

Does having a Sudden Change to Online Learning Impact the Learning/Understanding of Material in Pharmaceutical Studies?

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MPA 260: Applying Innovative Solutions to Current Problems

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Abstract

The purpose of this study was to determine the effects of remote learning on a pharmacy student's ability to learn and retain knowledge through the analysis of Grade Point Average trends and confidence using the information learned. Students and faculty were presented with two separate surveys regarding the switch to remote learning at Drake University. The survey answers were confidential and provided indications for understanding if students were learning and retaining information in the short term while remote. From the surveys, we found that students experienced more emotional stress and responsibilities once the school went remote. There was not a significant difference in the Grade Point Average earned throughout the semesters in which students were remote in comparison to in-person. More research on the long-term effects of remote learning will need to be conducted to determine if students were able to retain information while remote learning.

Keywords: *Remote learning, pharmacy, knowledge*

Introduction

In early 2020, the world was engulfed with illness and forced to change how it functioned. The World Health Organization defined the illness as a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2/ COVID-19) which began spreading across the world causing panic and isolation. On March 11th, 2020 the World Health Organization (WHO) characterized COVID-19 as a pandemic. COVID-19 is largely spread person-to-person whether the person is asymptomatic, pre-symptomatic, or symptomatic (World Health Organization, n.d.). As the pandemic was being defined by WHO, the United States utilized quarantine to help resolve the issue of COVID-19 and set a 14-day quarantine for its citizens. The Center for Disease Control and Prevention released a statement for the United State citizens on what quarantine is and why it is necessary to last 14 days; “quarantine refers to the practice of separating individuals who have had close contact with someone with COVID-19 to determine whether they develop symptoms or test positive for the disease. Quarantine reduces the risk of transmission if an individual is later found to have COVID-19” (CDC 2019).

Along with the quarantine, the CDC released other guidelines for safety including wearing face masks or face shields and limiting close contact with other individuals, defined as six feet apart (CDC 2019). Many parts of society had to adjust to a distanced lifestyle but also sustain their normal daily functions. For many people, this resulted in working from home on the computer and for students at Drake University this meant learning remotely.

Remote learning has been used before COVID-19 in settings such as online classes and other forms of telecommunications, but the change for everyone who

selected in-person schooling was sudden. In the fall of 2018, there were roughly 19.6 million students enrolled in a college program in the United States. Just under 19% of those students enrolled were enrolled in at least one, remote course along with in-person courses (U.S. Department of Education, n.d.). In 2011, Michael Simonson et al. reviewed literature that dealt with distance education research and defined in-person learning as “learning that takes place in a classroom with no telecommunication separation”. In addition to in-person learning, Simonson defined remote learning as, “institution-based, formal education where the learning group is separated, and where interactive telecommunication systems are used to connect learners, resources, and instructors” (Simonson, et al., 2011, pp. 124-142).

The pharmacy students at Drake University are required to complete a certain curriculum to obtain their Doctor of Pharmacy. Drake University’s purpose for the pharmacy program is, “to provide the graduate with relevant knowledge base, skills, attitudes, ethics and values to engage in the entry-level practice of pharmacy” (*PharmD Curriculum*, n.d.). To obtain these characteristics, courses utilize exams, quizzes, clinical practice cases and team-based discussion to create a well-rounded pharmacist.

In 2016 a team of pharmacists at three different pharmacy programs researched the use of medical literature evaluation in the *American Journal of Pharmaceutical Education*. They looked at pharmacy courses in accredited pharmacy programs throughout the United States to determine how often it is used and also determined how long active learning is used throughout a class time. The use of medical literature evaluation allowed for active learning throughout the programs, defined as a “form of journal clubs, interactive polling, and a variety of other methods” (O’Sullivan et al, 2016,

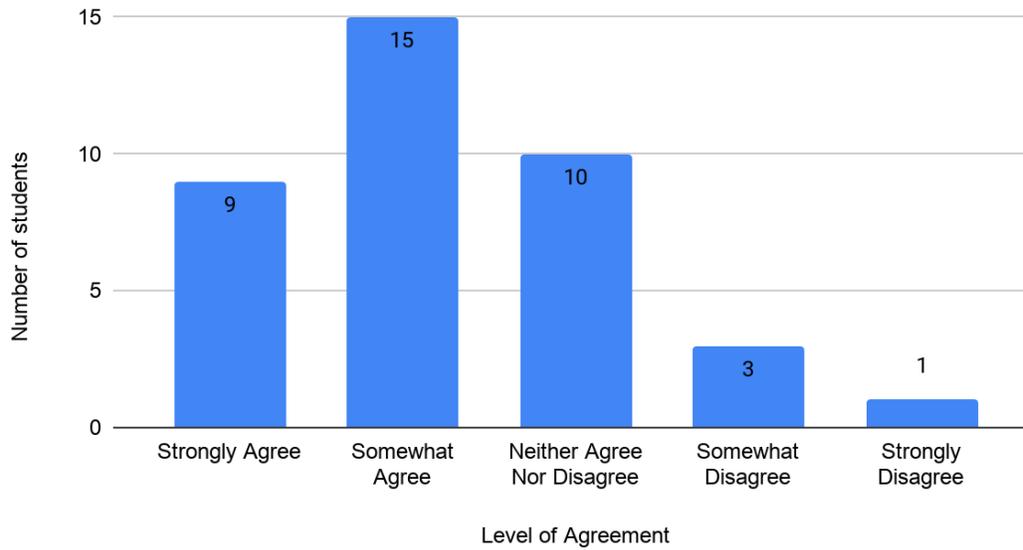
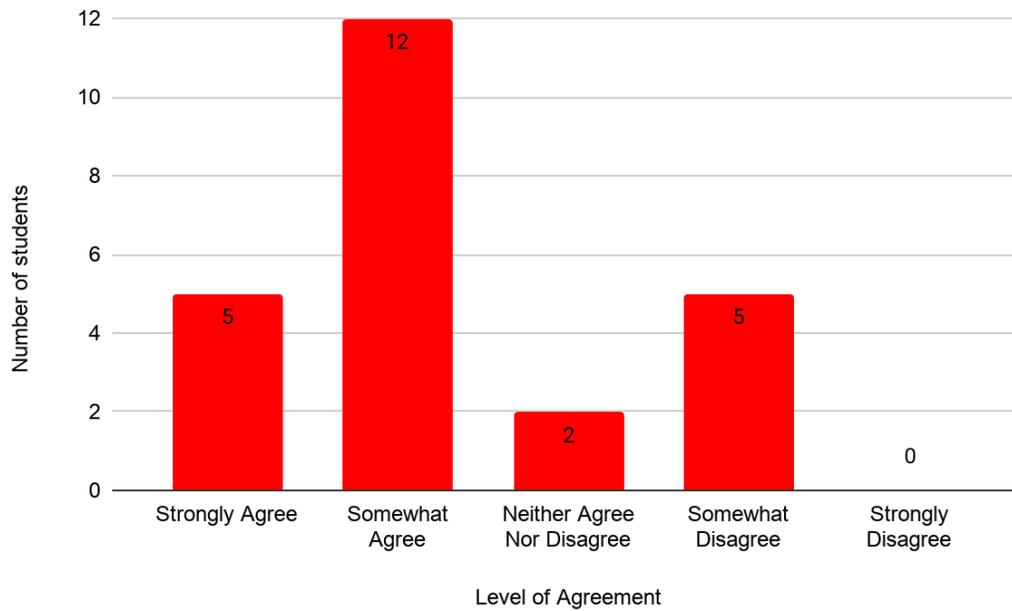
p. 6). The Drake University pharmacy program uses a team-based approach to learning which allows for discussion and active learning using problem-based learning throughout the course. Figures 2 and 3 demonstrate students and faculty in agreement, completing team discussions to be more difficult and presented limitations that in-person lectures did not have. Having limited discussion in courses designed for team learning can hinder one's ability to learn and retain information.

Figure 1

P1 through P3 Drake Pharmacy Curriculum

Doctor of Pharmacy 1			
FALL			SPRING
PHAR 130	Biochemistry	4 CR	PHAR 123
PHAR 131	Intro to Pharm Science	3 CR	Continuing Professional Development (CPD) II
ELEC ---	Drake Curriculum/General Electives	3 CR	PHAR 171
PHAR 144	Basic Pharmacy Skills & Applications 1	2 CR	Health Care Systems and Policies
PHAR 125	Physiology	4 CR	PHAR 140
PHAR 122	Continuing Professional Development (CPD) I	1 CR	Pharmaceutics I
			PHAR 145
			Basic Pharmacy Skills & Applications 2
			PHAR 132
			Pathophysiology
			PHAR 133
			Principles of Drug Action I
			PHAR 138
			Pharmaceutical Calculations
Semester Total Credit Hours		17	Semester Total Credit Hours
			19
Doctor of Pharmacy 2			
FALL			SPRING
PHAR 134	Principles of Drug Action II	5 CR	PHAR 169
PHAR 172	Literature Evaluation Methods	3 CR	Nonprescription Therapies
PHAR 142	Kinetics	3 CR	PHAR 168
PHAR 141	Pharmaceutics II	3 CR	Continuing Professional Development (CPD) IV
PHAR 167	Continuing Professional Development (CPD) III	1.5 CR	PHAR 155
PHAR 154	Intermediate Pharmacy Skills & Applications I	2 CR	Intermediate Pharmacy Skills & Applications II
PHAR 149	Immunizations	1 CR	PHAR 190
			Therapeutics I
			PHAR 143
			Therapeutic Drug Monitoring
			ELEC ---
			Drake Curriculum/General Electives
			PHAR 135
			Principles of Drug Action III
Semester Total Credit Hours		18.5	Semester Total Credit Hours
			18.5
Doctor of Pharmacy 3			
FALL			SPRING
ELEC ---	Pharmacy Professional Electives	3 CR	PHAR 176
PHAR 174	Management in Pharmacy	3 CR	Continuing Professional Development (CPD) VI
ELEC ---	Drake Curriculum/Gen Elec.	3 CR	PHAR 185
PHAR 191	Therapeutics II	5 CR	Advanced Pharmacy Skills & Applications II
PHAR 175	Continuing Professional Development (CPD) V	2 CR	PHAR 173
PHAR 184	Advanced Pharmacy Skills & Applications I	2 CR	Applied Social and Administrative Pharmacy
			ELEC ---
			Pharmacy Professional Electives
			PHAR 192
			Therapeutics III
			PHAR 162
			Pharmacy Law & Ethics
Semester Total Credit Hours		18	Semester Total Credit Hours
			17

(PharmD Curriculum, n.d.)

Figure 2***Discussions during Remote Learning more Difficult - Student*****Figure 3*****Discussions during Remote Learning created limitations - Faculty***

To maintain separation and abide by the quarantine guidelines set by the CDC and WHO, Drake University turned to platforms such as Zoom[®] and Blackboard Collaborate[®] to name a couple. Class structures have been changed and the purpose of the research conducted is to understand the effects of remote learning on pharmacy student's ability to learn and retain knowledge through analysis of grade point average (GPA) and confidence using the information learned while remote.

Drake University started remote learning (Spring 2020) by using Blackboard Collaborate[®] and included Zoom[®] as an option in Fall 2020. Blackboard Collaborate[®] included non-verbal methods of communication. This method of communication involved a chat function where students/faculty could chat through text, reaction emotes (i.e happy, sad, surprised, confused, faster, slower, agree, and disagree), a whiteboard function, and a voting poll. The voting poll, as the name suggests, was a way for professors to ask questions and for students to respond. The whiteboard function was for faculty/students to draw out responses. This function was utilized to help mimic the experience of in-person lectures. Zoom[®] also included similar functions in their software for faculty/students.

Methods and Materials

For background information and COVID-19 statistics and timeline, the Center for Disease Control and the World Health Organization was utilized. For defining remote and in-person learning PUBMED was accessed with the mesh terms "remote learning" AND "higher education". Drake University School of Health Science and Pharmacy was utilized for the pharmacy curriculum and description of courses. For further information on Drake University's education management, an interview was conducted with one of

Drake University's Success Coaches, Sophie Tibbals. She gave a broader understanding of how students adjust to college remotely and how they handle time management. In order to grasp the effects of online learning on student learning/understanding of material in pharmaceutical studies, two Qualtrics Surveys were utilized. One survey was given to pharmacy students and the other to pharmacy faculty at Drake University. As seen in Figure 4, the student version of the survey consisted of 16 questions and as seen in Figure 5, the faculty survey consisted of 12 questions. Each study was done on a volunteer basis and the participants were able to stop at any time. Answers to the surveys were confidential, and answers were gathered between April 1st, 2021 through April 21st, 2021. Software within Qualtrics was employed to analyze the data and look for trends. To determine significance regarding GPA, an α (alpha) of 0.5 was used and p-values were calculated through *Google Sheets*®.

Figure 4

Student Survey

<p>This survey is being conducted by Marc Thieme and Jacob Lucht as part of the Master of Public Administration (MPA) capstone project at Drake University. All information used for the project is confidential and will not disclose the respondent. You may withdraw from the survey at any time.</p> <p>The purpose of the survey is to further understand how changing from in person classes to remote learning, due to the sudden change from the COVID-19 pandemic, impacted the learning of pharmacy students.</p> <p>This survey will take about 5-10 minutes to complete. Thank you for your contribution.</p> <ol style="list-style-type: none"> 1. What is your current level of schooling? <ul style="list-style-type: none"> <input type="radio"/> P1 <input type="radio"/> P2 <input type="radio"/> P3 2. What was your semester GPA in the FALL of 2019? <ul style="list-style-type: none"> <input type="radio"/> (Space for written answer) 3. What was your semester GPA in the SPRING of 2020? <ul style="list-style-type: none"> <input type="radio"/> (Space for written answer) 4. What was your semester GPA in the FALL of 2020? <ul style="list-style-type: none"> <input type="radio"/> (Space for written answer) 5. Did you have a non-distracting environment to attend remote classes? <ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No 6. How long did it take for you to adjust to remote learning? <ul style="list-style-type: none"> <input type="radio"/> Less than or equal to 7 days <input type="radio"/> 7 days - 21 days <input type="radio"/> 22 days - 42 days <input type="radio"/> 43 days - 63 days <input type="radio"/> More than 64 days <input type="radio"/> Still not adjusted to remote learning 7. As of SPRING 2021 are your classes remote or in person? <ul style="list-style-type: none"> <input type="radio"/> Remote <input type="radio"/> In person <input type="radio"/> Hybrid of remote and in person <p>Answer each statement with your level agreement using the following scale: Strongly Agree Somewhat Agree Neither agree nor disagree Somewhat Disagree Strongly Disagree</p> <ol style="list-style-type: none"> 8. Remote learning has helped me understand material from classes more than in person classes. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 	<ol style="list-style-type: none"> 9. There was no difference in attentiveness during remote learning compared to in person classes. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 10. I was able to attend office hours with the instructor while the class was remote. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 11. I found it difficult to use campus resources (study areas, building access, tutoring, etc.). <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 12. The sudden change to remote learning added more emotional stress to classes. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 13. Discussions about topics/case studies in remote classes were difficult. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 14. I feel confident that I can use the knowledge learned through remote learning. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 15. I have not noticed a significant (+ or -10%) change on exams while remote learning. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 16. I would attend in person classes if it were an option. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree
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Figure 5
Faculty Survey

<p>This survey is being conducted by Marc Thieme and Jacob Lucht as part of the Master of Public Administration (MPA) capstone project at Drake University. All information used for the project is confidential and will not disclose the respondent. You may withdraw from the survey at any time.</p> <p>The purpose of the survey is to further understand how changing from in person classes to remote learning, due to the sudden change from the COVID-19 pandemic, impacted the learning of pharmacy students.</p> <p>This survey will take about 5-10 minutes to complete. Thank you for your contribution.</p> <ol style="list-style-type: none"> Have you taught a class or unit of a class remotely between the SPRING of 2020 and the FALL of 2020? <ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No Do you require your students to have a camera on while teaching remotely? <ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No If you were teaching during the transition from in person to remote classes in the SPRING of 2020, did you fall behind in lectures? <ul style="list-style-type: none"> <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Was not teaching during that time period How long did it take for you to adjust to remote teaching? <ul style="list-style-type: none"> <input type="radio"/> Less than or equal to 7 days <input type="radio"/> 7 days - 21 days <input type="radio"/> 22 days - 42 days <input type="radio"/> 43 days - 63 days <input type="radio"/> More than 64 days <input type="radio"/> Still not adjusted to remote teaching <p>Answer each statement with your level agreement using the following scale:</p> <p>Strongly Agree Somewhat Agree Neither agree nor disagree Somewhat Disagree Strongly Disagree</p> <ol style="list-style-type: none"> Remote teaching has made it easier to teach material to classes. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree 	<ol style="list-style-type: none"> I feel my students are/were understanding the material to the same extent in person or remotely. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree There is/was no difference in attentiveness during remote learning compared to in person classes. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree Students are willing to ask more questions during remote classes. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree There is no difference in access to office hours when in person compared to remote learning. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree Discussions during remote classes are limited. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree I have noticed a significant (+ or - 10%) change on exams while teaching remotely. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree I would teach in person if it were an option. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Somewhat Agree <input type="radio"/> Neither agree nor disagree <input type="radio"/> Somewhat Disagree <input type="radio"/> Strongly Disagree
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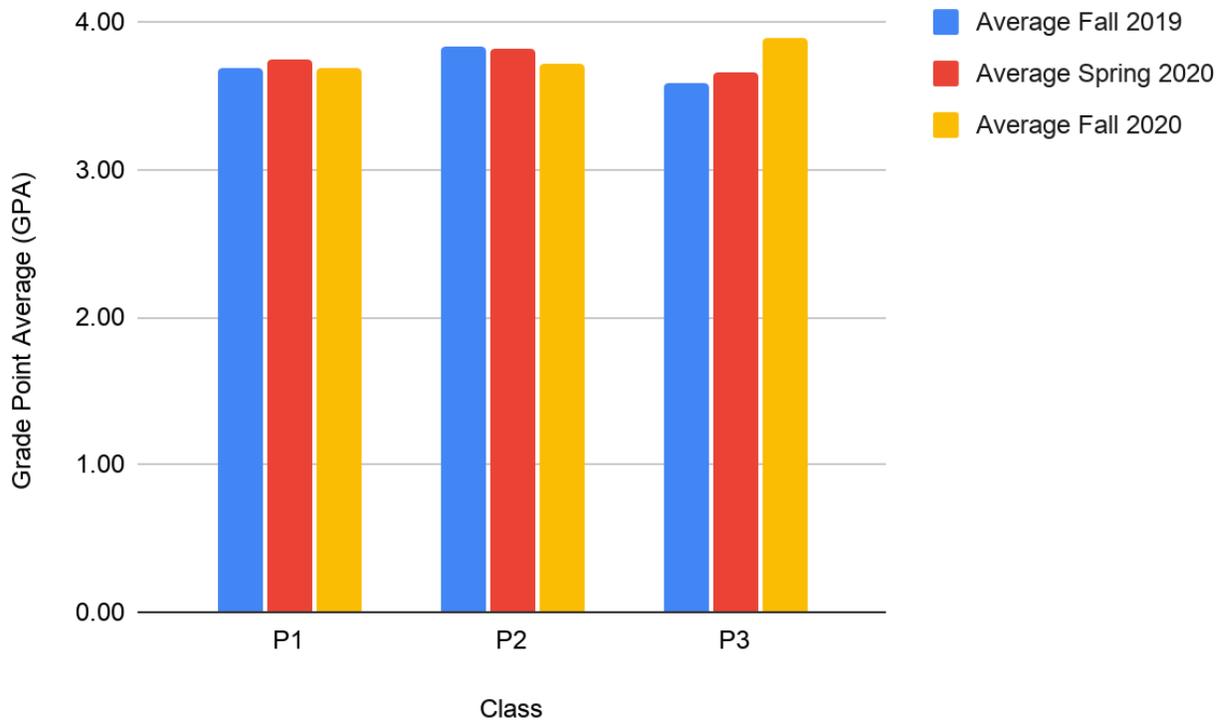
Study selection criteria

Students were included in the survey based on certain inclusion criteria. The first requirement was that they had to be a Drake Pharmacy School student. The next inclusion criteria was that they had to be in their first (P1), second (P2), or third (P3) year of pharmacy school. Undergraduate students and students from other graduate programs were excluded from this research to maintain uniformity between the rigor of classes that students were taking. Pharmacy in their final year (P4) were also excluded because they did not complete a full semester of didactic learning remotely. Faculty included were from the Pharmacy and Health Science Department; other faculty at Drake were excluded. There were 39 students and 24 faculty who responded to their respected survey. One student response was excluded due to the survey being left incomplete.

Results: Students

Grade Point Average:

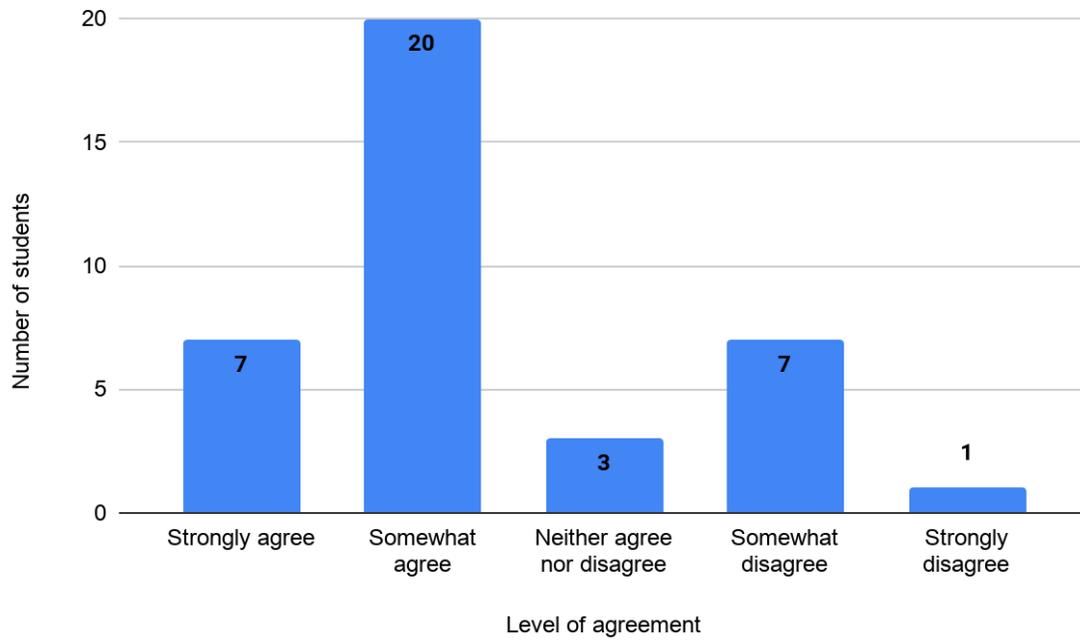
The GPA was looked at over three completed semesters (fall and spring). The fall of 2019 was used as a control because it was the last semester that was full in-person with no remote option. Figure 6 contains the average GPA for each semester and for each class, P1's through P3's. There was no significant difference (p -value = 0.15) between the average GPA in the fall of 2019 and the spring of 2020; additionally, there was no significant difference (p -value = 0.32) between the average GPA in the fall of 2019 and the fall of 2020.

Figure 6**Average GPA Compared by Class****Understanding**

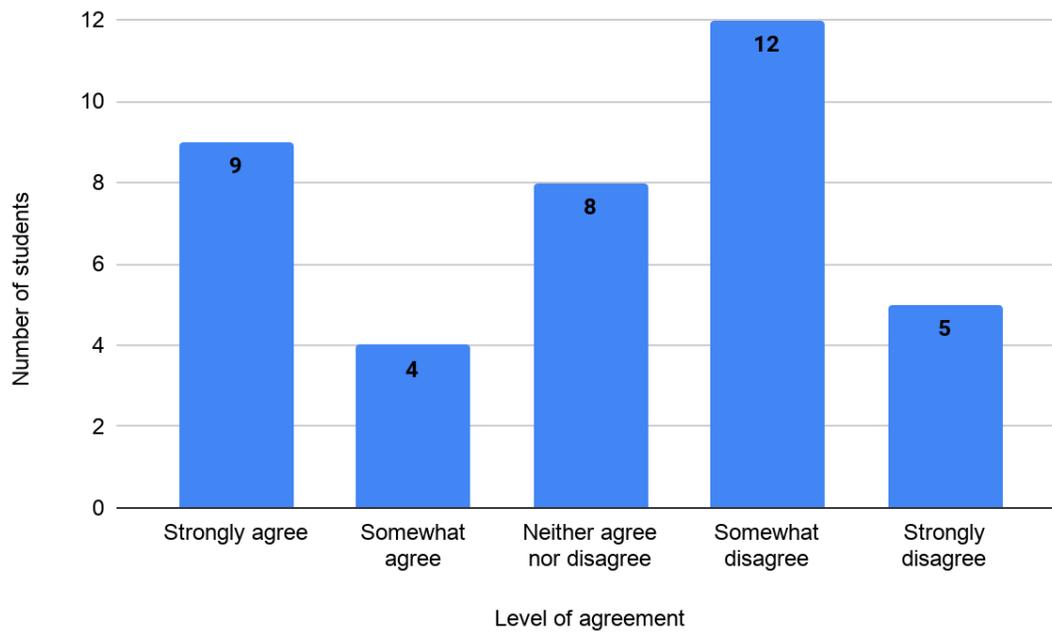
A majority (71%) of the students either somewhat agreed (20 students) or strongly agreed (7 students) that they are confident in using the knowledge and information learned remotely. Only 21% of the students felt they were not confident in using the knowledge and information. Figure 7 contains how many students responded to each level of agreement in confidence. A 10% increase or decrease on exams was used to determine the level of understanding students had on topics. Figure 8 shows the responses for each level of agreement with the statement “I have not noticed a significant difference (+/- 10%) change on exams while remote”.

Figure 7

I feel confident that I can use the knowledge learned through remote learning

**Figure 8**

I have not noticed a significant (+ or - 10%) change on exams while remote learning



Stress

Emotional stress is defined by the *Encyclopedia of Behavioral Medicine* as “emotional stress involves the experience of negative affect, such as anxiety, in the context of a physiological stress response that includes cardiovascular and hormonal changes” (Mendelson, 2013, n.d.). A majority of the students (84%) had some level of agreement that they had added emotional stress once their education went remote.

Figure 9

Level of agreement on added stress due to changing to remote learning

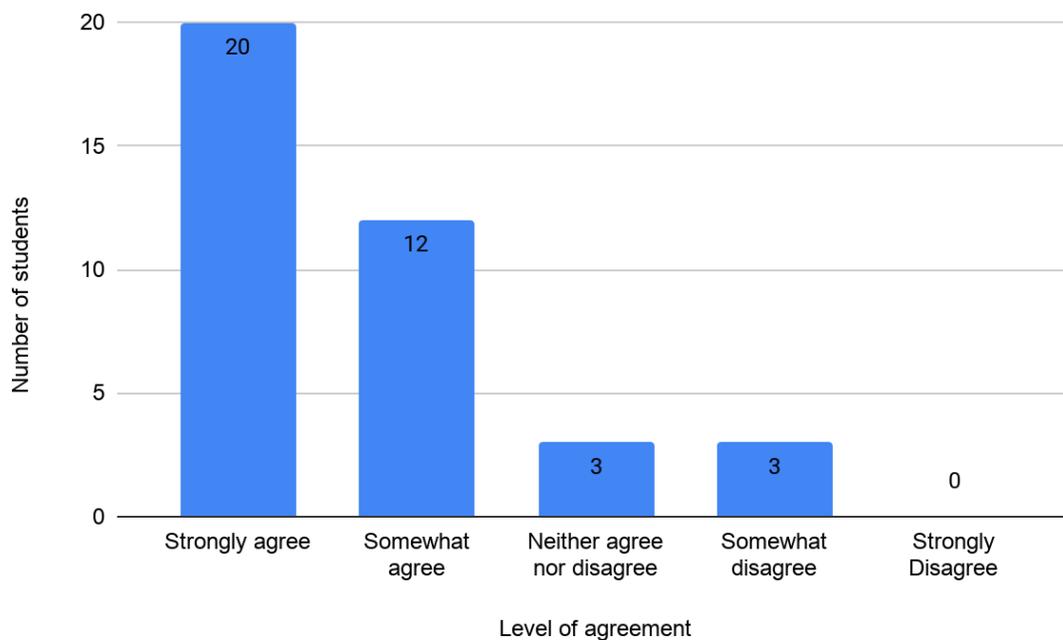
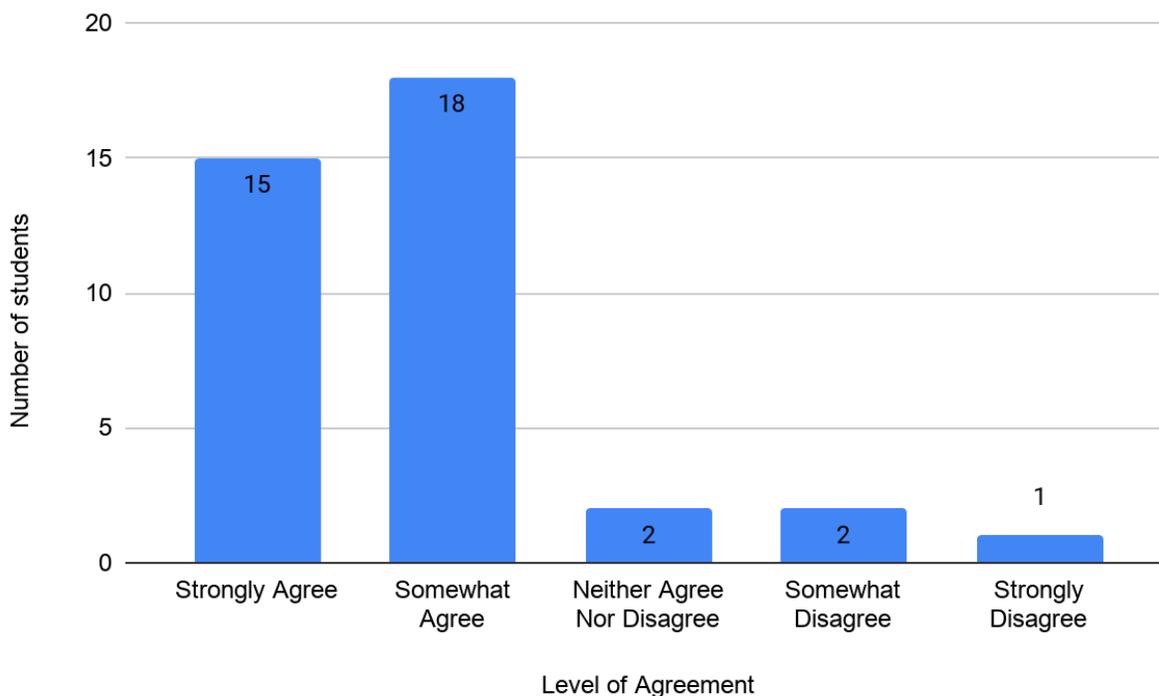


Figure 10

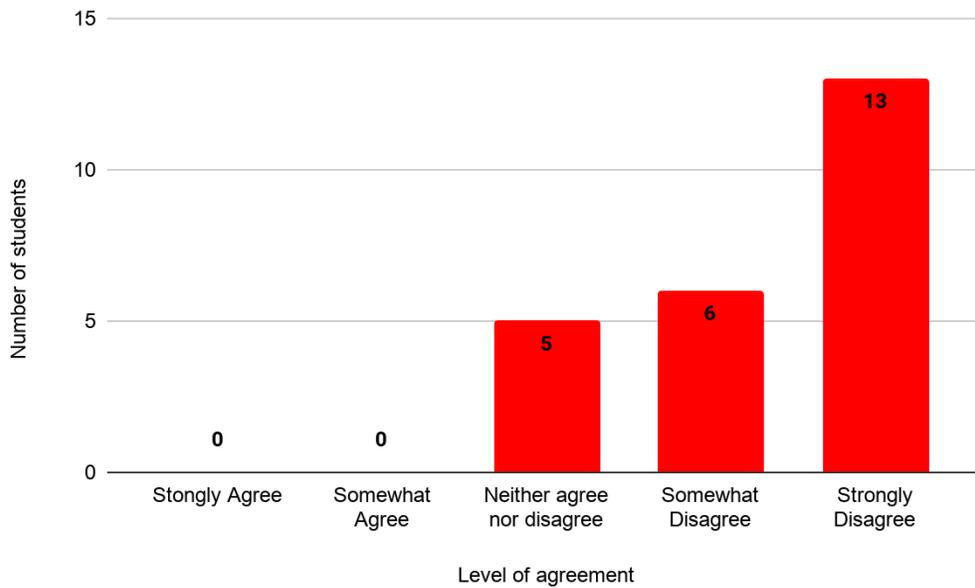
Level of Agreement students had on difficulty using campus resources



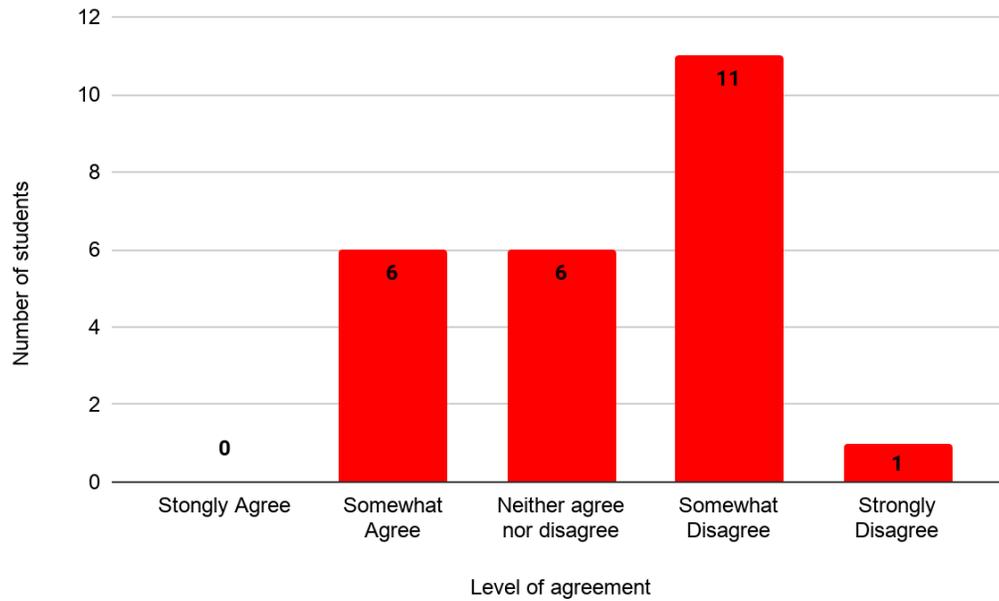
Results: Faculty

Understanding

The faculty were asked about the attentiveness of students and if they have noticed a change from in-person to remote. Of the 24 faculty that responded, 79% either somewhat or strongly disagreed that there was “no difference in attentiveness”. The level of understanding of the material was also asked about and 46% of respondents somewhat disagreed that there is the same level of understanding in-person versus remotely; 25% of respondents also somewhat agreed that there is the same level of understanding in-person versus remote.

Figure 11**Figure 12**

Level of Agreement faculty had on their students understanding of material remotely

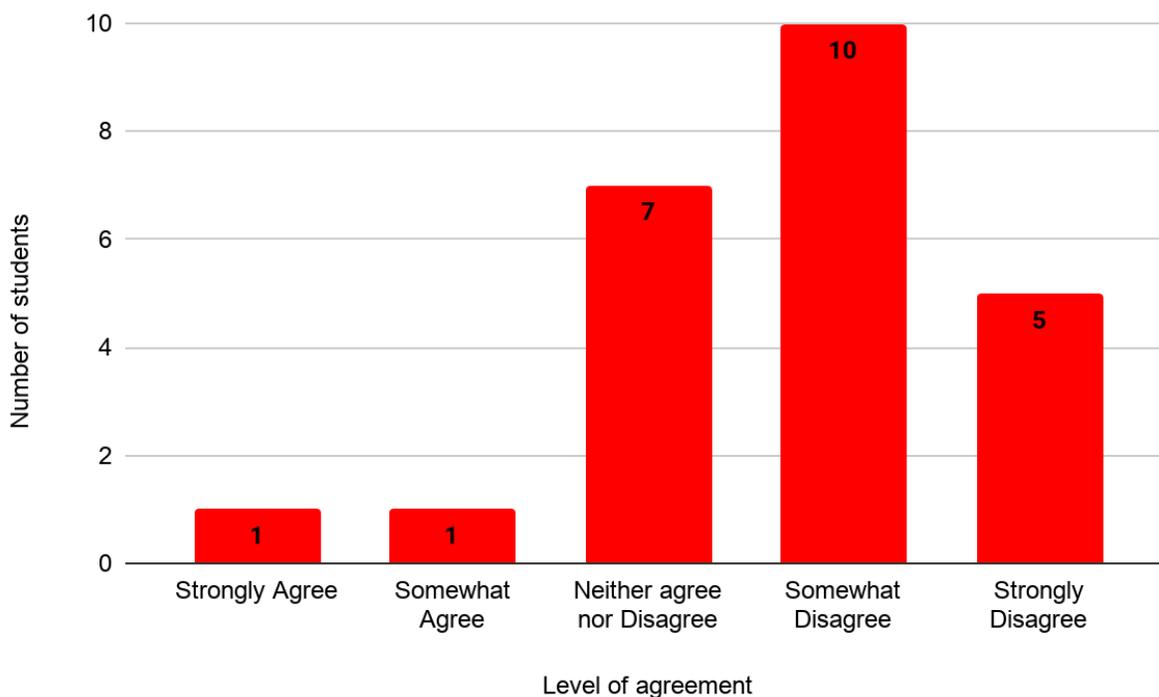


Exams

In majority, the faculty did not notice a significant difference (+/- 10%) on exams when learning moved remotely. 63% of respondents either somewhat disagreed or strongly disagreed that there was a significant change; 29% neither agreed nor disagreed.

Figure 13

Level of agreements faculty had on noticing a significant change (+ or - 10%) on exams



Discussion

Interview

There are many influences for understanding and retaining information whether the student is in-person or remote. Sophie Tibbals, a Success Coach at Drake University elaborated on student adjustment to remote learning, explaining that students

now have more responsibilities and distractions while remote. Students have an increased role at home by either being a caretaker for a sibling, extra responsibilities around the house and the added distractions that a classroom can limit. When asked in the survey, 26% of students did not have an environment free of distractions. This is also supported by the faculty's response to the statement "There is/was no difference in attentiveness during remote learning compared to in-person classes", 79% of the responses were either somewhat or strongly disagree that students had the same level of attentiveness (Figure 11). The change brought stress on students making sure they have a place in their house to give their attention to their studies and there is an added stress of making sure each student has an internet connection.

Sophie also talked about having a structured day and separate personal and school life. Many students attend classes in their room, study in their room, and any extra time they have was also spent within their room. The time students had after classes at the end of the day for personal time was important to release any stress they may have. Classes became a mix of synchronous and asynchronous, and 82% of the students either somewhat or strongly agreed that they would attend in-person classes if it was an option. The mix of synchronous and asynchronous allows for more flexibility but can also remove any schedule the student may have had before COVID-19 started. Sophie mentioned that some students rely on structure to be successful and having their class switch from synchronous to asynchronous could cause issues.

Students

The change from in-person to remote caused students emotional stress but in the majority, understanding of material and ability to use that information stayed

consistent. As discussed above, students' GPA did not increase or decrease in a statistically significant manner. The P1's GPA had much more influence from their undergraduate education since that group did not start their first year of pharmacy school until the fall of 2020. As a whole, the P3 students had the highest absolute increase (0.31) in GPA their fall of 2020 semester. During our interview, Sophie explained that fewer upper-class students were in need of help with their studies once Drake University went to remote learning. This could be due to the fact that they have more experience with managing their study time and have a further understanding of how they need to study. This same concept carries over to the individual pharmacy classes. The P1's on average maintained the same GPA from their last semester fully in person (fall of 2019) to their first full semester remote (fall of 2020). The transition to a graduate program from an undergraduate program will take time to adjust to.

In addition to GPA, students should be able to retain and utilize the information learned, understanding its importance. From the responses students gave in the survey, there was a high level of confidence that students are able to use the information learned remotely. Students in comparison to the faculty felt they noticed a significant difference (+/- 10%) on their exams. On individual exams, there are many co-factors that can play a role in an exam grade semester to semester. Depending on the level of pharmacy school will influence what classes are taken and can result in fluctuation of exam scores.

Figure 1 contains the curriculum for all P1 through P3 students in the Drake University Pharmacy program. Certain courses (e.g. *Principles of Drug Action* and *Therapeutics*) do not start until the student gets further in their education. The *Principles*

of Drug Action series which starts the Spring semester of year one, relates to how a medication's mechanism of action works, whereas the *Therapeutics* course series focuses more on why and when to use a medication based on the patient profile and is structured for problem-based learning. These courses often require some adjustments in study strategies and along with the adjustments students had to make for remote learning can influence exam scores (*PharmD Curriculum*, n.d.).

A high majority of students (84%) reported that they had added emotional stress once the curriculum switched to remote. The emotional stress relating to school and outside distractions would influence one's ability to be focused on their education. Stress can play a crucial role in mental health and academic performance among students (O'Driscoll M, 2019, pp. 876-887). Regardless of year of study, pharmacy students exemplify higher levels of stress than the general population (O'Driscoll M, 2019, pp. 876-887). In addition to not having a distraction-free environment, students found it difficult to use campus resources during remote learning. Figure 10 demonstrates the added difficulties students faced to maintain the same level of education without using the resources offered to them in previous semesters.

Students all had similar responses when asked to give their level of agreement with the statement "I would attend in-person classes if it were an option", and 21% somewhat agreed and 60% strongly agreed. This finding makes a lot of sense given the fact that students can focus on what the professor is teaching and should have fewer distractions.

Faculty

The responses that faculty gave varied in level but in general a common theme played out. In general, faculty felt that student attentiveness was affected by the presence of remote learning. This makes a lot of sense since there is no formal policy at Drake University requiring students to have their cameras on. It's a lot easier for students to get distracted and lower the amount of participation they give in class. This is especially evident when faculty utilize a lecture style and don't engage with students by asking questions. As stated earlier, Zoom[®] and Blackboard Collaborate[®] had multiple ways for faculty and students to engage with each other, but they weren't always utilized in class. Ayelet Israeli with Harvard Business Publishing Education recommends that faculty utilize the chat function and post polls in the chat to encourage participation and learning. With the shift to remote learning, an adjustment from both the faculty and students needed to happen.

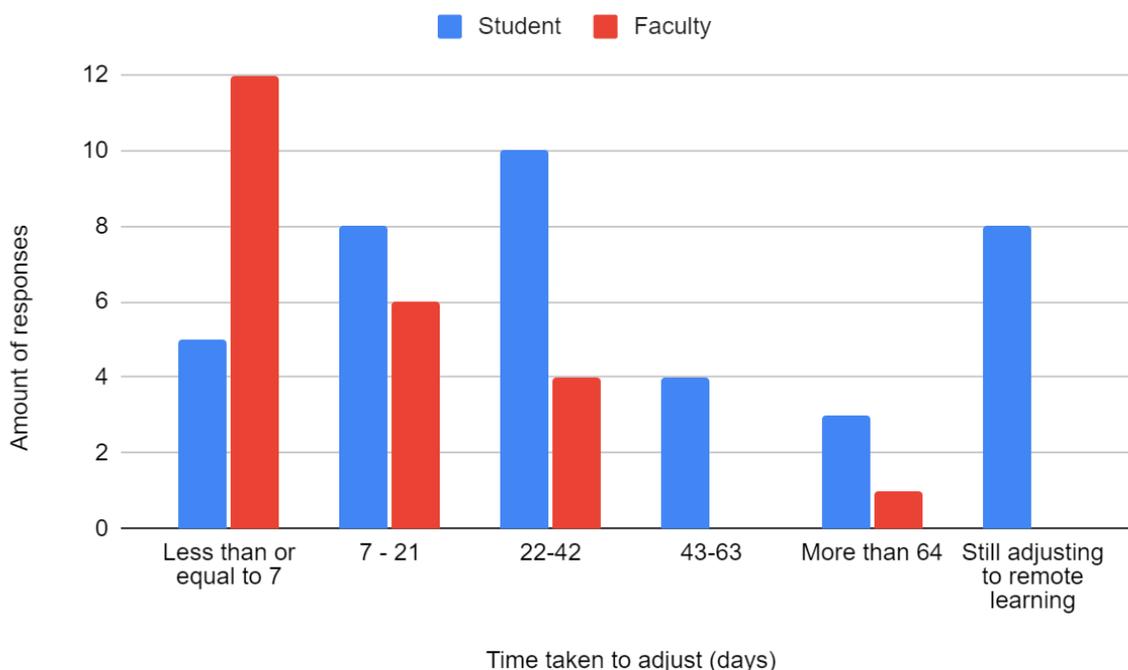
There was variation in the response that faculty answered in regard to their thoughts on whether they thought students were understanding concepts to the same extent as when students took the class in-person. The highest response for this question was "somewhat disagree" with "somewhat agree" and "neither agree nor disagree" tied for second. The varied responses may be due to the various levels the students are at and which classes the faculty teach. The older class, P3's have had more experience in pharmaceutical-based classes and have more of an understanding of concepts and how to study.

In conjunction with students' feelings on the topic, faculty at Drake University had an overall agreement that they would rather teach in-person if given the option. Faculty

were asked to give their level of agreement with the statement “I would teach in-person if it were an option” and 29% somewhat agreed along with 67% that strongly agreed. The faculty also had added responsibilities since their children were home attending school and had other distractions that would not normally occur in a classroom setting. Thus, similarly to how students can focus more since there are fewer distractions, faculty could also focus more on the topic at hand.

With any deviation from the typical norm, there is a certain time that must happen for one to be able to adjust to such change. The difficult part is that the time needed to adjust can vary from person to person. Similarly to stress, some people can deal with change better than others and therefore require little to no time to adjust. On the flip side, some people take longer to adjust and this can be seen. In the scope of this study, time to adjust for faculty and students was seen in the responses to the question “How long did it take for you to adjust to remote learning?” Students took much longer to adjust to the new learning format than faculty. Figure 14 contains student and faculty comparison of length of time taken to adjust to remote learning. There is an absolute difference in responses for adjusting to remote learning within seven days when looking at both faculty and students. It took students longer to learn the new format for classes and how to prepare for exams. Some students expressed that they are still adjusting to remote learning over a year later.

Figure 14



Study strengths and limitations

The surveys conducted gathered subjective information and the participants' confidence in how well they understood and retained the information learned while remote vs in-person. All questions within both the faculty and student surveys were non-leading, confidential, and clear for the participants to read and answer with full honesty. The survey resulted in a small sample size, with 39 students and 24 faculty responding on a volunteer basis. For participants that volunteered, there may have been positive or negative attitudes towards the change to remote learning. In future research, higher response rates may be accomplished by releasing the survey at the beginning or end of one of the *Continuing Professional Development* classes which are taken by all Drake Pharmacy students each semester (*PharmD Curriculum*, n.d.). Increasing the sample

size will also increase the statistical power of the study and reduce the chance of a type II error.

The research was done while remote learning was still an option for Drake Pharmacy students and faculty which may influence how participants answer the survey questions. For the P1 class, there may have been outside factors that influenced their choices in agreeing or disagreeing with the survey statements. The P1 class was part of the undergraduate program in the spring of 2020 and had to learn to adjust to a graduate program along with remote learning.

Conclusion

This study brought to light that even though many students and professors preferred in-person classes, students were maintaining academic performance throughout the switch. In general, there was no significant difference in mean GPA between Fall 2019 and Spring 2020 and Fall 2019 and Fall 2020 GPA. Once Drake University converts back to in-person, class structures would be formatted similarly to how they were before COVID-19. There are many factors that can have a role in a student's academic performance and success outside of the format of a class. Both students and faculty expressed the desire to be back in person to interact and learn face to face. More research will need to be done in the long term to understand if the information learned during this time is retained or if GPA will fluctuate once students/faculty are back to being in-person.

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