more directly investigate community college students' perceptions about their academic help-seeking. Specifically, the authors propose that measuring factors other than self-efficacy and anxiety can shed light on critical factors that influence community college student help-seeking. These other factors may include community college students' perceptions about their own resilience, their methods for help-seeking, perceived barriers to help-seeking, the perceived effect of help-seeking on their grades, and their thoughts about their relationships with their fellow students and instructor. In addition, a direct comparison between which factors influence help-seeking in hybrid classrooms versus face-to-face classrooms might clarify whether student perspectives differ between these two common delivery methods for community college A&P courses. Thus, student perspectives regarding their own help-seeking can elucidate whether the use of regular muddiest point assignments is a strong pedagogical choice for supporting the development of help-seeking skills in community college students. Furthermore, students' views about help-seeking can support the development of more effective help-seeking interventions in hybrid and face-to-face community college A&P classrooms.

About the Authors

Hilary Engebretson, Ph.D., is an associate professor of biology in the Science and Engineering Department at Whatcom Community College in Bellingham, Washington. Hilary was the instructor for the A&P courses in this pilot study. Suzanne Hood, Ph.D. serves as an associate professor of Psychology at Bishop's University. Suzanne performed all statistical analyses for this study.

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