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How Can STEM Retention Rates at BGSU be Increased Both In and Out of the Classroom?

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HOW CAN STEM STUDENT RETENTION RATES AT BGSU BE INCREASED

BOTH IN AND OUT OF THE CLASSROOM?

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HONORS PROJECT

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Abstract

Previous research in STEM student retention rates showed a gap in knowledge regarding why this group of student experience higher rates of burnout than other groups of students. This study investigated the barriers STEM students at BGSU experienced. A survey was sent out to STEM and non-STEM students alike that asked questions regarding student's personal history before attending BGSU, their course experiences at BGSU, and the levels of support they have outside of BGSU. The survey data showed that there was little difference in the rates that students switch majors solely based on being in the STEM field. The data did show that many healthcare related fields in STEM were affected more by COVID-19 than other fields of study. Survey results also revealed that underrepresented students did not access resources on campus at the same rate. For example, first-generation students used counseling center resources at a disproportionately lower rate than continuing-generation students. Proposed changes that BGSU could make to lend students more support on campus and bridge the gaps underrepresented students experience in access to resources and support were made. Some of these changes included creating private, quiet spaces on campus that students could use to access the resources already implemented at BGSU, creating a peer mentorship program so students can support one another, and employing an outreach program through to the counseling center to take the first step to reach out the students in need.

Keywords: STEM, undergraduate students, underrepresented students, survey

Research Questions

Previous research on undergraduate students in the science, technology, engineering, and mathematics (STEM) fields show a much higher rate of burnout and loss of motivation when taking unsupportive gateway courses early in their academic career (Robinson et al., 2019). This research seeks to investigate this topic further on Bowling green State University's (BGSU) campus. Why do STEM students switch majors? Are the classes too difficult? Do they have the resources available needed to succeed? Do they simply not have the motivation to persist in the major? Even with all the knowledge that has been gathered regarding STEM retention rates and motivation, there are still gaps in this information that needs to be further investigated.

Many students pick a STEM major to pursue a career in that respective field resulting in about 18% of bachelor's degrees being held in STEM fields according to the National Center for Education Statistics in 2015-16. But what makes them change their dreams? Do they simply change their mind or are their dreams crushed? This study will investigate how the students at BGSU feel about the support they have in both their personal life and from the university. It will further investigate how this support affects their success at reaching their goals. By sending out a survey to BGSU students, my aim is to narrow down why students change career paths after entering gateway STEM courses and to see if there is a difference in STEM and non-STEM motivation to persist in their chosen major between STEM and non-STEM students. Future goals can be developed and pursued focusing on new ways to support students' personal and academic careers. With the results of this research, I hope to be able to suggest resources based on student feedback that BGSU can continue to build upon on campus and ways that class pedagogy can be reconfigured to further support the underrepresented students on campus.

Literature Review

In college, students thrive from support both in and out of the classroom. Undergraduate support or lack of support can be seen in various ways. In the classroom, students find support in being able to choose which classroom they want to be in based on how they learn best (Kiessling et al., 2003) and by being motivated to learn through engaging material (Belland et al., 2013) and learning techniques (Tien et al., 2002). Outside of the classroom, there are two main areas where students can get support from: resources from the university and the people in the student's life (friends and family). Studies have shown that students who have more parental support in their college years are more successful (Pedersen, 2017) than those who do not. Students who do not have a parental support system that encourages academic success are those who are already facing more challenges, like first generation college students, whose family may not understand the workload or commitment that college requires (Gaudier-Diaz et al., 2019). From the university, students could potentially find support in on-campus resources, such as research projects, giving students hand on experience and validating their feeling of being a scientist (Stanford et al., 2015; Starr, 2018).

While undergraduate research through the university can support students, it does not reach all students equally. The underrepresented students can be those who are racial minorities, women, first-generation college students, and those who are affected by judgement and biases that hold them back from pursuing a STEM career (Leaper and Starr, 2018; Starr et al., 2020). The underrepresented students need additional resources to succeed, particularly in the STEM field, that are not normally offered (Harackiewicz et al., 2014). One technique that has been used by Harakiewicz et al. to help combat the gap in the system is a self-affirmation technique. Students write down positive attributes about themselves prior to completing a task or assignment in an environment where they might have experienced stereotypes about their

identity. This resource is something that would benefit underrepresented students specifically since it helps to combat the negative effects of biases that students face in the classroom while all students could participate so no single group would be singled out (Harackiewicz et al., 2014).

There are other biases that hold students back from reaching their full potential as well. Female students have reported feeling that some STEM careers would hinder their ability to have a family and therefore chose to pursue different careers and majors so that they can still have a family (Starr et al., 2020). Other observed biases include people being less romantic or less capable of empathy among those who chose STEM as a field of study (Starr et al., 2020). Additional studies found that sometimes the biases are sourced directly from the classroom or school as observed through not feeling like a validated scientist (Starr, 2018) or through sexual harassment or gender-based biases (Leaper and Starr, 2018).

Success in the STEM field and other areas of undergraduate study comes from intrinsic and self-motivation of the student. When instructors show students that they are still learning and willing to grow in their field of study, their students are more likely to put in the effort to continue to grow their knowledge base as well (Richardson et al., 2020). A student's motivation drives everything they do, and thus leads to their success or downfall in schooling. Studies have shown that higher levels of motivation lead to higher success levels in engineering students first two years of undergraduate schooling (Robinson et al., 2019). Robinson et al. studied the classes first year engineering students took and how these courses affected the values the students had about their learning. They found that if students started in more supportive gateway courses, they were more likely to hold onto the utility and attainment values of the information than if they took the class later in their undergraduate career (Robinson et al., 2019).

While it has been proven that all these problems exist in undergraduate schooling, there is still a gap in knowledge on how to remediate these issues and how to best support the students based on their wants and needs. It is the aim of this study to further understand the effects of biases and the support or lack of support BGSU students receive both in and out of the classroom.

Methods

A Qualtrics survey was used to better understand how students at BGSU feel about their levels of support on and off campus. This survey, titled *How to Help Students Succeed,* was approved by the BGSU Institutional Review Board on October 21st, 2021, as an exemption category 2 submission. *How to Help Students Succeed* asked BGSU students a variety of questions about their personal history before attending BGSU, their course experiences at BGSU, and the levels of support they have outside of BGSU. Please see Appendix A for a full list of the survey questions.

The survey went out to professors that I contacted via email who then posted the survey to their canvas shells or sent the information out to their students. Professors were picked based on the classes they taught. Emails went out specifically to professors who mainly taught BG Perspective courses, classes that students took early in their major, and classes that used the LA model. My main goal was to reach as many students as possible from a variety of majors. Students were not required to answer every question, only questions that they felt comfortable answering and that applied to them. They accessed the survey via a link that they either saw on their course website, in an email from a professor, or from the Honors College canvas shell.

Survey Questions

The beginning of the survey asked many quantitative questions to better understand if the subjects were STEM majors, non-STEM majors (Question 6), how long they had been at BGSU (Questions 3-4), and if they were a first-generation student or continuing generation student (Question 5). I also asked for the student's gender identity and ethnicity (Questions 1-2). These questions allowed me to better understand the ratios of underrepresented students that answered my survey to base my conclusions on. Additionally, respondents filled out information about their highest levels of math and science taken in high school (Questions 21- 22), their ACT score (Question 24), and their high school GPA (Question 23). This gave me a better insight on student's academic performance did prior to coming to BGSU.

Students who took the survey also had the opportunity to answer whether they have switched majors and if they did, did they switch out of or into STEM from a STEM or non-STEM major (Questions 7 -8). The next set of questions asked whether students have participated in research (9-11), as students who have participated in research tend to better understand their field of study and usually within the STEM field, feel more validated as a scientist (Starr, 2018), so they are less likely to switch majors. A series of lab questions aimed at students who had taken a lab credit sought to better understand how student learning in the lab was impacted by the attached lecture course. This series of questions also looked into student's opinion on the grading of the lab and lecture course (16-20). Another section of questions was dedicated to problem-based learning. Students were asked if they had been in a problem-based classroom and a classroom with learning assistants (Questions 12-15, 35).

Subjects also answered scaled questions seeing how much or how little they agreed with statements regarding experiencing biases in their field of study and if biases pushed them away from other areas of study (Questions 32). The data from these questions were not strictly

multiple choice, so it gave a lot of information about how different groups a people felt regarding

biases. Students were also asked a rated question about how respected they feel by their

professors and if they are willing to accept feedback from students about the course (Question

33).

The qualitative questions in the *How to Help Students Succeed* Survey started by asking

subjects how COVID-19 has affected their classes for their career and their career choice outside

of the classroom. Students were also asked to elaborate on how supported they felt by both

campus resources and by family and friends in their personal life (Questions 29-31). These

survey questions helped me to have a better understanding on the levels of support students were

receiving and how this has affected their classes, major, academics, and relationship with their

field of study.

Survey Analysis

To analyze the survey results, I used standard statistics such as averages, percentages, and

Excel Pivot tables to better understand the relationship between quantitative data. I read through

qualitative data several times to identify trends. Using the study data, I was also able to compare

percentages to better understand the differences in answers different groups of students. The

Pivot tables allowed comparisons between responses, such as first-generation students that

switched majors and continuing-generation students that switched majors. Some of these

question comparisons decreased the number of responses because not every survey participant

answered every question. Qualitative data responses were treated in a similar way being

categorized into two or three groups, putting answers with the same tone and feelings together.

These categories created themes for the qualitative data and provided context and depth too

quantitative data.

Results and Discussion

Switching Majors

While there were 205 responses to my survey, there were not 205 answers to every question because some of the questions did not apply to every student. Some participants were only willing to fill out the multiple-choice questions, and this could have been due to the time they had available to fill out the survey, or because they were just no longer interested in the questions. Many of the professors I reached out to taught Introduction to Writing courses, which is mainly taken by first year students. Due to this, I think many students wanted to say they took the survey, but only clicked through the questions without taking the time to fill them out. I also saw very few responses to question 7 referring to students who have switched majors. According to withfrank.org, about 80% of students change their major, but in my survey only 22% of students reported having switched majors. This contrast with the existing literature was likely due to my subject base primarily being first year students, about 73% of the students. These students have not had the time at BGSU yet to consider changing their major (Figure B1).

First-Generation vs Continuing Generation Students

When comparing first-generation students who switched majors to continuing-generation students who switched majors, I found that of the 40 students who reported having switched majors, 33% of those students were first-generation students. Of the students who look the survey, 33% reported being first generation students. Since the rate of students switching majors who also identify as a first-generation student match, based on this survey we can say that first-generation students at BGSU do not switch majors at a disproportionately higher rate than continuing-generation students.

Looking at the students who specifically reported switching majors, we see that most continuing generation students who switched majors stayed within the non-STEM or STEM field they were originally in. But in the first-generation students, we see an almost equal rate of change between students switching out of their current field of study (non-STEM to STEM or STEM to non-STEM) and switching majors within their current field of study (STEM to STEM or non-STEM to non-STEM) (Figure 1). Based on this data, first-generation students have a lot more variability in the majors they switch out of and to and are more likely than continuing-generation students to switch out of STEM majors. This could be from a lack of support on campus or off campus (Gaudier-Diaz et al., 2019; Harackiewicz et al., 2014).

Figure 1
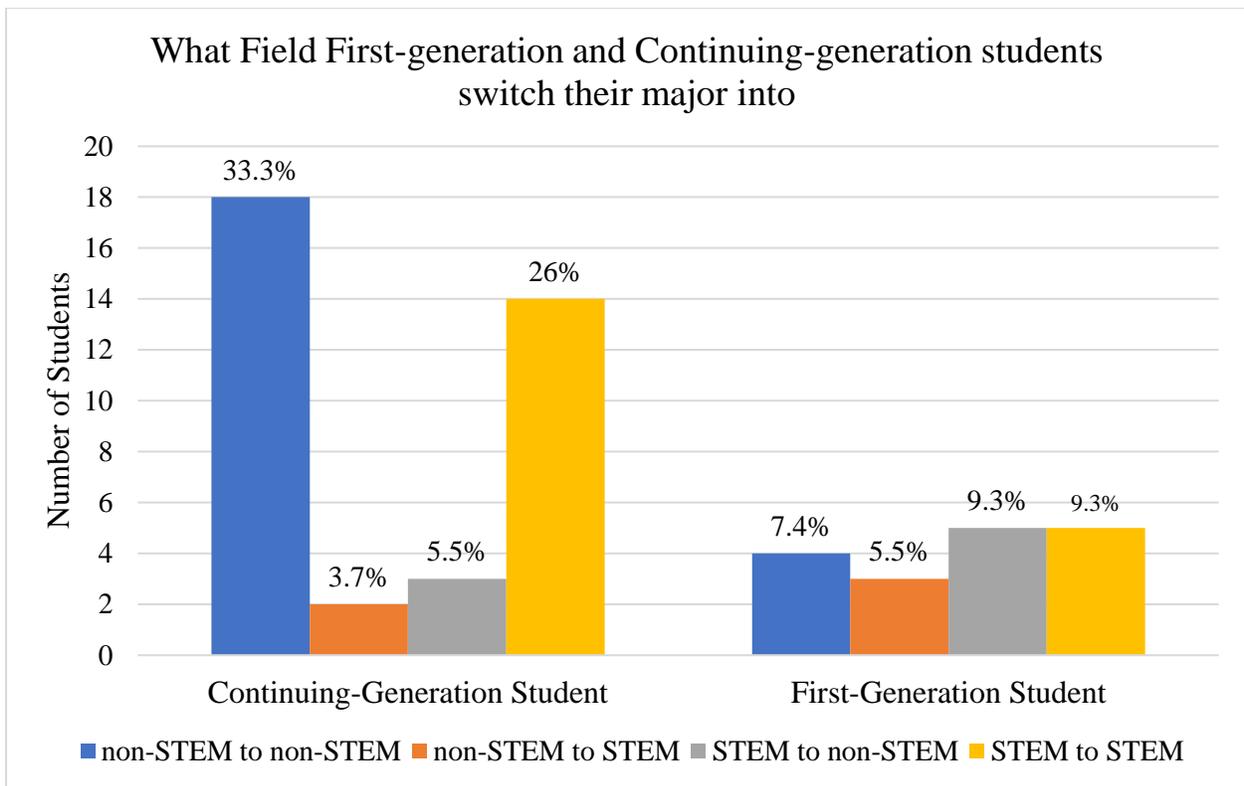
Note. Comparing questions 5 and 8 from Appendix A, this graph shows the difference in rates that first-generation students and continuing generation students switch completely out of their

field of student (STEM to non-STEM and non-STEM to STEM) and switching within their

current field of study (STEM to STEM and non-STEM to non-STEM). First-generation switch

into similar fields of study and to different fields of study at an almost equal rate compared to

continuing generation students who stay within the current field of study at a much higher rate.

Undergraduate Research

Research has established that students who participated in undergraduate research were

expected to switch majors at a lower rate due to feeling more validated in their field of study

(Starr, 2018). From the data obtained from the survey, I found that students who participated in

research at BGSU were just as likely as students who did not participate in research to switch

their major. Students had about a 22% chance of changing their major regardless of their

participation in research (Figure 2).

Figure 2
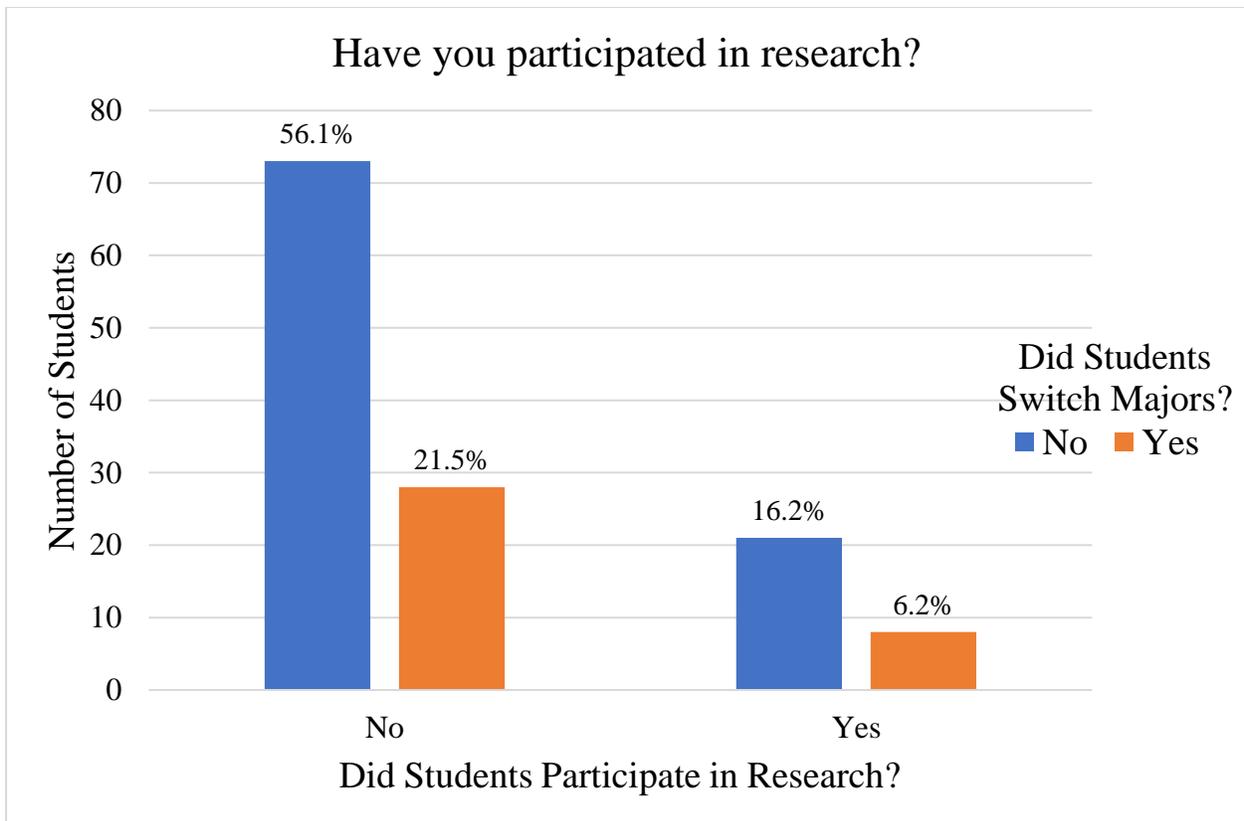
Note. This graph shows the relationship between questions 7 and 9 from Appendix A. A similar ratio between the left two bars of students who did not participate in research and the right two bars of students who did participate in research can be seen. This helps to show that student's involvement in undergraduate research did not change the rates at which students switched majors.

While this data likely reflects the percentages of students at BGSU who have participated in research compared to those who have switched majors, the numbers could have been skewed. Question 9 asked students if they had participated in research and if that research was related to their major. Some students who did participate in research might have answered no or not at all because the research did not pertain to their major. This could have skewed the results and resulted in fewer students responding to the question than have participated in research at the college level.

Class Style Preference

Question 35 prompted students to consider how they best learn in the classroom. Many students prefer to pick which type of class style they would like to learn in (Kiessling et al., 2003). For the subjects first pick, they were the most likely to pick a problem-based classroom. Students most preferred second choice was the LA model. And the most picked third option was a lecture-based classroom. While some students did prefer a lecture-based classroom, it was the third option pick (Figure B2).

Effects of COVID-19

There was a wide range of answers for how COVID-19 has affected students views on their career choice and major (Question 25). Overall, students who felt that COVID-19 has affected their view on the major, expressed that they were more aware of what can happen in

their field of study. Many students realized how much work might have to go into their future job and the potential dangers they could be exposed to. One subject said, "it's given me a whole different outlook into nursing." STEM students in the healthcare field have had more of an eye-opening experience than other career fields affected by COVID-19 (Table B1). While other fields like teaching have had a lot of changes, in healthcare there have been huge changes to both the work environment and the patients being treated. Patients are dying at a might higher rate due to COVID-19 which is extremely difficult for healthcare workers to see and go through every day. Healthcare worker's chance of dying just from being on the job is also a lot higher due to COVID-19. The combination of new risk factors and the change in the environment of the job have just greatly changed, and it has caused a change in perspective that not many other fields besides healthcare have experienced to the same degree.

Even more students felt their views were unaffected by COVID-19, but also acknowledged that there are new challenges in their field even if it did not persuade them to change their perspective. A student who felt their views were unchanged commented, "It makes my dream job difficult, but not impossible," seen in Table B1. Feedback from question 26 also reflected this split of student's feelings. Many subjects did not like online courses and felt remote learning was more of "a chore compared to in-person." Others still preferred in-person courses or felt it was "useful having a mix between in person and online classes" but did not feel their views on their career choice were changed because of it (Table B2). Question 27 prompted students to consider their feelings based on how the lives of the people in their future jobs have changed. For some, the changes that have resulted from COVID-19 made their job more appealing. Many jobs have shifted online, and one student's take is that the pandemic is "the best thing to happen to public accounting" so that accountants can work from home or anywhere with a computer. Other

students "haven't thought about" the effects on people currently in the field and some have

realized that they "could die from trying to save" others in their future career (Table B3).

Students who mentioned their choice of going into the medical and teaching fields had stronger

opinions on how COVID-19 has changed their views compared to students who did not mention

their career path.

BGSU Resources

Resources Used

Students also reported what resources on campus they used in question 29. Most

commonly, students used academic resources such as office hours, the learning commons, and

reaching out to their professors and advisors. A smaller number of students also reported using

the counseling center. When I compared the number of continuing-generation students to first-

generation students who mentioned the counseling center in their answer, 4 of the students were

first-generation students and 15 were continuing generation students. Of the students who

participated in the survey, 33% of the 196 students that answered question 5 were first-

generation students. The number of first-generation students that mentioned using the counseling

center was only 22% of the 19 students that mentioned using counseling services. I would have

expected that about 1/3 of the students who mentioned the counseling center in their question 29

answer to have been first-generation students since 1/3 of the students who participated in the

survey were first-generation students. This means that first-generation students use the

counseling center at a lower rate than continuing-generation students on campus. If first-

generation students were using counseling services at the same rate as continuing-generation

students, the survey data would have shown the same ratio of first-generation students using

counseling services as taking the survey.

Suggested Resources

Additional response gathered regarding campus resources for students focused on mental health and peer support. Question 31 prompted students to give any suggestions for resources that BGSU should offer to students to extend their support (Table B4). Many of the suggestions focused on mental health services. While the counseling center is seeing students in person currently, it was previously only online in the spring of 2021. Services from the counseling center are currently offered both in person and online. But with online counseling sessions and online classes there is a large conflict. Students in on-campus housing have a hard time finding a private place for counseling sessions. One student talked about her struggles with having to "kick (their) roommate out for an hour" just so they could attend their therapy appointment. There are no designated spots that you can reserve that are private for a telehealth appointment. This could be a resource that BGSU could offer to better accommodate students and give them a private space to use the resources that already exist on campus. While this is an issue regarding healthcare appointments, quiet private spaces are also needed for students to take tests. Classes are switching to more and more online exams. Many students are expected to be able to find a spot on-campus to use a lockdown browser and webcam recording while they take an exam and this task alone can be more difficult that taking the actual exam, especially for those students who have roommates or do not live alone. Private, quiet spaces on campus would benefit students both personally and academically.

Another area that some students felt that there should be more support in was with mentorship. While 15 students specifically mentioned using their advisors for help in question 29, some students want help from fellow students (Table B5). Sometimes this advice comes from friendships that you make in classes, but that is a lot harder to do with online classes and students

still want the opportunity "to make friends" on campus outside of class. One way to help

students support each other would be through a mentorship program. One student suggested

creating groups of "juniors and seniors to (guide) freshman and sophomores" and another

mentioned underclassman being paired with an upperclassman buddy in your major that you

could go to for advice. Many organizations on campus offer their resources to their members like

the President's Leadership Academy, ACTION, and most majors within the college of education.

Students should not have to join specific majors or programs just to have access to advice from

other students. Research has shown that peer mentoring programs can help the transition to

college and have improved retention rates in undergraduate programs (Ward et al., 2014). The

LA model used in several classes offered at BGSU also offers a source of mentorship to students.

Students are able to reach out to their LAs for both class-related help, but also advice on what

classes to take next and how to get around on campus. This is an excellent source of mentorship

already on campus at BGSU, but it needs to be more accessible. Students do not know if the

class they are signing up for uses the LA model or not. If students were able to see during

registration which courses use the LA model, they could better customize their schedule to their

needs. When students can choose classes that best fit their learning styles and needs, they feel

more supported (Kiessling et al., 2003). A peer mentoring program could be a resource that

BGSU should create to help its students better support each other more easily, whether that's by

major or college or just underclassman paired with upperclassmen, many students would benefit.

Additionally, allowing students to see what format and style of class they are signing up for

during registration would give students more support on campus.

Conclusions

All things considered, the drastic numbers I expected to see between different student groups in my survey were not observed. There were no significant differences between rates of students who switch their major between first-generation students and continuing generation students. There were also no strong leaning opinions on COVID-19 affecting student's opinions on their majors, it was very split between being affected and unaffected, and most of the responses felt that they just understood more about their field of study because of COVID-19. One statistic that supported my initial theories was that they on average students preferred problem-based classes over lecture-based classes. Surprisingly, amount of research did not greatly affect rates at which students switched majors. Between the wording of my question leaving room for open answers and how many first years answered the survey, this could explain why there were greater differences seen in the data. Question 9 asked students if they were involved in research and additionally if they had, was if related to their major. The wording of this question could have caused some students to leave it blank if they had participated in undergraduate research, but it did not relate to their major. Question 10 asked students what role they held in their research and this question was too ambiguous. Many undergraduate researchers help complete research under a professor and might not have an exact role but are still gaining experience in the field. If I were to send out another survey, I would leave question 9 as a simple yes or no question, and would combine question 10 and 11 to ask "Did being a part of undergraduate research help you better understand your field of study? Yes or no? Please explain." I think student responses would have been a better way to collect the information on how students felt research has guided their career choices.

One of the most impactful questions on this survey (Question 31) allowed students to suggest changes to what is currently offered that they think would benefit students on campus.

While no two answers were the same, many of the student's open responses stemmed from changes in how BGSU handles mental health among the student population. The responses from question 29 showed that many of the students who responded to the survey take advantage of the academic resources that BGSU has to offer such as the learning commons, advisors, and professors office hours. While some students indicated making use of counseling services, most of the respondents were continuing-generation students as opposed to first-generation students. The counseling center is open to all students, but its resources do not always reach everyone in need. On the website, there are links for how to recommend a fellow student, a link for professors to recommend students, and a link for parents to recommend students. But first-generation students do not always have as much support from their parents or from home based on previous research (Starr, 2018; Gaudier-Diaz et al., 2019). First-generation students might not have the parental support to be pushed to seek professional help when struggling, or a parent there who understands the stress they are going through (Gaudier-Diaz et al., 2019). It is my suggestion that for the counseling center to reach both continuing-generation students and first-generation students equally, they need to employ more outreach to all students in general. For example, I get calls about once a semester from the career center asking if I need help with my resume or finding a job. If the counseling center did something similar, taking the first step to reaching out for the students in need, they could reach an even larger number of students who need the help. Displaying the counseling services on a hard to navigate website keeps students from taking advantage of the help that is already offered on campus. Employing more active outreach to the student body through calls instead of just an online list of resources could help a much larger number of students.

Another point that was made, was that students who do use the counseling center or other health related services on campus like the falcon-health center, have no place to take their calls and appointments. With COVID-19, the world of telehealth has grown exponentially, and for people living in their own home, this is ideal. But for students who live on campus with many roommates and little privacy, this is a nightmare. Access to private, quiet spaces is essential for students to be able to make their appointments with their counselors or doctors. These spaces could even be reserved for interviews, or big online tests. There are copious study spaces on campus, but no guaranteed private, quiet spaces, and these are what students need to be able to use the services that BGSU offers.

Overall BGSU does a good job of accommodating all its students to the best of its abilities, but there is always room to grow. Underrepresented students will always need extra help to be at the same level as regular students, until there are no longer underrepresented students which is a long way out. Creating private, quiet spaces for students to use the services that BGSU has to offer would be a huge step towards supporting its students more. When supports like private quiet spaces, mentorship programs, and counseling center outreach come together, students will be able to pursue the career that they want without a lack of resources, biases, or barriers holding them back.

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Appendix A

How to Help Students Succeed Survey Questions

Multiple Choice Questions

1. Which do you most identify with? (Choices: Female, Male, Non-binary, other ____)

2. What ethnicity do you best identify with? (Choices: American Indian or Alaskan Native,
    Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White,
    Other ___, Prefer not to say)

3. How many school years have you been at BGSU? (If this is your first year, count it as 1)
    (Choices: 1, 2, 3, 4, 4+)

4. Based on credit hours, what year are you at BGSU? (Choices: Freshman, Sophomore,
    Junior, Senior, Other please list ____)

5. Are you a first-generation student or a continuing-generation student? (Choices: First-
    Generation Student, Continuing-Generation Student)

6. Is your current major STEM or non-STEM? (Choices: STEM, non-STEM)

7. Have you switched majors? (Choices: Yes, No)

8. If your major has switched, was it from: (Choices: STEM to STEM, STEM to non-
    STEM, non-STEM to STEM, non-STEM to non-STEM)

9. Have you ever participated in research at the college level? If yes was it related to your
    major? (Choices: No, Yes ____)

10. If you participated in research, were you apart of the investigation team or were you the
    investigator? If yes, please list role. (No, Yes___)

11. If you participated in research, did it help guide your field of study? Please explain how.
    (Choices: No, Yes___)

12. Have you ever been in a problem-based classroom at the college level? (Choices: definitely not, probably not, might or might not, probably yes, definitely yes)

13. If you have been in a problem-based classroom, did you like it better or worse than a lecture-based class? (Choices: definitely not, probably not, might or might not, probably yes, definitely yes)

14. If you have been in a problem-based classroom, did you feel it was an effective learning tool? (Choices: definitely not, probably not, might or might not, probably yes, definitely yes)

15. Have you ever been in a class that uses the LA model with learning assistants? (Choices: definitely not, probably not, might or might not, probably yes, definitely yes)

16. If you had a lab, was the grade for the lab alone, or was it tied together with a lecture course? (Choices: My grade was for the lab alone, My grade was combined with my lecture grade, Other please elaborate ___)

17. If you've had class with a lab, did you feel the content in the lecture part of the class correlated with the content of the lab? (Choices: definitely not, probably not, might or might not, probably yes, definitely yes)

18. If you've had a class with a lab, do you feel you would have learned more or less if the lecture and lab section content had been more connected? (Choices: definitely less, probably less, neither more or less, probably more, definitely more)

19. If you had to take class with a lab again, or for the first time, would you prefer the lecture section and the lab section to relate more or less? (Choices: definitely less, probably less, neither more or less, probably more, definitely more)

20. If you had to take class with a lab again or for the first time, would you prefer the lecture

    section, and the lab section grades to be combined or stay separate? (Choices: Definitely

    separate, probably separate, indifferent, probably combined, definitely combined)

Extended response Questions

21. What is the highest level of math you took in high school?

22. What is the highest level of science you took in high school?

23. What was you high school GPA?

24. What was your ACT score?

25. Do you feel COVID-19 has affected the view you have on your career choice/major?

    Please explain.

26. Have your views changed based on how your classes have changed (in-person vs online)

    sue to COVID-19? How so?

27. Have your views changed based on how persons lives in the career/field you want to go

    into have changed due to COVID-19? How so?

28. Have you ever had a class with a lab at the undergraduate level? Please list all classes that

    apply, (specifying if a lab taken was not attached to a lecture course).

29. Please list any resources you have used on BGSU's campus (ex: learning commons,

    counseling center, office hours, etc.)

30. Do you feel your success at BGSU is based on the level of support you have in your

    personal life and through campus resources? Please elaborate.

31. Are there any resources that BGSU should offer? Please explain.

Ratings Questions

32-34: Participants filled in bubbles in a matrix table to rate their response to the statement. Each table had 5 rankings: Strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree.

35: Participants were asked to rank from highest to lowest the three class types: problem-based learning, lecture-based learning, and LA model

32. Matrix 1 Statements: I have experienced biases in my field of study, I have experienced these biases prior to choosing my field of study, Biases I felt about a field of study pushed me away from that study (ex: biases in education pushed me to business), If there were no biases, I would be in a different field of study, I have experienced biases in my field of study at BGSU

33. Matrix 2 Statements: My professors accept mid-semester feedback or feedback during the semester, My professors have changed or modified their course based on feedback, I feel respected by my professors, My time feels respected by my professors (ex: timely feedback, amount of homework, on time to class), My professors allow make-up assignments, My professors do not allow for make-up assignments, but I would be a lot more successful if they did

34. Matrix 3 Statements: I feel there are resources on campus that support me through my time at BGSU, I have used resources offered by BGSU, I feel supported by the people in my life (family, friends, etc.)

35. If you had the opportunity, would you prefer to pick classes based on the type of learning techniques they were going to use (problem-based, lecture-based, LA model)? Please rank which learning technique you would prefer to have, top being most favored and bottom being least favored.
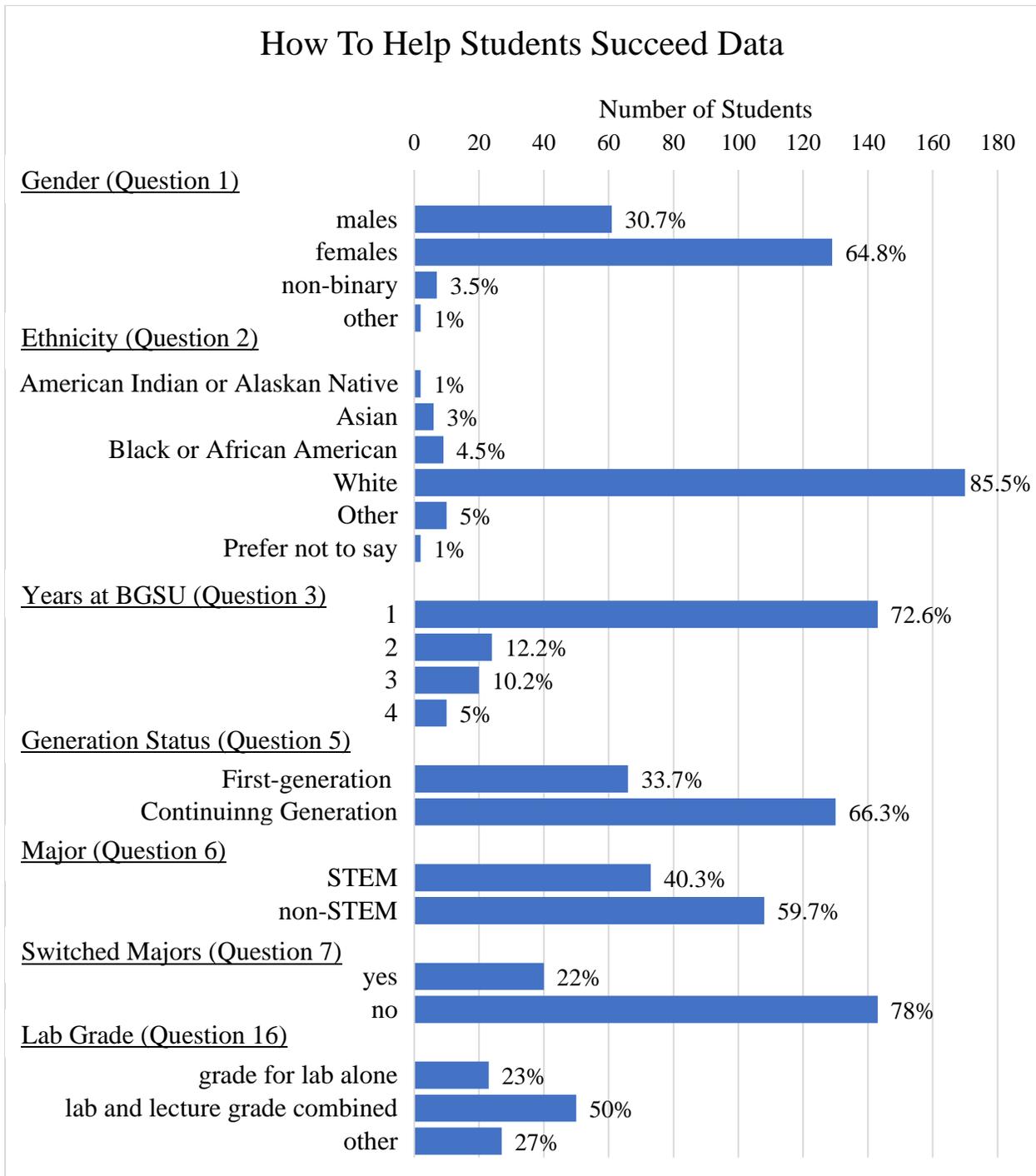
Appendix B

Supporting Figures and Tables

Figure B1. This figure depicts the answers given to questions 1-3, 5-7, and 16 in the survey. This

data helps us better understand the demographics of the participants of the survey and apply

them to the other survey results. The percentages next to each bar are based on the percentage of

students that answered each question and the length of the bars corresponds with the number of

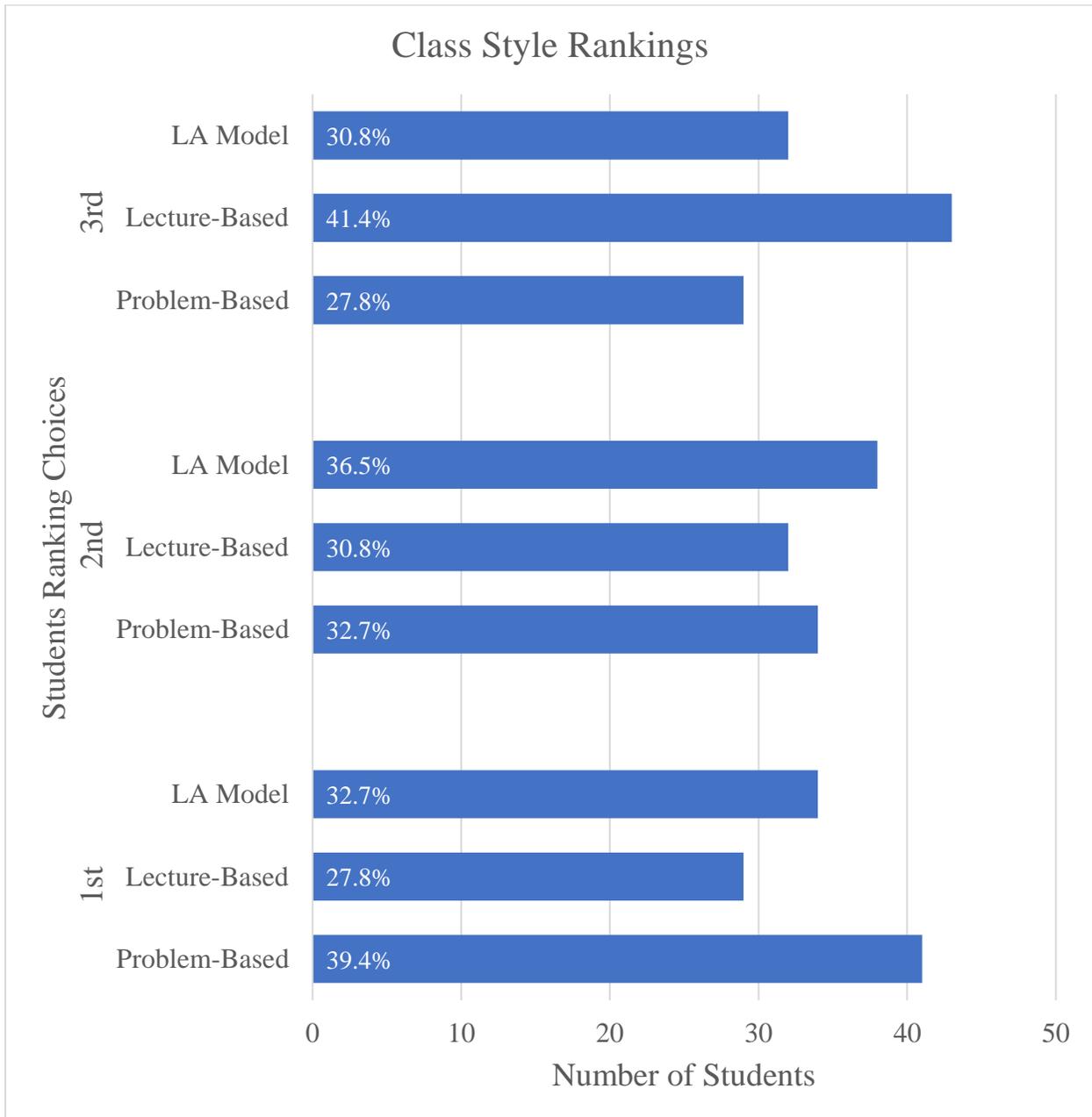student responses based on x-axis labels found at the top of the graph.

Figure B2. This figure displays the responses to question 35. Students had to rank the three class

teaching styles (LA model, lecture-based, or problem-based) based on their first pick, second

pick, and third pick. The bottom three bars show how often the options were the students first

pick, the middle three bars the students second pick, and the top three choices the third pick.

Question 25 Responses

Yes, healthcare professionals have been abused, poorly treated, and overworked even worse than usual throughout the pandemic.
Yes, it has opened my eyes to the realities and difficulties that can come with teaching math education.
Yes, as a nursing major it's given me a whole different outlook into nursing
Yes, it pushed me away from non essential jobs.
yes, I feel that their are less jobs and competition has grown
I think it has made certain learning aspects and environments less accessible, but overall has not changed the personal view I have on my choice.
No, I don't think it has changed, if anything it strengthes my view on my choice
No. It makes my dream job difficult, but not impossible. I have stuck with it.
It broadened my perspective on different ways to make a living after college.
not really but it gave me time to realize that I need to just go after what I want rather than just the safe option.

Table B1. This table lists some of the responses to question 25 in the survey. Student responses

who were in the healthcare field felt more impacted by COVID-19 than other students. Many

now better understand the scope of their future career, even if they felt COVID-19 did not affect

their feelings directly.

Question 26 Responses

I like classes that are ordinarily in big lecture halls when they're online, but hate online classes otherwise. This is more of a safety thing, especially when all that's going on is a lecture with no discussion.
Not necessarily, it just makes it harder to learn
Not at the moment, but it has made remote learning sound like a chore compared to in person. where as we used to love the idea of online learning.
Before COVID i did not mind online classes but now I do not like them
Yes, I feel that it showed me that some classes are very difficult to complete online. However, it also showed me that some classes are easier online.
Yes, I am more worried about being a teacher in the classroom.
Yes I realised how useful having a mix between in person and online classes are
Kind of, I realized that a self paced online environment can be both beneficial and harmful at times.
I am definitely more open to online courses now
I would say the only thing that has changed would be my willingness to work in a hybrid format (some days in office and some days at home)

I feel I learn more with in person classes, but the flexibility of online classes better suits my schedule.

Table B2. Listed are some of the responses to survey question 26. Student opinions were again

split between COVID-19 having a negative impact on their opinion of their career based on the

changes to their classes. Many students noted the changes in difficulty and that they do not prefer

online courses.

Question 27 Responses
Yes, I have realized how much more teachers are expected to do in order to keep students learning at all times.
Yes, it showed me that if I am serious about education, then it will not be an easy journey.
Yes because it scares me a little to think that I could die from trying to save people.
Honestly, Covid-19 was the best thing to happen to public accounting. We can now work from home and not required to go to the client site everyday. We can work for any office from anywhere in the world.
People in the medical field have suffered greatly, especially mentally due to the pandemic
Not really, but it did open my eyes into how important investing your money is.
Honestly I haven't thought about this
Not particularly, as I know how badly overworked many game developers could be well before the COVID-19 outbreak.
Yes, since it is nursing if something like COVID were to happen again I would have to be ready for the hardworking
No. I haven't met many people in my career field
No because by then I think everything will be changed

Table B3. Some of the student responses to question 27 of the survey are in this table. There

were big differences in opinions between students. For some the effect of COVID-19 made their

future career easier and within the comfort of their own home, and for others it made it more

dangerous and a lot harder to deal with. Responses from this question again felt more affected by

COVID-19 when the respondents mentioned their future career was in healthcare.

Question 31 Reponses
Every time I've contacted the mental health resources at say falcon health, they've been booked for months out. Makes it kinda difficult to get therapy when the therapists can't get you in till next semester

Not really any resource but I feel in many STEM courses here, very basic examples are given in lecture but the test has very complex questions. My peers and I sometimes feel unprepared as it is basically new material that we've never seen before.
Allow ebt cards to be used on campus. Many somewhere for students to rest/ nap if they are a commuter student. Having a six hour difference between two classes is hard for commuters.
Maybe specific spaces for students who need alone time to relax in, like a one person room with blankets and pillows and low lighting for people to relax
Death grieving
More personalized academic advising
Private rooms to do tell-a-health for the counseling center. It is very difficult to seek out counseling when I would only be able to do tell-a-health. This would force me to kick my roommate out for an hour or so in order to attend my appointment.
better transfer resources and qualities
Quiet spaces. I get very anxious and would like it for there to be designated places for me to decompress.
more help with figuring out majors and scheduling classes.
not that I can think of, the only change I would make is a better policy about absences especially in covid times, if you wake up one day feeling sick you should be able to stay home from class without losing points because at this point you never know if you have covid or if you have been exposed and sometimes you can not get tested right away.
a senior "buddy" in your select major to tell you its okay and that they were there once two and explain how they got to where they are/ tips
I think it would be extremely helpful if BG offered more direct support to students with ADHD and ADD. Both can make learning and getting work done by strict deadlines extremely difficult and having assistance, or ever more awareness on the proffessors part would be nice.
Peer Group. Like a group with a lot of juniors and seniors to guild freshmen and sophomore
The library should not close. Like other major R1 institutions, it should be open 24/7. Learning and studying should not be limited by hours of business.
I feel like they need to also look for ways to help the non tradital students more. I
An anonymous way to make report about professors behaviors or unfairness is class.
Easier ways to get ahold of health care and ways to make friends in a less public setting
More timely counciling, they are always booked out weeks in advance.
Mental Health breaks!!!!!!!!!!
A functioning shuttle service or a closer parking lot. Also, more sidewalks once you get closer to the edge of campus. It it stressful going back to my dorm at night, in the dark, without any true path to follow.

Table B4. This table has some of the responses to question 31 of the survey. Many of these

responses focused on changes that could be made to the mental health support that BGSU offers

and mentorship programs.

Common Question 29 Responses

Office Hours	Library
Learning Commons	Advising
LAs	Admissions
Open Labs	Life Coach
Academic Peer Mentor Program	Peer Leaders
Counseling Center	Workshops
Curriculum Center	Pre-Professional Offices
Pharmacy	HLC Events
SMART Program	Athletic Advisor
TA Office Hours	Academic Advisor
Drop in Tutoring Sessions	PSA Advising
Work Order	See it, Hear it, Report it
TRC	

Table B5. This table lists some of the common resources that respondents used on BGSU's

campus. Many of these were repeated and students often listed several resources per response.