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Role of Mindfulness Practices in the College Classroom

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Abstract. The following study examined the effect of mindful practices on college student attitudes and learning comprehension using two sections of an introductory biology course taught by the same instructor. One section used lecture complemented with active learning formats while the other section additionally included mindful practices. Comparisons were made between the students' surveys and quiz/exam scores. Students in the mindful section also kept journals. Results showed no significant differences in quiz and exam scores between the two groups; however, students in the mindfulness section found value in the practices both in and outside the classroom. Students reported a gain in their attitude towards the value of mindfulness practices as well as the use of mindfulness practices and reported a decrease in anxiety levels. Students identified these practices as helping them with focused attention, peace, and relaxation. At the end of the semester, over 90% of students agreed that mindfulness has a valuable place in the college classroom.

Keywords: mindfulness; contemplative practice; student learning; innovative pedagogy

Learning and memory are necessary for a student's success. Various strategies have been employed over the years to help student comprehension of material and topics, including active learning, using case studies, and flipping the class. Tools that can be harnessed to help students of all backgrounds, those that are academically underprepared as well as the academically gifted, white students and students of color, along with students of different socioeconomic groups, should be utilized in such a way that allows all students to see learning gains. One such emerging device to be considered in the pedagogical toolbox is the use of mindfulness practices, where we can see its application to the educational field just beginning.

Mindfulness is predicted to have a positive impact on teaching and student learning. Mindfulness is focusing on the present with concentration and attentiveness to the present. Instead of seeing all that may be around a person, a person centers in on a specific and particular part of the environment. When first introduced in the literature, mindfulness was described in this way as bringing attention to the present moment or experience (Kabat-Zinn, 2013); however, since then, mindfulness has also been described as a metacognitive skill that requires monitoring and control such that self-regulation and attention is given. It is a state of alertness, and where the inhibition of elaborative processing and orientation to experience occurs, so that a person can focus or concentrate on something specific (Bishop et al., 2004).

During the 2000s, much research on mindfulness confirmed its effectiveness with helping physical and mental health. For example, reduced anxiety and depression

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have been shown in numerous studies (e.g., Roemer & Orsillo, 2002). This may be related to how mindfulness can interact on the cellular level to reduce the negative effects of stress. In one study, mindfulness practices were shown to reverse the expression of genes that are involved in inflammatory reactions that are triggered by stress (Buric et al., 2017). Much of modern disease, such as cancer and diabetes, can be linked to inflammation (Tian et al., 2014), and mindfulness practices promise to help reduce such inflammation. Other physical benefits connected to mindfulness practices include better heart health, such as heart rate control (Delizonna et al., 2009), and, in one study, immune response increases (as compared to control groups) following the influenza vaccination (Davidson et al., 2003).

Research on the effects of mindfulness practice in the education field has been conducted primarily with elementary school children (e.g., Zenner et al., 2014), but its potential to help with learning and memory is suggested for all age groups, including college students. For example, neuroimaging studies suggest that the gray matter in the brain, which is related to learning and memory (among other things), increases with mindfulness practice (e.g., Vestergaard-Poulsen et al., 2009) along with increases in volume of the hippocampus, another area of the brain associated with learning and memory (Holzel et al., 2011).

Specifically, within the higher education field, mindfulness practices have been shown to help students both with their mental health (Gray et al., 2018; Lynch et al., 2018) and with their learning. For example, meditation has been shown to help students connect with their internal processes, grow their self-compassion, and, in turn, allow for connection to others in the classroom. This has helped student learning in college (Martin, 2018). In another study, students in a semester-long course practiced mindfulness techniques in and out of the classroom and reported that these activities helped reduce stress and anxiety (Vilvens et al., 2021). When taking a semester-long course specifically on mindfulness, undergraduate students showed a signification reduction in their perceived stress levels and procrastination as well as increases in self-compassion and sleep quality (Gray, 2021). While these studies reveal the potential of mindfulness practices in the classroom, there is still not a lot of research on how learning and memory are influenced by mindfulness practices in the college population.

There have been a few recent exceptions to the above, in which researchers have considered mindfulness and college student learning gains. One study considered if cognitive mindfulness intervention could improve student learning. It was determined in this study that interventions did not result in better same-day learning but that students performed better on the final exam items that were taught on those intervention days (Cavanah et al., 2021). In another study, with only a two-week mindfulness training course, mind wandering was reduced and working memory capacity improved (Mrazek et al., 2013). That is, students were able to remember list items in prescribed order better than prior to the training. Additionally, these students were given GRE reading-comprehension tests before and after the mindfulness training, and their scores significantly improved. In a third study, college students were taught basic mindfulness skills in class over a

semester and self-reported that these practices enhanced their learning experience (Mapel, 2012). A final notable study conducted with college students compared two groups of students to one another (Hall, 1999). Students were randomly assigned to one of two study groups that met regularly (one hour a week) to study throughout the first semester of college. The treatment group practiced meditation for 10 minutes at the start and conclusion of each one-hour study group session. They were also instructed to meditate at home and before exams. The control group did not do any mindfulness practices. The groups did not differ in grade point average (GPA) at the beginning of the study, but at the end of the second academic semester, the meditation group had significantly higher GPA scores compared to the control group. These studies show the potential of mindfulness practice to positively influence student learning gains over a semester and course.

Mindfulness may allow students to improve their ability to maintain preparedness and keep attention during a course and/or may improve the ability to process information quickly and accurately (Jha et al., 2007). Sustained attention is essential for learning and academic achievement (Spira & Fischel, 2005) and this could lead to a positive impact on academic achievement.

The current study aims to contribute to the understanding of how mindfulness can be used in the college classroom in which biology was the subject matter, specifically by addressing two questions:

> (1) Do mindfulness practices and activities help students in their attitudes towards the subject (biology) and/or their personal confidence?
>
> (2) Do mindfulness practices help students comprehend material more fully because they would be more attentive in class?

We predicted that students would find value with incorporating the practice into the classroom setting as well as earn higher scores on quizzes and exams compared to their peers who did not have the benefit of mindful practice.

Methods

Two sections of the course Evolution (BIO 222) were taught in the fall semester of 2018. This course is an introductory biology course intended for students majoring in biological sciences. One section, A, contained 25 students and was taught in the morning (9:30–11:10 am), and the other section, B, contained 20 students and was taught in the afternoon (1:00–2:30 pm). The author taught both sections, covering the same content in the same order and using the same quizzes, exams, homework assignments, case studies, and in-class problems. The only difference was the insertion of mindfulness practices into one of the sections, Section A, which was chosen randomly. Additionally, this section heard a short presentation on the benefits of mindfulness practices for physical health, mental health, and the potential for its use in learning comprehension and reduction in test anxiety. This section is referred to as the mindfulness or treatment group. Section B, without

such mindfulness practices, is referred to as the control group. The student composition in these sections were similar in many ways (Table 1).

Table 1

Participating Student Demographics of the Two Sections of an Introductory Biology Course Involved in the Study

Characteristics	Section A: Mindfulness/Trt	Section B: Control
Males	10	4
Females	15	16
Caucasian	14	11
African-American/Black	8	5
Latinx/Asian/Middle-Eastern	3	4
Mean Age	19	20*
% Transfer	20	55
Mean Grade Earned in pre-requisite course	B	B

**Note.* There were 4 students in this section who indicated the category of 22+ as their final age. These may have been 30 years old or 25 years old and it was still recorded as 22.

Students in this study were members of the traditional campus program, which serves 1,110+ students at a suburban liberal arts college in eastern North Carolina. Of these students, 57% are males and 43% are females, and 62% of the student body is of minority standing. There is a strong athletic program, which draws 41% of the student body (59% of the students are non-athletes), and most of the students are from North Carolina (65%). There is also a substantial international student population with students coming from 42 countries across the world.

At the start of the semester, both sections were informed of the author's interest in studying student attitudes, motivation, and learning preferences for a study and consent forms were provided for participation. Both sections were given the same surveys at the beginning of the semester and the end of the semester (see Figure 1). These surveys were developed internally with the help of colleagues in the Psychology Department, were IRB-approved, and aimed to ask questions on knowledge of mindfulness practices and perceived value of such interventions.

Additionally, students were given the Mindfulness Attention Awareness Scale instrument (MAAS; developed by Brown & Ryan, 2003) at the beginning of the semester. This 15-question instrument aims to measure qualities of consciousness

that are associated with a sense of well-being and self-awareness. The MAAS considers day-to-day experiences and how students self-report their feelings towards statements such as "I break or spill things because of carelessness, not paying attention, or thinking of something else" and "I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there." All items are rated on a five-point scale to capture respondents' perceptions at that moment (1 = "almost always" to 5 = "almost never"). Higher scores reflect higher levels of perceived mindfulness. The MAAS instrument was chosen because it has been verified as reliable and has been validated (MacKillop & Anderson, 2007), it is commonly used in studies across the country, and the questions seemed straight forward and appropriate for the college population.

Finally, students in the mindfulness section were asked to reflect on their experiences four times throughout the semester in a journal. Journal prompts included the following:

- Which mindfulness practices did you like and why? Elaborate on how you felt while engaging in the activities.
- Explain how your attitude towards and/or your journey with mindfulness practices evolved and changed over the semester. If it did not, explain why that may have been the case.
- Did you personally find value in engaging in mindfulness practices during class? Explain.
- Describe your opinion on the value of including mindfulness practices in the college classroom.

Figure 1

Survey given to the students at the start of the semester. Twenty-three surveys were completed in section A and 20 in section B.

1. Are you familiar with, or have participated in "mindfulness practices?" (very familiar, somewhat familiar, not familiar; If no, a description is provided in the next question)
2. Mindfulness can be defined in a few ways, but is commonly used to describe practices that allow you to be aware in the present. It is paying attention, on purpose, in the present moment and knowing what is on your mind. What are your initial feelings about how mindfulness practices will help you with (helpful, somewhat helpful, not helpful):
    a. Anxiety or depression or negative emotions
    b. Studying for biology
    c. Learning biology content

3. I believe mindfulness can help me directly with relieving anxiety and helping omit depression. (yes, no)
4. I believe mindfulness can help me concentrate better and focus more, therefore helping me with learning more effectively. (yes, no)
5. I believe mindfulness has a place in the classroom. In other words, I see the value of using mindfulness practices during class. (yes, no)
6. Given the following list, do you think the activity listed is a mindfulness practice? (yes or no)
    a. Yoga
    b. Meditation
    c. Slow walks in nature
    d. Concentrating on music
    e. Reflective writing
    f. Concentrated body movements (like moving your fingers slowly in a particular pattern)
7. Overall, I see the value of mindfulness on a scale of 1 to 10 as a _____ (1 is of no value and 10 is of much value).

The only difference in pedagogy was the addition of mindful practices in section A, the treatment section. These practices and activities were varied but included breathing exercises, short meditation sessions (3-5 minutes), reflective writing exercises, Columbian hypnosis, focus exercises on sounds of an audio recording, and focus exercises on nature sounds as well as classical music. Course content covered was the same as the control section. Occasionally, the control section was released a few minutes early from class to keep the sections at the same place content-wise.

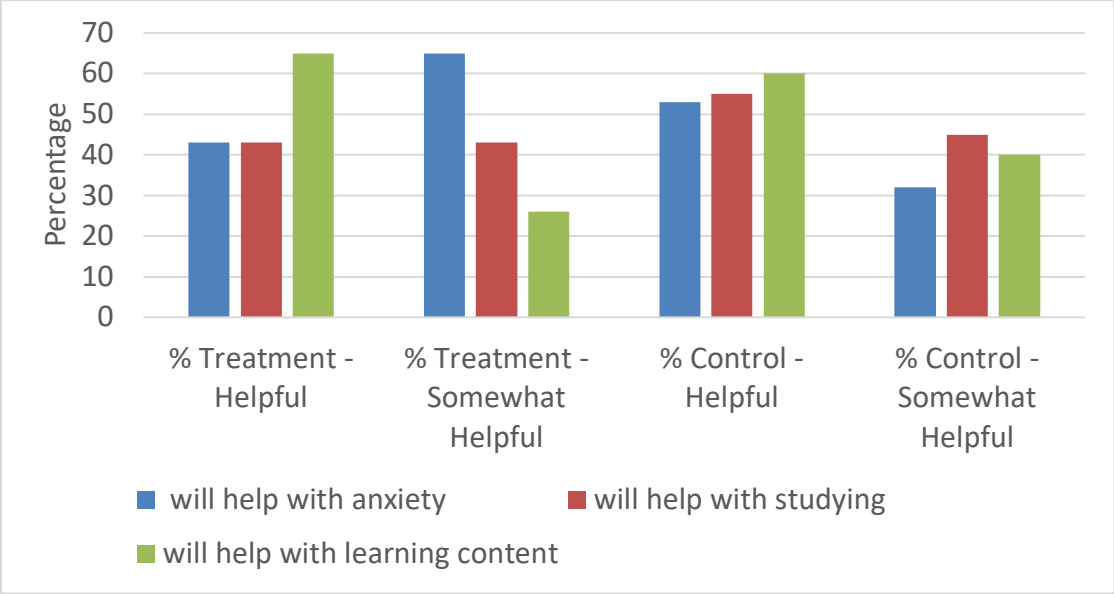
Results

Beginning of Semester Surveys

When both sections of students were asked about mindfulness practices, there were some differences in perceived potential. For example, when asked what the students' initial feelings towards mindfulness practices were and if they would help a student with anxiety, studying for biology, and learning biology content, most students in the control group felt such practices would be "helpful," and most students in the treatment group felt such practices would be "somewhat helpful." Both sections placed the value of mindfulness practices highest in terms of being helpful for learning biology content. Results show that 65% of the treatment group and 60% of the control group thought these practices would be most helpful with learning biology content (Figure 2).

Figure 2

Student responses from the beginning of the semester survey on the potential value of mindfulness practices to help with anxiety, studying, and learning biology content



Note: Notice that the treatment group had more "somewhat helpful" responses and that the control group had more "helpful" responses. Both sections help that mindfulness practices would be most helpful with learning biology content.

Both sections expressed similar opinions regarding mindfulness potential. Students could answer "yes" or "no" to several opinion questions with the following results:

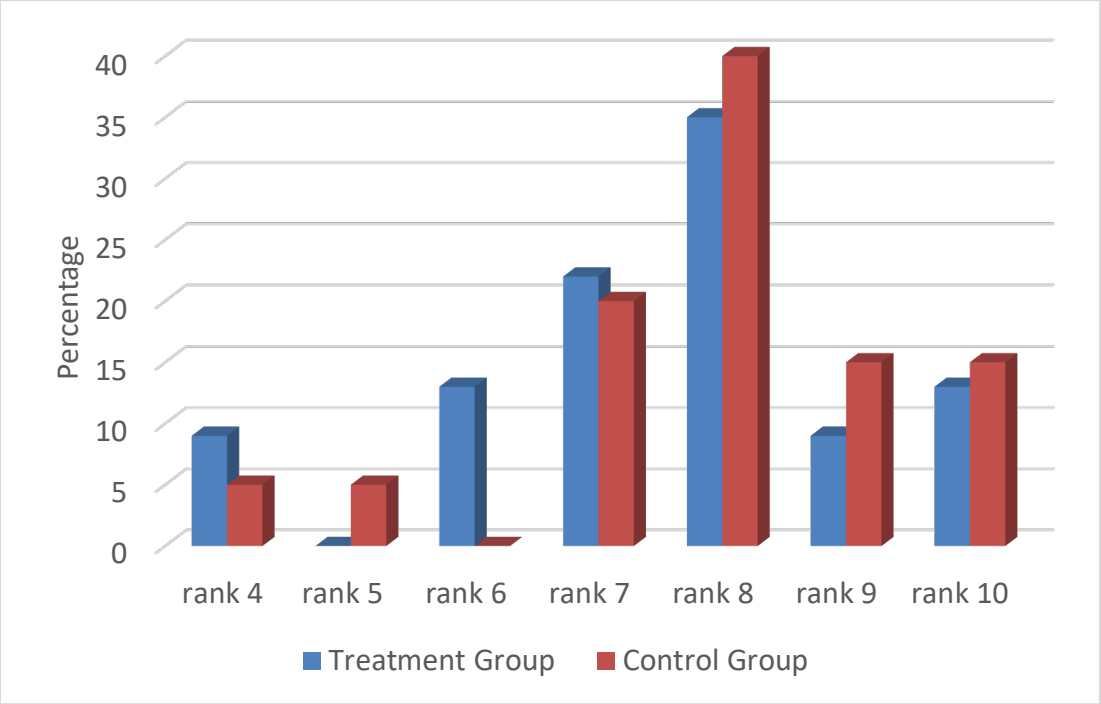
- 70% of the treatment group and 65% of the control group said "yes" to "I believe mindfulness can help me directly with relieving anxiety and helping omit depression."
- 96% of the treatment group and 100% of the control group replied "yes" to "I believe mindfulness can help me concentrate better and focus more, therefore helping me with learning more effectively."
- 74% of the treatment group and 100% of the control group say "yes" to "I believe mindfulness has a place in the classroom. In other words, I see the value of using mindfulness practices during class."

Students were then asked to give a score to the statement "I see the value of mindfulness" from 1 (lowest) to 10 (highest). The treatment group's mean was 7.5 and the control group's mean was 7.9. When considering the range of scores

selected by the students, the control group had more frequency scored higher ranked numbers than the treatment group (Figure 3).

Figure 3

Students in each section gave a number rank to the statement "I see the value of mindfulness" from 1 (lowest) to 10 (highest).



When considering data collected from the MAAS instrument, both sections were again comparable. The treatment group's mean score was 57, with a range of 24–85. The control group's mean score was also 57, with a range of 27–81. Higher scores are considered to show higher levels of dispositional mindfulness, in other words, that students are aware of and pay attention to what is taking place in the present. The maximum score a student could report would be 90—this is ranking each of the 15 items with a 6 being equated with a "almost never" ranking. Because 57 is not far from the middle of this instrument of 45, students at the beginning of the semester were not particularly mindful.

Mid-Semester and End-of-Semester Surveys

When considering the mindfulness treatment section, student attitudes after the first exam reflected positive attitudes. Results indicated that 64% percent of the students found the mindfulness meditation session immediately before the exam to be helpful, and 88% liked the mindfulness practices during class time in general. When identifying the biggest benefit students found from these practices, 35% of them wrote in that they found the benefit of focus, 30% reported calmness, 30%

stated a clear and relaxed mindset, and 5% found the time to be restful. These were words the students chose themselves, which can be categorized into two main areas: focused attention at 35–40% and peaceful/relaxed nature at 60–65%.

An interesting result was found to the question "do you feel like you did better on this exam in terms of anxiety levels than in the past (on other exams in other courses) based on the mindfulness practices we have been doing?" The answers were split here with 48% reporting "yes" and 48% reporting "no" (the remaining 4% replied "I don't know"). As the semester progressed, it became evident from their journaling that during this early part of the semester, students were still learning how to use mindfulness meditation before a quiz or an exam to their benefit. At the start of the semester, they were novices and found their minds wandering before an exam, but as the semester progressed, they were able to successfully use the 5 minutes before an exam to relax and clear their minds.

Students ranked the value of mindfulness practices at the start of semester on a scale of 1 (lowest) to 10 (highest) and gave a mean of 7.3 (with a median of 7) after the first exam. At the end of the semester this ranking rose to a mean of 8.4 (with a median of 9). Additionally, at the end of the semester, 87.5% of the students who took the survey (n = 24) found value in the mindfulness practices when it came to reducing anxiety or negative emotions. The results showed that 54% of the students found value in the mindfulness practices for helping with studying for biology, and 62.5% found value in the practices for helping to learn biology content. When asked if mindfulness has a place in the classroom, 92% agree that there was value for its use. The majority of students in the mindfulness section, 71% said they have an improved opinion about the potential value of mindfulness overall.

Quiz and Exam Scores

There were no statistically significant differences found between the two groups of students when comparing mean scores using t-tests. The average overall quiz scores on the three quizzes given throughout the semester were 74% for both the mindfulness section and the control section. When considering individual quiz data, there were some variations detected but none of statistical significance. On the first quiz, students in the mindfulness section scored between 53% and 100%, with the mean score of 75%; the control section students ranged from 47% to 100% on the quiz with a mean of 77% (t-test NS, t = 0.349). On the second quiz, the range of scores for the students in the mindfulness section was 28% to 96%, and in the control section, students ranged from 39% to 86%. The mean for the mindfulness section was 67% and 68% for the control section (t-test NS, t = 0.2037). The scores for the third quiz were also not statistically significant (t-test NS, t = 0.937) with students in the mindfulness section earning between 33% and 100%, with a mean of 81%, and students in the control section ranging from 42% to 100% with a mean of 76%. This last quiz did seem to show more of a potential difference leaning toward the mindfulness section faring better, and it would be interesting to have an additional quiz if time was available to test this trend.

There were also no statistically significant differences in exam scores between the two groups. Overall, the means for exams for the mindfulness section was 78% and for the control section, 78.5%. For the first exam, the mindfulness group of students earned a mean of 76% and a range of 58% to 92%, and the median was 75%. The control group of students earned a mean of 77%, ranging from 58% to 96%, and a median of 78% (t-test NS, t=0.265). For the second exam, the mindfulness group scored a mean of 78%, with a range of 55% to 100%, and a median of 73%. The control section had a mean of 78%, a range of 47% to 100%, but a higher median of 78%; however, this was not statistically significant (t-test NS, t = 0.034). The third exam showed the reverse pattern with the median being higher for the mindfulness section of students at 85% and for the control at 82%, but the means were comparable (mindfulness group with a mean of 84% and the control group at 83%). The ranges were 50% to 100% for the mindfulness section, and 64% to 100% for the control section. These were not statistically significant (t-test NS, t = 0.1129). Likewise, final exam scores were also comparable between the sections and not statistically significant (t-test NS, t = 0.26215). The mindfulness section of students earned a mean of 74% with a range of 50% to 99%, and the control group of students earned a mean of 76% with a range of 40% to 100%. The median for the mindfulness section was 77% and for the control section, 76%.

Journal Responses

Students reflected on the practices used during class time at two main intervals during the semester: after the first exam and at the end of the semester; they also answered prompts two other times throughout the semester. Their positive reflections at 4.5 weeks into the semester was a testament to the fast nature of acceptance and the value students found. Their attitudes continued to grow stronger and more positive as the semester progressed with students commenting that they were engaging in such practices outside of class time to help them in other areas as well.

Of the 23 students who responded at the first major check-in after the first exam, 91% (n = 21) found the practices enjoyable and helpful. Some sample excerpts from the journals are included below. These students are all 19–20 years of age. Most commented on being unsure or skeptical of the mindfulness practices but growing to enjoy them and even look forward to them in class.

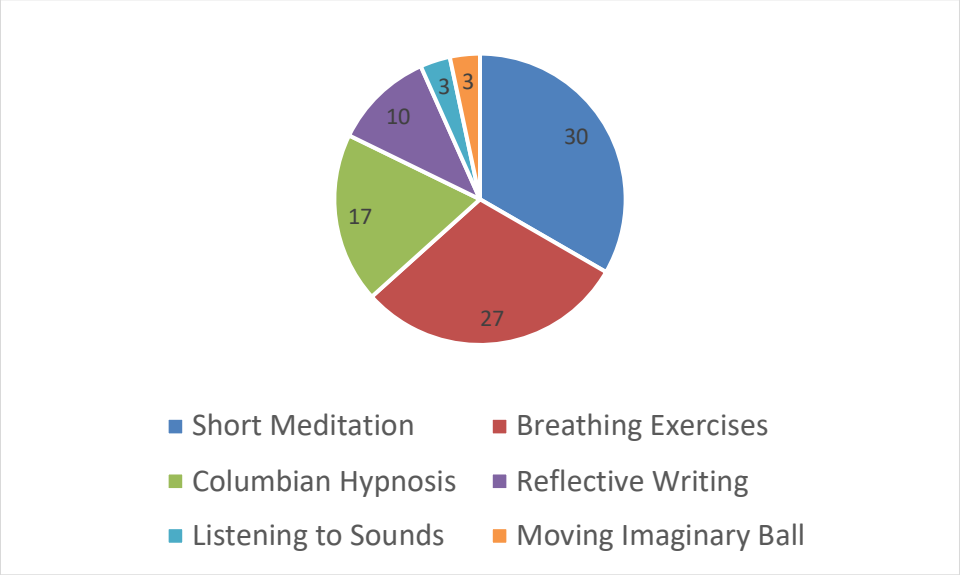
> Student 1 (female): "At the beginning, I didn't think that the techniques and practices could help me focus more, but the more and more we do them, the easier I feel like it is to focus in class. It has also reduced my stress a little when it comes to assignments and the quiz."
>
> Student 2 (female): "At first, I thought that mindfulness wasn't very beneficial. Now, I see and value the importance of mindfulness. The videos that we watch in class allow me to unwind and clear my mind so I can better absorb material."

> Student 3 (male): "I think the role of mindfulness in a classroom is very important. It can help you concentrate more on one thing and help you to focus and understand more clearly. At first, I wasn't too sure how well these mindfulness practices would work, but after trying these practices during class, [they] have helped me focus in class more."

At the end of the semester, their fourth journal entries reflected the same spirit, but with stronger enthusiasm. When asked to write about which practices they found most helpful and least helpful, student responses varied widely. Students could comment on multiple practices; therefore, the percentages reported may be higher collectively than 100%. The short meditation sessions were valued the most at 30%, followed closely by the breathing exercises at 27%. The Columbian hypnosis practice, which was quite opposite to these quiet and still practices, had the students moving and giggling and was favored at a value of 17%. Reflective writing and listening to sounds both earned 10%, and listening to songs and moving an imaginary ball were scored at 3% each (Fig 4).

Figure 4

Students self-reported the exercises they preferred throughout the semester and could comment on multiple practices if they found value in more than one.



Note: Numbers reported are in percentages.

Practices that were not favored by students also varied widely. The Columbian hypnosis as well as the reflective writing exercises were tied at 30% each for least favored, followed closely by moving the imaginary ball at 26%. Listening to nature sounds, breathing exercises, and short meditations were also included with a value of 4% each.

Students wrote about how they felt during class time when they engaged in mindfulness practices. Students could list multiple ideas or just focus on one theme. Percentages reported came from categorizing their paragraphs into subject areas. The most commonly reported was peacefulness/calmness/relaxation at 43%, followed by being present or focused at 21%. The following themes were reported at 7% each: comforted, tiredness, "good," and distracted. The last two themes were reported at 4% each: bored and awareness of how their body felt. Sample student reflections are included below. These students are all 19–20 years of age.

> Student 1 (female): "When it comes to the mindfulness exercises, I find that there is so much value in them, especially for college students. To begin with, these exercises provide students with a better understanding of peace and meditation which I feel is so essential for providing a positive way of dealing with stress of test and being overwhelmed. In addition, the practices provide people to get a better understanding of themselves. Meaning, that you can now understand what is causing you stress and why it's not as big of a predicament as you may think it might be. Lastly, the practice enhances focus which has really aided me in having the capability to achieving multiple complex tasks all at once."
>
> Student 2 (male): "My attitude has completely transformed towards mindfulness throughout the semester. I used to think that mindfulness was not effective, and that it was a waste of time. Now, I see the importance of mindfulness. Occasionally, we need a break from our daily lives, and our minds just need a moment to rest. Ever since participating in these practices, I have seen a change in my mindset. I am more positive and motivated to do work, and I look forward to the mindfulness activity."
>
> Student 3 (female): "At the beginning of the semester, I did not feel like that the mindfulness practices would help me focus better or perform better on the tests. I thought that these mindfulness practices wouldn't help at all and that they were pointless. However, I did not take these practices seriously enough in the beginning. I didn't take them seriously on the first quiz, and I was anxious and forgot all the material that I studied. I performed poorly and took the practices more seriously after that quiz, and they seemed to help. After I started to take the mindfulness practices more seriously, I realized that they are helpful. Over the course of the semester, class by class, I learned that these practices help to relieve my stress and help me to focus more. I have performed better on the quizzes and test progressively through the semester as we did more mindfulness practices. I feel like there are benefits to partaking in these mindfulness practices. My attitude towards these practices is that they can be beneficial to students in their classes and outside the classroom with various tasks they perform."

Students wrote about engagement in mindfulness practices outside of the classroom. Sixty-eight percent of students said they use mindfulness on their own as a result of their exposure to it from class, and 32% did not. Many students commented on their appreciation of the practice in class and how it helped them to

focus just on class itself (and ignore other courses and stressful assignments). Two students did not see much value in the practice, commenting that it seemed a waste of time, took away time from covering material related to the course content, or made them feel more anxious when asked to participate because they felt silly. These two students are male students, and although the sample size is very low, it may be worthwhile to examine gender differences in the future.

Discussion

When beginning the semester, both sections of the course were comparable in most aspects with a few exceptions. There were fewer men and more transfer students in the control section, and their views of the potential of mindfulness practices on student gains was higher when compared to the treatment group. This control group seemed more motivated overall in terms of coming to class prepared, asking questions during class, and attending outside supplemental instruction from a peer mentor. Although not formally analyzed, the author sensed this motivation had to do with maturity level. The many transfer students in the control section were older, two came with bachelor's degrees earned already (and were returning to school for a career change), one student was a mother of three children, and two students were taking the course for a second time for the goal of earning a higher grade. These factors likely played into the statistically non-significant test and quiz score results found between the control and treatment sections. The potential, however, to see a difference given a more homogenous set of students for a future study remains.

It should also be noted that during the semester of study, the college experienced a significant interruption of flow to the semester as a result of two hurricane storms. Several days of the semester were cancelled, and many students were without power and electricity (and in some cases stranded as they went home to be with family only to then be blocked from returning to campus because of flooding and highway/road closures). It is very likely that these weather events played into students being able to concentrate and study biology as effectively as they would have done in a "typical" semester.

Time and length of exposure to mindfulness practice has been shown to play a role in student learning gains (see Cavanah et al., 2021). In this way, it would be helpful to explore specific content and mindfulness intervention correlations on final exam questions. In a multi-semester study, Cavanah et al. (2021) found students did not perform better initially on learning content on days where mindfulness intervention was conducted; however, students did show improvement on final exam learning gains on content from the original mindfulness intervention days compared to the control group. It is possible that my students in the current study had a similar gain; however, this was not measured. In its current form, the prediction that students would perform better on quizzes and tests when engaging in mindfulness practices throughout the semester is not supported.

From self-assessment, the majority of students (62.5%) in the mindfulness treatment section did report the practices were helping them to learn biology

content. So perhaps with a non-disrupted semester, or with a focus on final exam questions compared to early exam questions, more direct gains in learning could be found. This should be studied more fully in the future.

The second prediction that students would find value with incorporating the practice into the classroom was supported. A very clear result found in this study was the value of mindfulness on student attitudes. Students gave higher ranking scores to the value of mindfulness practices as the semester progressed, and the vast majority of students (92%) said they believe mindfulness has a place in the classroom. Additionally, 87.5% of the students found the practices helped with reducing anxiety or negative emotions. Students wrote in their journals that they didn't engage fully and/or seriously in the practices at the start of the semester but then began to see them of more value and found them helpful with focusing and relieving stress. This shows the relevance of using the exercises as often as possible. Most of the exercises used in class took 3 to 5 minutes each and, therefore, a small investment has potentially huge payoffs.

From the end of the semester journaling, students preferred different practices. This supports the idea that incorporating a variety of mindfulness practices in the classroom is helpful. Some individuals will connect with one type of exercise and others with something else. This is especially important when first being introduced to mindfulness. Students need to explore and find a style that suites them as they move forward with the goal of incorporating such practice into their daily lives. In general, students self-report that the mindfulness practices help them focus their attention during class and/or that by engaging in such practices they enter into a more relaxed or peaceful state. It would be interesting to consider in future research if specific mindfulness practices were more effective in helping with student learning gains than others.

Although mindfulness practices did not show a boost in student comprehension of the biology subject material in this current study, there is still potential it may exist, and the study should be repeated with more homogeneous groups of students and with a semester free from cancellations. The role that mindfulness practices did show in terms of student attitudes is of significant value. Mindfulness helps students focus, feel good about themselves, and release stress and anxiety. Many students report continuing using these practices outside of the classroom and that mindfulness practice is of value to them. A survey result of 92% approval rating for a practice should call us all in the educational field to consider how to incorporate mindfulness into our own classrooms.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this article.

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