Journal of Cybersecurity Education, Research and Practice

Volume 2024 | Number 1 Article 28

10-7-2024

Happy hours, not office hours: Socially engaging cybersecurity students in a large online graduate course

James T. McCafferty
Kennesaw State University, jmccaff4@kennesaw.edu

Recommended Citation

McCafferty, James T. (2024) "Happy hours, not office hours: Socially engaging cybersecurity students in a large online graduate course," *Journal of Cybersecurity Education, Research and Practice*: Vol. 2024: No. 1, Article 28.
DOI: https://doi.org/10.62915/2472-2707.1200
Available at: https://digitalcommons.kennesaw.edu/jcerp/vol2024/iss1/28

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Abstract

Engagement is a critical part of student learning and student success. This is especially true in online classes where students have less interaction with their classmates and instructors when compared to traditional face-to-face courses. Research on engagement has shown that when students are meaningfully engaged it can increase student satisfaction and it may also increase levels of academic achievement, including grades earned and degree progression (e.g. Wong et al., 2024). This paper focuses on social engagement in a graduate cybersecurity program that uses large, expandable online courses as described by Whitman and Mattord (2023). Large online graduate classes (i.e., more than 35 students in one class) present a new challenge to educators who are traditionally accustomed to teaching graduate classes with much smaller enrollment. To help faculty meaningfully engage students in large online classes, this paper presents three strategies for faculty to synchronously connect with students in an asynchronous class: welcome events, drop-in sessions, and happy hours. Finally, this paper will also report the results from a survey administered to cybersecurity students in a large online class to measure their perceptions of engagement.

Keywords

cybersecurity, engagement, online learning

Cover Page Footnote

This paper was completed with support from the SoTL Manuscript Completion Program at Kennesaw State University's Center for Excellence in Teaching and Learning.

Happy Hours, Not Office Hours: Socially Engaging Cybersecurity Students in a Large Online Graduate Course

James T. McCafferty
Department of Sociology and Criminal Justice
Kennesaw State University
Kennesaw, Georgia USA
jmccaff4@kennesaw.edu
ORCID: 0000-0002-9949-5722

***Abstract*—Engagement is a critical part of student learning and student success. This is especially true in online classes where students have less interactions with their classmates and instructors compared to traditional face-to-face courses. Research on engagement has shown that when students are meaningfully engaged it can increase student satisfaction and it may also increase levels of academic achievement, including grades earned and degree progression. This paper focuses on social engagement in a graduate cybersecurity program that uses large, expandable online courses (i.e., more than 35 students in one class). Large online graduate classes present a new challenge to educators who are traditionally accustomed to teaching graduate classes with much smaller enrollment. To help faculty meaningfully engage students in large online classes, this paper presents three strategies for faculty to synchronously connect with students in an asynchronous class: welcome events, drop-in sessions, and happy hours. Finally, this paper will also report the results from a survey administered to cybersecurity students in a large online class to measure their perceptions of engagement.**

Keywords—cybersecurity, engagement, online learning

I. Introduction

Educational engagement is a critical part of student learning and student success [1, 2]. This is particularly true in online learning environments in higher education where students have less contact with instructors and fellow students when compared to traditional face-to-face instruction [3]. While virtual learning environments can be beneficial to students due to their ease of access, reduced costs, and flexibility, the online format may leave students feeling detached from their educational experiences, class peers, and faculty instructors [4]. These feelings of detachment have the potential to negatively impact student engagement with their studies which could ultimately hinder their degree progress [4, 5].

To address these types of concerns, student success initiatives have focused on increasing engagement opportunities in the online environment with the hopes of improving student engagement and, when possible, providing students an educational experience like the traditional face-to-face format [4, 6, 7]. In other words, engagement efforts for online programs should strive to provide students similar collegiate experiences enjoyed by students on-campus. Researchers and academics have identified several types of evidence-based engagement efforts for online courses, including such strategies as increasing faculty presence online, creating and facilitating peer-to-peer activities, and the personalization of class interactions in the learning management system [4]. These so-called "high touch" strategies are specifically designed to deepen student learning through a combination of evidence-based approaches to improve student engagement and, in turn, academic retention and degree completion [4]. The focus of this paper will be social engagement and networking opportunities used in large-enrollment online graduate cybersecurity courses. Meaningful forms of social engagement should be of interest to cybersecurity educators as these have been shown to improve student satisfaction and learning, while also increasing student retention [4,7,8].

A. Graduate Cybersecurity Programs

Online cybersecurity degree programs have grown rapidly in recent years partly in response to increased cybersecurity awareness, rising cybercrime rates, and state-sponsored cyberwarfare [9]. Some programs, including the one particular to this study, have used large-enrollment online classes (i.e., student enrollment greater than 35 graduate students per class) to educate as many people as possible to meet the student demand for these programs. Additionally, these programs with large enrollment are designed to help prepare as many graduates as possible to join the workforce in a field that is facing a significant shortage in talent to fill available positions [10]. Large graduate class sizes, however, present a challenge to educators who are typically accustomed to graduate class sizes with a much smaller enrollment [4]. Therefore, new approaches to teaching and student engagement are necessary to meet this evolving online field.

To help conceptualize a graduate cybersecurity program with large online classes, Whitman and Mattord provide an overview of the strategies used to create, model, and manage a cybersecurity program with large enrollment [11]. To design a program of this type, the authors describe how they administratively created a program using large enrollment classes at a public university and they also make several

recommendations on topics related to course set up and the management of students, grading structures, and labs. The design calls for a course structure of one instructor-of-record (i.e., fulltime faculty member and lead instructor) to be paired with an assistant instructor (i.e., parttime faculty member) for every multiple of 35 students. So, for example, if a course had 90 students enrolled in the class, there would be one instructor-of-record who is responsible for course curriculum delivery and two assistant instructors who would be primarily responsible for grading student work. The three instructors create a team to effectively manage, teach, and assess students. Theoretically, this expandable design can be used for "unrestricted growth". The authors note that graduate classes usually ranged from 75 to 100 graduate students with some classes approaching enrollment of 150 graduate students. But should enrollment numbers grow beyond 150 students, it would not be necessary to add additional sections of a course – instead, more assistant instructors would be hired and assigned to the course to help the instructor of record for grading and student management purposes.

Whitman and Mattord focus on the organization of a program from an administrative point-of-view [11]. Even though the researchers emphasize that the learner's perspective should be a key part of course design, the authors do not provide specific recommendations for engaging online graduate students beyond the structural means of engagement within the learning management software. Some of the recommendations for engagement from the authors include setting expectations in class announcements, providing open discussion boards, and providing students with the answers to frequently asked questions. Given the size of the enrollment within these courses, it is important for instructors to have an additional set of empirically supported means for meaningfully engaging large groups of online students that go beyond the mechanical and impersonable interactions available in the learning management system. Furthermore, it is important to recognize that the population has different motivations and priorities for engagement than undergraduate students [12]. Therefore, the research on undergraduate student engagement may not necessarily apply here. Graduate students, who are typically more advanced developmentally than undergraduate students, have different and more career-focused needs when compared to undergraduate students.

This paper builds upon and extends Whitman and Mattord's work with two intended purposes [11]. First, this paper will review strategies used to socially engage cybersecurity graduate students in a large enrollment online course. Second, this paper will report the results of a survey designed to measure student perceptions of engagement in a large, online graduate cybersecurity course from Fall 2023.

II. Literature Review

Even though *engagement* is a term used frequently by educators, it has been criticized as being vague with a definition that some researchers have referred to as "elusive" [7]. To help provide a framework for defining engagement, Redmond and colleagues identify five key areas of online engagement in higher education: behavioral, cognitive, collaborative, emotional, and social [7]. Key to this paper is *social engagement* which refers to efforts made to enhance students' social investment in their collegiate opportunities and experiences [7]. Indicators of positive social engagement include community building, fostering a sense of belonging within a class or degree program, and the development of relationships among students and faculty. In short, social engagement efforts can be described as active participation and interactions among faculty and students with a goal of creating and fostering relationships.

Engagement matters in education as evidenced by research that highlights its positive impact on student success. A recent meta-analysis by Wong et al. included data from 137 studies which showed a positive and robust correlation between student engagement and academic achievement (r = .33) as well as a similar effect between engagement and social wellbeing (r = .35) [13]. Additionally, research has also highlighted that students who are exposed to positive social engagement in their classes reported having a better rapport with their instructors and fellow students [12, 14, 15]. Students notice and appreciate when faculty make efforts to engage them and their classmates – especially in the virtual modality. When faculty passively teach online courses (e.g., faculty not logging into the class regularly, not actively participating in discussions, not regularly posting announcements), they are taking a set-it-and-forget-it approach to online teaching. But students may be perceptive of this unengaging attitude towards teaching and rate those courses as less engaging and negatively overall when compared to classes with more active instructors [16, 17].

The importance of social engagement became incredibly clear during the unexpected transition to online learning caused by the COVID-19 pandemic. This crisis brought about ingenuity-by-necessity across academic disciplines as educators adapted to encourage and maintain student engagement in the virtual learning environment. In some cases, academics created laidback, social events to help them manage graduate student engagement and morale during the time of social distancing. For example, Lauterbach et al. discuss how weekly virtual happy hours for contract law students during the pandemic contributed positively to student motivation [18]. Furthermore, these social events gave both students and faculty an opportunity to touch-base while sustaining positive social wellbeing within the class. In fact, the authors found enough value in these types of interactions that virtual engagement for social purposes was carried into more traditional face-to-face settings following the return to campus as the pandemic waned.

In another recent study, Schauer et al. renamed office hours as "happy hours" for three different undergraduate engineering courses at Boise State University [19]. In their study, the researchers coupled their happy hours with the course material to help prepare students for lecture the following day or to act as a review for exams. Their study found that students believed the virtual setting was more accommodating and useful when compared to in-person office hours. Furthermore, their study, which included data collection from courses across five academic years, highlighted that their students appreciated the virtual office hours more as they progressed through the degree program. This indicates that as students become more advanced in the program, the value they place on engagement efforts by faculty increased.

Lowenthal et al. provide insight on student engagement that closely aligns with the themes of this current paper [8]. In their study of office hours, the faculty focused on rebranding "office hours" with the more appealing title of "happy hours". The researchers expressed that, like many faculty members, they were dissatisfied with the level of engagement and attendance from students to their office hours. So, they sought solutions for increasing interaction with students by changing office hours to happy hours and providing a small amount course credit for attending. Students positively responded to these changes by attending these events which lead to increased interactions between students and faculty. Finally, the authors provide 21 recommendations for engaging graduate students that highlights some key themes for effectively interacting with students, including: 1) engagement should be done in a synchronous virtual format (such as Microsoft Teams or Zoom); 2) there should be consideration to schedules by using scheduling technologies (such as Doodle); 3) engagement should have relevance to the course; 4) students should be provided an incentive for attendance (such as course participation credit); and 5) engagement opportunities should have time for both structured and informal interactions [8].

III. Happy hours, not office hours

Cybersecurity faculty that are responsible for large-enrollment asynchronous graduate classes should make efforts to incorporate synchronous activities to give students opportunities to socialize and network with one another, as the research has shown that these types of efforts may be beneficial to overall student success [8]. To help faculty conceptualize engagement ideas for their classes, this paper reports on three synchronous strategies used in an asynchronous graduate cybersecurity course with large enrollment: 1) welcome events, 2) drop-in sessions, and 3) happy hours.

The graduate cybersecurity class was taught in the Fall 2023 semester during a seven-week term starting in August. The course had a final enrollment of 138 graduate students. Administratively, this course was set up based on the staffing standards described by Whitman and Mattord [11]. Therefore, due to the enrollment of 138 students, there was one instructor-of-record and three assistant instructors assigned to the course. The synchronous events described here mainly used Microsoft Teams, which is integrated with the learning management system and therefore available to all the students enrolled in the course. The timing and topic of the events varied, as described below, and each event had time for both structured and informal interactions as recommended by Lowenthal et al. [8]. All the events described here were optional and no course credit was given to students for attendance.

A. Welcome Events

Within four days from the start of the course, a synchronous welcome event was used to help personalize the lead instructor and assistant instructors to the class. Further, the purpose of the event was to give students the opportunity to interact with their instructors in real-time early in the academic term. Ideally, faculty have already created personalized background messages (i.e., "about me" videos) as well as a course introduction or syllabus review videos that have been posted to the course. At the beginning of this class, students were provided personalized welcome videos from the instructor-of-record and each of the assistant instructors. There was also a video posted of the instructor-of-record introducing the course which included a review of the syllabus, so students should have had the opportunity to review these introduction videos prior to the event. Nevertheless, at the start of the welcome event the lead instructor and assistant instructors briefly reintroduced themself and the instructor-of-record reviewed some of the key information from the syllabus. Next, students had the chance to ask questions about the syllabus or the expectations of the course. Following this period of structured interaction, these welcome events focused on informal means of socialization. Faculty informally asked students about their professional backgrounds, experiences, and expectations for the class. Students also took the opportunity to ask more personal questions of the instructors, as well and a freeform discussion ensued.

To reach as many people as possible, an invitation email for the welcome event was sent out through the learning management system and a link was posted to the course as well. The welcome event for this course was held at 8pm on a Thursday and lasted for slightly more than one hour. Both the instructor-of-record and the assistant instructors were considered hosts for this event, which gave students the opportunity to interact with everyone responsible for teaching and administering the course. Attendance is strong at these events and, in this case, nearly 60% of the class attended. A video of this event was recorded and posted to the course for people who were unable to attend.

B. Drop-in Sessions

Throughout the semester, the instructors in this course held open meetings that provided students the chance to interact with their peers and instructor which were called "drop-in sessions". The sessions had no set agendas – students could use the time to ask questions to the instructor like traditional office hours but could also use it as a time for socialization with instructors and fellow students. The timing of drop-in sessions varied in terms of both time of day and day of the week to reach as many people as possible. For example, some sessions were held earlier in the day during the middle of the week, while others were held later in the day or on weekends. Each week had at least two drop-in sessions available for students. Attendance for these sessions was much different than the welcome events. Some drop-in sessions had no one attend, while others had a dozen or so students in attendance. These drop-in sessions were usually about half-hour in length and the responsibilities for hosting these were shared among the teaching team. This allowed for the instructor-of-record and the assistant instructors to each host about three drop-in sessions during the semester. Videos were not recorded and posted for drop-in sessions.

C. Happy Hours

Virtual happy hours for graduate cybersecurity students are a great way for them to socialize and network with one another. These events could be coupled with exam reviews, or they could be set up independent of any course work. Particular to this study, the virtual happy hours were used in addition to exam reviews. The exam review would be the structured form of interaction, which was followed by a virtual informal BYOB

(bring your own beverage) happy hour event. Happy hours were typically held the evening prior to the opening of an exam (there were two exams in this course). To reach as many people as possible, the happy hours were announced alongside the release of a review sheet for the exam. Students were invited through email in the learning management system and reminders were posted online. Attendance again was very strong at these events with about 50% participation from the class. For these events, video was recorded and posted for the exam review portion of the event for students that wanted, but were unable, to attend.

In total, the attendance at these events were encouraging from a teaching-faculty point-of-view. To better understand the student perceptive, this author carried out a small survey to better gauge how students felt about social engagement in this course.

IV. Methodology

Data for this study were obtained from an online survey administered to graduate students enrolled in an online cybersecurity course during the Fall 2023 semester at a large, public university in Georgia using Qualtrics. This study was approved (exempt status) by the Institutional Review Board at the investigator's university. Recruitment was conducted through course announcements and email invitations were sent to students through the learning management system. The survey was available for students after the conclusion of the course, to not interfere with course curriculum or the traditional university-lead course evaluations which closed prior to the start of the final exam. Specifically, this survey was open for 15 days in October 2023 after the final exam closed. In total, 138 students were invited to participate, with 41 students responding to the survey (29.7% response rate).

The purpose of the survey was to gauge information from students about their engagement experiences and satisfaction with their interactions with the instructors and other students in the course. Respondents were also asked about simple demographic questions (e.g., age, race, gender) and they were asked a series of questions about their perceptions of engagement using a five-point Likert Scale (0 = *strongly disagree, 1 = somewhat disagree, 2 = neither agree or disagree, 3 = somewhat agree*, and 4 = *strongly agree*). The survey also used modified measures from The Online Student Engagement Scale, or OSE, which is a scale that is both reliable and valid [20]. Students were asked about a series of behaviors and were told to rate themselves on a five-point Likert Scale: 0 = *not at all characteristic of me*, 1 = *not really characteristic of me*, 2 = *moderately characteristic of me*, 3 = *characteristic of me*, and 4 = *very characteristic of me*.

The majority of respondents were female (54%), white (53%), and non-Hispanic (92%). The average age of the respondents was approximately 32 years old. Slightly over 80% of the sample reported working full-time (i.e., 36 hours or more per week) and 24% reported currently working in a job related to cybersecurity. Most of the respondents (83%) reported enrolling in graduate school after taking at least one year off following graduation from their undergraduate degree. And 40% of the overall sample reported having taken off more than five years from school following their undergraduate studies. Put different, only a small number of these students in this sample were attending graduate school immediately following their undergraduate graduation. In terms of academic achievement, 68% anticipated earning an A in the course, 29% believed they would earn a B in the course, and 2% anticipated a C in the course (*note*: Final course grades were released while the survey was open and available to students. Approximately 85% of the respondents completed the survey prior to final grades being assigned). Finally, 83% of the respondents reported attending at least one of the synchronous events (e.g., welcome event, drop-in session, or happy hours). For the students who responded that they did not attend a live event, all of them cited work or family/personal conflicts for not attending. None of the respondents said that they were "not interested in participating" when asked for a reason for not attending the live events.

V. Results

Table 1 reports the results from the general attitudes towards engagement in online classes. The results indicate that most students are interested in opportunities to engage with their faculty and other students in their classes. Specifically, the students reported that they would like to see other cybersecurity classes incorporate more synchronous components for general interaction (66% either somewhat or strongly agreed). A majority of students reported wanting non-course assignment related opportunities to interact with their classmates and instructors (both items were 61%). Additionally, 66% of the respondents would like to attend in-person or virtual social events specifically for cybersecurity students. Finally, only 24% of the sample felt like it was difficult to feel engaged in an online course.

Table 2 reports the results about the perceptions of engagement specific to the Fall 2023 course where the engagement activities described above took place. The results indicate that the students believed that the instructor and the assistant instructors were invested in their success (both measures of investments were at approximately 93% agreement). Students agreed that there were opportunities for socialization with the instructor and other students outside of course assignments (86% either somewhat or strongly agreed). Table 2 reports the results about the perceptions of engagement specific to the Fall 2023 course where the engagement activities described above took place.

TABLE I. General attitudes towards virtual social engagement

	5-point Scale Mean (Range: 0-4)	***Percent Agreement***
I would like other cybersecurity classes to incorporate more live components for interaction	2.95	65.85
I am interested in non-course assignment related interactions with classmates	2.56	60.98
I am interested in non-course assignment related interactions with my instructors	2.78	60.98
I find it difficult to feel engaged in online classes	1.66	24.39
I would like to attend in-person social events for cybersecurity students	2.85	65.85
I would like to attend online social events for cybersecurity students	2.90	65.85

TABLE II. STUDENT ATTITUDES TOWARDS CLASS ENGAGEMENT

	5-point Scale Mean (Range: 0-4)	*Percent Agreement*
The instructor is invested in my success	3.73	92.68
The assistant instructors are invested in my success	3.71	92.68
There were opportunities in this class for socialization with instructors and other classmates outside of course assignments	3.34	85.37
There are opportunities in my other cybersecurity classes for socialization with instructors and other classmates outside of course assignments	2.33	32.50
There is a sense of community in this class	2.98	65.85
I feel detached from my classmates	2.05	35.00
I feel detached from the course instructors	1.32	21.95
I found the live components of the class to be helpful to my learning	3.35	94.12
I found the live components of the class to be helpful for increasing feelings of connection to my instructors and classmates	3.41	94.12

Table 2 reports the results about the perceptions of engagement specific to the Fall 2023 course where the engagement activities described above took place. The results indicate that the students believed that the instructor and the assistant instructors were invested in their success (both measures of investments were at approximately 93% agreement). Students agreed that there were opportunities for socialization with the instructor and other students outside of course assignments (86% either somewhat or strongly agreed). However, the students did not report similar opportunities in other classes within the same cybersecurity graduate program (33% agreement). Students reported that this specific class had a sense of community (66%). The students also reported low feelings of detachment from the instructors (22%) and other classmates (35%). Most importantly 94% of the students reported that they found synchronous components of class to be helpful to their learning. Additionally, 94% of the respondents found that the live components increased their feelings of connection to their instructors and classmates.

Results from the OSE measures were also calculated. As a scale, the measures performed well and had a Cronbach's Alpha of .86, which is similar to the results found by Dixson [20]. However, there was little variation among the respondents within the scale which precluded the use of inferential statistics. For example, four of the eighteen survey measures had 100% agreement across all respondents and an additional eight measures had agreement among respondents that was greater than 90%. Nevertheless, these measures from the OSE generally showed that this group of graduate cybersecurity students were motivated to learn and regularly engaged in educational behaviors that lead to their success. The results from this part of the survey are reported in Appendix A.

VI. DISCUSSION

As more students enroll in online graduate cybersecurity programs, it is important for cybersecurity educators to ensure that students have an engaging graduate school experience in addition to providing a rigorous and contemporary curriculum taught using high-impact practices in online learning within the field [21]. Research has shown that when meaningfully engaged, graduate students will achieve better across many academic indicators including retention, progression, and graduation [6, 13]. Therefore, it is vital that higher education faculty consider engagement a key part of their teaching repertoire to help maximize student success.

This is particularly true in cybersecurity, as the popularity of these degrees coupled with the growing job market, have created conditions where enrollment in academic programs and classes have ballooned in size. Educators in many circumstances may be overwhelmed by the challenge of engaging large online courses and may simply dismiss this as an impossible task. However, the strategies described above, and the survey results provided here, indicated three important implications for faculty teaching these large enrollment courses: 1) graduate cybersecurity students are interested in social engagement opportunities, 2) graduate cybersecurity students see social engagement as helpful to their overall success, and 3) graduate cybersecurity students perceive social engagement as a good way to feel connected to their instructors and fellow students. Therefore, the evidence here indicates that cybersecurity faculty should make efforts to synchronously and socially engage with the students in their online classes. To help maximize the impact of social engagement events, it is recommended that cybersecurity faculty refer to the engagement recommendations laid out by Lowenthal et al., with an emphasis that faculty engage students in a *synchronous* manner that includes time for structured and unstructured interactions [8]. For cybersecurity faculty that might not know where to begin, they should consider the synchronous activities described above and use these as a template for engagement opportunities for their own courses.

These results add to the growing body of evidence that faculty can meaningfully engage with graduate students in an online cybersecurity program in a way that can positively impact student experiences. Furthermore, the strategies discussed here are broad enough that this evidence will likely be of use to faculty members in other academic fields because of how portable these ideas can be to any other discipline (i.e., any discipline can have its own happy hour). These points are all good news, of course, but the efforts described here may require faculty to go above-and-beyond their usual means of interacting with students. It's a tall order to ask a faculty member to get online for an hour or two starting at 8pm on a weeknight. Many faculty may not be interested in these types of activities or may not have schedules that would allow them to interact with students in this manner. In fact, a future direction of research may be to look at the barriers that faculty face for effectively engaging online graduate students. Nevertheless, if the faculty are able and willing to take the time to interact with students in a social manner, they will likely have appreciative students that look forward to the opportunity of being socially engaged. And that social engagement opportunity may have a positive influence on student success.

Finally, like all academic studies, this research is challenged with different limitations. First, the survey reported here is a case study of graduate students in one class at one university;

therefore, this study has a small sample size, and the data may not be generalizable to a larger population due to the sampling method. Second, this is cross-sectional data with no pre-test survey and no control group, so the study itself cannot be considered causal which further limits the implications of this study. Third, there may be many unmeasured attributes about the team of faculty instructors that made them more relatable to the students in this class which could have biased the survey responses. Fourth, the survey measures included here are student *perceptions* and are not measures of their actual academic success. Self-report data can introduce bias which may influence the results reported here. Many of these limitations can be mitigated through future research that uses stronger research designs. It is recommended that future researchers consider longitudinal models of data collection to fully understand the impact of engagement on student success.

ACKNOWLEDGMENT

This paper was completed with support from the Center for Excellence in Teaching and Learning at Kennesaw State University.

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APPENDIX A. STUDENT ONLINE ENGAGEMENT SCALE

	5-point Scale Mean (Range: 0-4)	***Percent Agreement***
Making sure to study on a regular basis	2.76	92.86
Staying up on the readings	3.00	92.86
Looking over class notes between getting online to make sure I understand the material	2.76	88.10
Being organized	2.90	85.71
Taking good notes over readings, PowerPoints, or video lecture	2.19	71.43
Listening and reading carefully	3.12	100.00
Putting forth effort in the readings and course assignments	3.38	100.00
Finding ways to make the course material relevant to my career	3.17	97.56
Applying course material to my life	2.90	95.12
Finding ways to make the course interesting to me	3.07	95.24
Desiring to learn the material	3.17	100.00
Participating actively in small-group discsuion forums or group chats	2.02	64.29
Helping fellow students	2.61	85.37
Engaging in conversations online (chat, discussions, emails)	2.37	80.49
Getting to know other students in the class	1.83	65.85
Getting a good grade	3.59	100.00
Doing well on tests	3.31	100.00