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Introducing Structural Engineering Faculty into Beginning Architectural Design Studios Taken by Architectural Engineering Students

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Including Structural Engineering Faculty in Beginning Design Studios to act as Mentors for Architectural Engineering Students

Abstract

As students begin their educational career, they are often unable to initially interact with professors who are experts in the major of study they have chosen. In many programs, students take general education and prerequisite courses in their first few years before taking courses taught by professors in the program major of their choice. This can potentially lead to students feeling isolated and left questioning whether their choice of study was the correct decision. With retention being an important issue in every higher education program, if interaction with experts in a students' field of study could happen earlier in the program, this interaction might foster an increase in retention, providing students with a fuller educational experience.

For Architectural Engineering students in a program with both Architectural and Architectural Engineering majors, measures should be taken to ensure that all students feel they are a part of the program. So how can a program achieve a sense of belonging where students largely enroll in basic introductory courses during their first year and a half of the program, at which time they have little to no interaction with the Architectural Engineering faculty? One method being investigated is to include a Structural Engineering faculty member in the introductory architectural design studios. This interaction allows both Architecture students to be introduced to structural concepts, and Architectural Engineering students to feel more fully immersed in the program through their interaction with engineering faculty.

This paper will present an overview and assess the relative success of a faculty staffing change in which a Structural Engineering professor is introduced into beginning architectural design studios with the intention of interacting with both Architecture and Architectural Engineering students. A literature search will outline related research in undergraduate programs on this topic and method of instruction. Results of a survey given to students across the two-degree majors on this topic will be included, with conclusions, thoughts, and recommendations pertaining to this revision within the programs.

Introduction

Students beginning their career in higher education typically enroll in basic introductory courses that are taught by professors outside of their declared major. This can make a student feel distant from their chosen major, and potentially lead to a lack of retention. Interaction with professors from a student's chosen major in the initial semesters of higher education might be advantageous in getting them involved and integrated into the program they have chosen. A report by the President's Council of Advisors on Science and Technology published in 2012, suggested that the first two years of college are the most critical to the retention and recruitment of STEM majors [1]. Often curriculums have introductory courses for each program, and these are typically taught wholly or in part by professors who are experts in a student's field of study. However, there is often only a brief amount of time in courses of this type dedicated to interacting with each student, which is commonly a result of the large class sizes and minimal credit hours for these introductory courses. In a study by Morrow and Ackermann in 2012, they suggest that faculty support has a small, but significant positive relationship with intention to

persist at their university [2]. Other recent work also suggests that developing meaningful relations with instructors is associated with less students leaving STEM fields and that an unwelcoming atmosphere from faculty in STEM courses is one reason for their departure [1]. So how does a program increase the interaction of professors with expertise in specific majors of study and ensure that they can interact and mentor beginning students in their programs? One possible method is to allow more faculty members to interact with beginning students by having the faculty be involved with courses taught in the initial years of a curriculum. It is this premise that makes up the basis of the research for this paper.

For Architectural Engineering students in a program with both Architecture (ARCH) and Architectural Engineering (ARCHE) majors, it is important for students in their initial years of these programs to interact with professors from both majors. However, architectural design studios at the beginning of the curriculum are often taught solely by Architecture faculty, with little to no interaction with Architectural Engineering faculty. This lack of interaction with the engineering faculty in the initial semesters of the curriculum could be a reason for retention issues in the ARCHE program. As a result of this issue, a revision to the faculty assigned to courses in the curriculum has been attempted to determine if better retention can be achieved in the ARCHE program. To provide equity and to foster a sense of belonging in the Architectural Engineering program, a Structural Engineering faculty member has been introduced into the first-year architectural design studio taken by both Architecture and Architectural Engineering students. Note that throughout this paper, the terms *Structural Engineering* faculty and *Architectural Engineering* faculty are used interchangeably and are intended to have the same meaning.

The relative success of this faculty change is examined utilizing two student surveys. One survey was sent at the beginning of the semester and the other was sent near the end of the semester to determine if first-year Architectural Engineering students feel a stronger connection to their major. These results will be compared with students in other years of the program that did not have a Structural Engineering faculty member in their initial architectural design studios. The survey sent at the beginning of the semester went to all current students in our programs, both ARCH and ARCHE majors. The survey sent near the end of the semester was only sent to the first-year students in the architectural design studio in an attempt to identify if their perspectives on having an Architectural Engineering faculty member present in the architectural design studio was altered during the semester. Results of the survey were also used to address the perspectives of ARCH majors and to determine if a Structural Engineering faculty member enriched their architectural design studio environment.

An Overview of Our Programs

The degree offerings at Oklahoma State University (OSU) include accredited programs in Architecture (NAAB) and Architectural Engineering (ABET). The Architectural Engineering program originated in 1909, and six years later a degree in Architecture began. Students and faculty associated with both of these degree programs are part of what is currently the School of Architecture at Oklahoma State University [3]. The program is unique in that it is one of only a very few programs in which the ARCH and ARCHE programs exist in the same school. Our program focuses on professional practice of building design and construction, and the interaction of the students in the two majors is a precursor to what they will encounter upon graduation and

entrance into the professions. The programs are currently structured such that students take many of the same courses at the start of the curriculums, before dividing and concentrating on the courses that make their majors unique. At the end of the curriculum, the students come back together in the capstone design course, where they act on interdisciplinary teams to arrive at solutions for a semester-long building project. The number of ARCHE graduates from our program has been historically low, and one reason for this is the number of students who change their declared major to either design, or they leave our program entirely, in the initial two years of the curriculum. It is this condition that warranted a change in the way we approach teaching and mentoring beginning students in our program.

Literature Review

A review of literature found that most studies regarding early faculty involvement and mentoring of students within the first few years of their academic careers were focused on the STEM field as a whole and there are limited studies specifically addressing ARCH and ARCHE students. The role of an Architectural Engineering faculty member in an architectural design studio is also limited in research, but it is hypothesized that introducing an ARCHE faculty member into the beginning design studio will result in an increase in persistence for ARCHE students while also enriching the design studio experience for ARCH students. For this paper, persistence can be defined as a student pursuing their chosen major until graduation.

Since ARCHE students in our curriculum typically do not have courses taught by an ARCHE faculty member until their third year, the ARCHE faculty may not have an opportunity to guide students through what may be the most critical years regarding the student's retention and persistence. A focus on the results of this study is to discover if the introduction of a Structural Engineering faculty member in the first-year design studio correlates to the research conducted regarding the STEM field.

A report by The Structural Engineering, Engagement, and Equity Committee (SE3) of the Structural Engineers Association of Northern California was studied and utilized in establishing the survey questions sent to each student in our program to determine if there is a correlation between our program and the results that represent a larger population of students. The SE3 report found that 46% of Civil/Structural Engineering students considered switching majors during their undergraduate career [4]. With such a large percentage of students considering switching majors, it is important to understand why.

Mentoring of Beginning Students

Thevenin, et. al studied how perceived self-efficacy, motivation, and the presence of mentors and role models can influence occupational and academic behavior, pursuits, and success for construction-education. Their research suggested that students with a person of influence have higher self-efficacy and motivation toward successful performance in their construction education [5]. While our study focuses on whether a Structural Engineer faculty member can be a mentor and/or role model for students, it does not determine if the faculty member is the primary person of influence.

There are multiple options on how to incorporate mentoring within the architecture, engineering, and construction (A/E/C) related majors. One mentoring model is the P⁵BL pedagogical approach which stands for *Problem-*, *Project-*, *Product-*, *Process-*, *People-Based Learning*. Fruchter and Lewis utilize mentors and role models to engage students with a deeper understanding of being on a cross-disciplinary design team. This experience was designed to facilitate team interaction with professors, industry mentors, and owners that provides a structure for modeling and coaching which scaffolds the learning process [6]. The structure of that program is similar to the capstone course in our program, referred to as *Integrative Design Studio,* taken by fifth-year ARCH and ARCHE students where they interact with professors and industry professionals as they progress on a semester long design project.

The use of learning communities or first-year seminar courses in higher education to improve retention of students has been studied by Meyer, et. al. The purpose of those courses is to provide first-year students with a basic understanding of architecture and architectural engineering while developing the study habits and time management skills required to be successful in these majors. Meyer, et. al suggests their study gave clear evidence that instruction given in the learning community on the topic of student success strategies does matter [7]. This program is similar to the *Introduction to Architecture* course, a two-credit hour course taken the first semester of the curriculum by all students in our programs. This introductory course at our university also includes student success coaches consisting of upper-level students in the ARCH and ARCHE programs who act as mentors and role models for the first-year students.

An Overview of the First-Year Design Studio

Under the current curriculum Architectural Engineering students do not enroll in classes taught by a Structural Engineering faculty member until the fall semester of their third year. The introduction of an ARCHE faculty member in the architectural design studio engages students in the spring semester of their first year. Additionally, as a prerequisite to the design studio, students have completed the *Introduction to Architecture* course which is instructed by an Architecture professor. It is important to know this information as the structure and format of the beginning design studio is presented.

The first-year design studio introduces architecture as dependent upon 2D and 3D systems of order and helps to stimulate an interest in, curiosity about, concern for, and basic understanding of design. This instruction is currently provided by a team of five faculty members, comprised of four architects, one structural engineer, and in addition, one fifth-year architecture teaching assistant. The faculty members divide the design studio into five sections that consist of both ARCH and ARCHE students. Each faculty member is responsible for providing critiques, instruction and grading for their individual section of the studio. For this initial offering of the course with an ARCHE professor, the fifth-year architecture teaching assistant is paired with the Structural Engineering faculty member.

The design studio projects focus on developing students graphic journaling, basic design principles, skills in abstraction, composition, physical, and digital craft. This can be potentially problematic when selecting a Structural Engineering faculty member since graphic communication is not a common focus in most engineering curriculum or in practice. The Structural Engineering faculty member needs to have the ability to enhance the first-year

students artistic sketching skills and provide software expertise on programs rarely used in the structural engineering profession (i.e., Adobe Photoshop, Illustrator, and Rhino).

The first project for the students introduces them to sketching, drawing, shade, and shadow. The students learn to use a journal as an instrument for communicating and storing ideas or thoughts. They are asked in the first assignment to graphically communicate how to draw various objects in a quick sketch. Highlighted in Figure 1 is an example of a student's sketch of their car. Figure 2 is an example of a student's study of shade and shadow on an object that they also included in their journal. Although in these two examples it may appear these students either possess a natural artistic ability or have previous art experience, it has been observed that many of the students going through the program, and particularly the Architectural Engineering students, have little to no previous experience with art. This is somewhat unique when compared to other majors with artistic characteristics, such as Fine Arts or Music, where most students have developed some basic principles prior to attending their university courses. For ARCHE students who have not previously had an art class, this can often lead to a disconnect of their chosen major and could cause students to question if this is the correct major for them. The faculty must be able to express to all students the need for the ability to sketch. While ARCHE students may not need to sketch a hand, car, or tree in practice, the development of drawing skills through these exercises allows them to develop sketching abilities that will be useful in practice at meetings with design team members and clients, and at the construction site as they communicate to contractors.

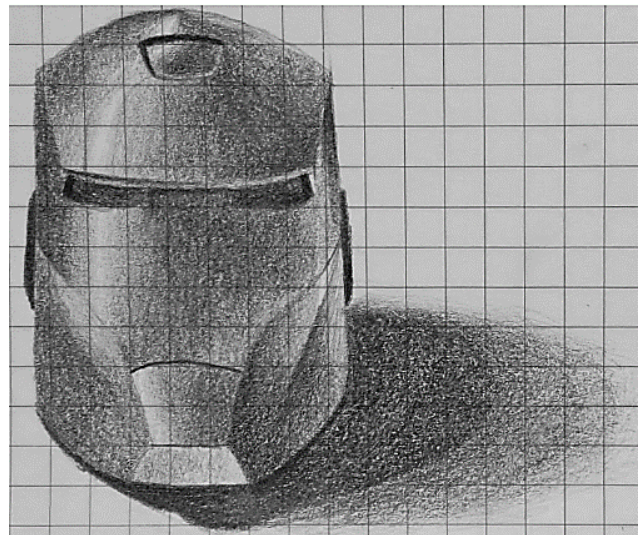

Figure 1: Student Example of Sketching

Figure 2: Student Example of Shade and Shadow Drawing

The second and third projects in the semester continue to develop the basic principles of design while the fourth project in the semester begins to introduce basic structural engineering principles. This project involves the students developing a model of a bridge that spans a set landscape and encourages them to explore the potentialities within a simple span in form and

structural logic. One example of a student's work on the bridge project is presented in Figure 3. The students are often asked to develop their bridges with an artistic representation and in the past have designed the bridges expressing their representation of a utopian or dystopian society. An example of a student's bridge that represented a dystopian society is shown in Figure 4.

Figure 3: Student Bridge Project Example

Figure 4: Student Bridge Project Example

Student Survey and Discussion of Results

To ascertain the influence a mentor and/or role model could have on students early in their educational careers, a series of surveys were presented to students in our program. Towards the beginning of the spring 2023 semester, one survey was presented to those enrolled in the beginning architecture design studio that occurs during the spring semester of their first year. A similar survey was presented to students that have completed their architectural design studios and are in the spring semester of their second, third, fourth, and fifth year of the program. Near the end of the semester, a follow-up survey that was nearly identical to the initial survey was sent to the same first-year students. The only additional question provided in the follow-up survey asked if the student had completed the initial survey.

The initial survey had a total of 121 respondents (n=121) out of 348 students in our program. The follow-up survey had 42 respondents out of a total of 96 students currently enrolled in the beginning architectural design studio. Out of those 42 respondents, 27 stated they did not previously fill out the initial survey, 11 stated they did fill out the initial survey, and 3 students left this question unanswered. Initial questions on the survey asked the students declared major (ARCH, ARCHE, dual major, or undeclared), and a second question asked their year in our programs. Table 1(a) gives a breakdown of the responses, with none of the respondents indicating undeclared as their current major. Table 1(b) provides a similar breakdown of responses from the follow-up survey. There were no respondents indicating a dual major or undeclared as their current major in the follow-up survey.

It is important to the understanding of this survey that since the curriculum has the *Introduction to Architecture* course as a prerequisite to the first architecture design studio, the benefits of this course should be considered within this research. In the fall 2022 semester, approximately 150 students were enrolled in the *Introduction to Architecture* course, however the number of those

students who then enrolled in the follow up first-year architectural design studio the next semester dropped to 96 students. Thus, if the first-year students in their fall semester were asked if they had considered switching majors, it would be expected that approximately 54 students would have responded yes. A future study could investigate the reason behind why these students, which represent over one third of the students who initially enrolled in our programs, switched majors or are no longer with the university.

Table 1(a): Initial Survey Demographics on Major and Year in Program		
Architectural Engineering Major		
	Number of Respondents	**Percentage of Total Respondents**
1st Year	6	5%
2nd Year	8	7%
3rd Year	13	11%
4th Year	10	8%
5th Year	12	10%
Total ARCHE Respondents	49	40%

Architecture Major		
	Number of Respondents	**Percentage of Total Respondents**
1st Year	16	13%
2nd Year	11	9%
3rd Year	18	15%
4th Year	17	14%
5th Year	5	4%
Total ARCH Respondents	68	56%

Dual Major Architecture and Architectural Engineering		
	Number of Respondents	**Percentage of Total Respondents**
1st Year	1	1%
2nd Year	0	0%
3rd Year	2	2%
4th Year	1	1%
5th Year	0	0%
Total Dual Major Respondents	4	4%

Table 1(b): Follow-Up Survey Demographics on Major and Year in Program		
	Number of Respondents	**Percentage of Total Respondents**
1st Year ARCHE	13	31%
1st Year ARCH	29	69%

The current level of persistence within the ARCH and ARCHE majors was measured by asking students if they have considered changing majors during their undergraduate career and if so, what year this was considered. From the initial survey, it was discovered that in total 47 of the respondents stated they have considered switching majors at some point during their college career. A summary of the total number of respondents who have considered switching majors with a breakdown of the year it was considered is provided in Table 2(a). Among the ARCHE students, 41% have considered changing majors at some point during their college career, with 60% of those making the consideration during their first year at the university and 35% considering changing their major in their second year. The ARCH students were less likely to consider changing majors, although 35% considered making a change and 50% of those students considered it during their first year. The remaining 50% considered a change to their major in their second year. These results appear to suggest that a large percentage of ARCHE students are likely to consider changing majors in their first two years in our program, which could be potentially lessened by providing availability to mentors in the form of a Structural Engineer faculty member in the beginning design studios.

Table 2(a): Initial Survey Response on Who Has Considered Changing Majors		
	Number of Students	**Percentage of Students Who Considered Changing Majors**
1st Year	24	51%
2nd Year	20	43%
3rd Year	1	2%
4th Year	0	0%
5th Year	0	0%
No Response	2	4%

In the follow-up survey, the first-year students were again asked if they have considered changing their majors. Of the 42 total respondents, 15 students have considered switching majors (36%). Out of those 15 students, 7 of them were ARCHE and 8 were ARCH. This information translates to 54% of the ARCHE respondents compared to only 28% of the ARCH respondents, suggesting that ARCHE students who are in the beginning architectural design studio are more likely to consider switching their major than their ARCH classmates. A summary of this information is provided in Table 2(b). While the survey results indicate that ARCHE students are still likely to consider changing their major during their first year in the School of Architecture at OSU, it has been the experience of the Structural Engineering faculty member instructing the course, that several students have approached this faculty member to discuss possibly leaving the major. This may suggest that the students view the Structural

Engineering faculty member as a mentor and the ability to have this discussion with someone who is directly involved with the ARCHE major may have an impact on whether that student persists in the major.

Table 2(b): Follow-Up Survey Response on Who Has Considered Changing Majors		
	Number of Students	**Percentage of Students Who Considered Changing Majors**
1st Year ARCHE	7	54%
1st Year ARCH	8	28%

It is difficult to determine persistence of students further in their academic careers since there are fewer students who change majors during their 3rd, 4th, or 5th years, and the older students who took the initial survey are more likely to persist, even though they did not have a Structural Engineering faculty member in their first-year design studio. Continuing to perform this study over the next few years will provide additional information regarding the persistence of students based on having a Structural Engineering faculty member in the beginning architecture design studios. To provide a baseline for the study, the survey asked the non-first year students who had previously considered changing majors if having a Structural Engineering faculty member in their first-year architecture design studio would have made a difference in whether they considered changing majors. Since these respondents did not have an ARCHE faculty member in their first-year design studio, the most common response was that they were unsure, which is understandable. For those that did respond with a definitive answer, it was divided with 8 students stating they would not have considered changing majors if they had a Structural Engineering faculty member in their first-year design studio, and 8 students stating they would have still considered changing majors. However, of the ARCHE students, there were no respondents that stated they would have definitively still considered changing majors if there was a Structural Engineering faculty member in their first-year design studio. Those who responded that they would change majors were ones who had declared ARCH or dual majors in ARCH and ARCHE. This appears to suggest that the upper year ARCHE students may have been less likely to consider changing majors if a Structural Engineering faculty member would have been introduced in their first-year design studio.

To gain a better understanding of why students were considering changing majors, the students were asked for their primary reason for considering a change, with Table 3(a) providing results from the survey. The four main responses reported in the SE3 study were used in addition to allowing students to answer "other" and input their own text response. A majority of the respondents selected option E, "Other". The text results input by respondents for this question were screened to see if they fit into any of the categories asked in options A-D, and to better understand if there was another primary reason for students wanting to change majors that was not directly asked in the survey.

Upon screening the text responses to this question, it was discovered that five respondents considered changing majors to become a dual major in ARCH and ARCHE, or they considered changing from ARCHE to ARCH. These respondents stated it was because they enjoyed the studio courses more, became interested in architecture after the first design studio, or enjoyed the

creative side of architecture more than the analytical side of engineering. There were only two respondents that stated they considered changing from ARCH to ARCHE in the survey. It was further investigated whether there was a correlation between this question and the survey responses to the question "if there was an Architectural Engineering faculty member in your first-year design studio, would you have still considered switching majors." For the five respondents that considered changing out of the ARCHE major, two stated they would have still considered changing majors even if there had been a Structural Engineering faculty member in the first-year design studio, one stated they would not have considered changing majors, and two stated they were unsure if they would have still considered changing majors. While these results appear to suggest that the lack of interaction with a Structural Engineering faculty member was not a primary reason for considering a change in their declared major, it should be noted that as of this semester, many of these respondents have had a Structural Engineering faculty member in their first-year design studio.

Table 3(a): Initial Survey Response to Primary Reason for Considering Change in Major		
	Number of Students	Percentage of Respondents
A. Other majors are less challenging	6	13%
B. I am more interested in a different career	7	16%
C. I am not enjoying the courses in my chosen major of study	6	13%
D. I would have better career opportunities with a different degree	4	9%
E. Other	22	49%

Additionally, from the survey results on this question, three respondents indicated they were not enjoying the major because the first design studios did not have a structural emphasis or that the design studio made them feel like they were able to continue with the ARCHE major. While the intention of introducing a Structural Engineer faculty member into the first-year design studio is to provide mentorship and/or be a role model to the students, it is interesting to note that these two students responded they would not have considered changing majors if there was a Structural Engineering faculty member in the first-year design studio and the other one stated they were unsure if they would have still considered changing majors. Other responses for students considering a change in majors included work-life balance, studio culture, not being creative enough to continue with their chosen major, switching from other majors outside our programs into ARCH or ARCHE, or other conflicts and interests that demanded their attention.

In the follow-up survey, 3 first-year ARCHE students responded their primary reason for considering switching majors was because other majors are less challenging, one student responded they are more interested in a different career, one responded they are not enjoying the courses in their chosen major of study, one student suggested they have too many interests which are causing doubts, and lastly one student switched into the ARCHE major from another major. There were 4 first-year ARCH students that responded their primary reason for considering switching majors was because other majors are less challenging, one student was more interested

in a different career, one switched into the ARCH major from another major, one suggested they loved engineering more, and one stated they did not have much experience with computer design. A summary of the combined ARCHE and ARCH results are presented in Table 3(b).

Table 3(b): Follow-Up Survey Response to Primary Reason for Considering Change in Major		
	Number of Students	Percentage of Respondents
A. Other majors are less challenging	7	47%
B. I am more interested in a different career	2	13%
C. I am not enjoying the courses in my chosen major of study	1	7%
D. I would have better career opportunities with a different degree	0	0%
E. Other	5	33%

There is also a desire to better understand what student's expectations are from the university and whether they expected a faculty member from their declared major to be involved in the first few years of their studies. The students were asked in the initial survey, "prior to attending Oklahoma State University, what year did you anticipate attending your first course taught by a professor in your declared major?" Based on the survey results, 78% of the respondents expected to have a professor from their declared major during their first year at our university. When broken down by major, it was observed that the ARCH students expected to have an Architecture faculty member instructing a course during their first year more than the ARCHE students expected to have a Structural Engineering faculty member instructing a course during their first year. However, all respondents expected to have a faculty member from their declared major instructing courses they take by the third year in our program.

As a continuation to the previous question the students were asked, "as a current student attending our university, what year did you actually take your first course taught by a professor in your declared major?" As expected, the majority of ARCH majors (98%) responded that this occurred during their first year. The ARCHE students had more variation in their responses, with 27% stating their first year, 39% stating their second year, and 34% stating their third year. One important point to consider is that the required statics course, listed on the curriculum to be taken during the second year, is instructed by an ARCHE faculty member, which may be the reason for the variation in the responses of the ARCHE students and the reason they selected first or second year in their responses. Table 4 indicates the responses to this question from the initial survey.

To assess the hypothesis that introducing an ARCHE faculty member into the beginning design studio will result in an increase in persistence for Architectural Engineering students, the first-year non-architecture majors were asked in the initial survey if the presence of an ARCHE faculty member in their first-year design studio created a stronger connection to the Architectural Engineering major compared to instruction solely by Architecture faculty members. These students were also asked if having the ARCHE faculty member offered a unique perspective that benefited their projects. Of the six respondents, five of them responded positively and one

responded that they had not interacted with an ARCHE faculty member at the time they took the survey. In the follow-up survey, 11 first-year ARCHE students responded positively, and one responded that they did not believe the presence of an ARCHE faculty member created a stronger connection to the Architectural Engineering major.

Table 4: Initial Survey Response to Question "*Prior to attending our university, what year did you anticipate attending your first course taught by a professor in your declared major?*"		
Architectural Engineering Students Only		
Response:	**Number of Respondents**	**Percentage of ARCHE Respondents**
1st Year	30	63%
2nd Year	13	27%
3rd Year	5	10%
4th Year	0	0%
5th Year	0	0%

Architectural Students Only		
Response:	**Number of Respondents**	**Percentage of Arch Respondents**
1st Year	57	90%
2nd Year	3	5%
3rd Year	3	5%
4th Year	0	0%
5th Year	0	0%

All Respondents (Includes Dual Major and Undecided)		
Response:	**Number of Respondents**	**Percentage of Respondents**
1st Year	90	78%
2nd Year	16	14%
3rd Year	9	8%
4th Year	0	0%
5th Year	0	0%

The ARCHE students in second through fifth year were asked in the initial survey, "on a scale of 1-5, how beneficial would it be to have an Architectural Engineering faculty member in your first-year design studio?" The average response was 4.2, which suggests that the older students believe that having an ARCHE faculty member in the first-year design studio is very beneficial. These same students were also asked if the presence of an ARCHE faculty member in their first-year design would have provided them with a better connection to the ARCHE major compared to instruction solely by Architecture faculty members. The results were similar to the first-year students' responses, in that of the 46 respondents, 45 responded yes. Lastly, these students were asked, "would the presence of an ARCHE faculty member in your first-year design studio provide you with a unique perspective that benefits your projects compared to instruction solely by Architecture faculty members?" Of the 46 responses, 43 responded yes.

In the follow-up survey, the first-year ARCHE students provided an average response of 4.0 to the question "on a scale of 1-5, how important is interacting with a professor in your declared major within the first year of attending Oklahoma State University?" A 4 on the scale represented "very important." The first-year ARCHE students were also asked on a scale of 1-5, how important is interacting with a professor in your declared major within the first three years of attending Oklahoma State University?" The average response was 4.75, which indicates that they believe it is "extremely important."

For the Architecture students, the question was asked in the initial survey if the presence of an ARCHE faculty member enriched the design studio experience and whether the ARCHE faculty member provided them with a unique perspective that benefitted their project. When looking at the 16 responses of first-year Architecture students, 13 responded yes and the remaining 3 responded that they had not been instructed by the ARCHE faculty member yet. For the 41 responses of second through fifth year architecture students, 36 responded yes and only 10 responded no.

The initial survey results indicated that 39% of the 121 respondents have considered switching majors at some point in their undergraduate career. The follow-up survey results provided to only students in the first-year architectural design studio towards the end of the semester indicated that 36% of the 42 respondents have considered switching majors. While this figure is less than what was indicated in the SE3 survey (46%), it still represents over a third of the respondents in our programs. The survey also appears to corroborate other research that suggests the first couple of years are critical in determining if a student will persist in their chosen major since 51% of students considered switching majors in their first year and 43% considered a change in their second year. Because the survey results indicate the importance the first two years of a student's undergraduate career are in determining whether they will persist in their chosen major, it appears to be worth implementing the faculty change to include a Structural Engineer faculty member in the introductory architecture design studio in order to become a role model and/or mentor for the ARCHE students to improve retention and persistence in the program.

Conclusions and Future Study on This Topic

How can a program ensure that beginning students have proper access to instructors and mentors that are representative of their chosen major of study? One method is to integrate them into courses in the initial year of curriculums to allow interaction with students that could be effective in retaining students in the program. Further study is needed on this topic, however, an initial review of the changes made to the faculty included in beginning architectural design studios at Oklahoma State University indicates that making these types of adjustments to beginning courses might be a step in the right direction.

This study has some limitations, with one being that the survey was sent only to current students enrolled in the School of Architecture. To acquire a better understanding of why students have left their original major, the study could be expanded to include students who have switched majors from ARCH or ARCHE to something outside of the School of Architecture. This would enhance the understanding of why students have switched majors and if retention could have been improved by introducing a Structural Engineering faculty member earlier in their academic

career. Additionally, the survey was administered during the spring semester and students who have switched majors in the fall semester were not addressed in the survey. A future study on why these students decided to leave the ARCH or ARCHE program would help to potentially uncover more data on retention and persistence of these students during their first year at Oklahoma State University.

The results of the survey developed additional questions that could be explored in future studies. Although research suggests faculty members have an impact on retention and persistence of students within their chosen majors, it is possible that students are influenced by other people in their lives as well. These individuals could have a larger impact in terms of persistence than a faculty member. It could be further studied if relatives, friends, family friends, or other people of influence that are involved in the architecture or architectural engineer professions are more impactful on persistence of ARCH and ARCHE students than faculty members.

If the idea is to provide students with role models and mentors with which they can identify and interact with from the beginning of the curriculum in their chosen field of study, then the decision to include ARCHE professors in the beginning architectural design studios appears to be successful and should be continued.

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