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BOARD #159: Class Families - An approach in Engineering to improve student connections, positivity, retention, and success among students

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Lessons Learned : Class Families - An approach in Engineering to improve student connections, positivity, retention, and success among students

Abstract: The idea of class groups is very widely used in engineering education, and working in groups is one of the learning outcomes required as per ABET criteria. Most of the times, the groups are assigned for working in lab classes. Here, I put forward a similar but, a more personal approach – class families. The members of class families were identified by random allocation in the beginning of the semester and the group members were responsible for each other like members of a close-knit family- who communicate with each other on a daily basis. The students looking out for each other helped them feel not secluded in hard times, encouraged each other to succeed in the course, gave them mental support for other courses, and also resulted in a long-term friendship that helped them in choosing other classes, projects, and internships. The class families did group quizzes each week to teach each other what they learned in class during that week, did labs together, and prepared for exams together, to name a few. In my observation, the class families approach helped the students manage their academic stress better and provided a reliable support system, ultimately contributing to student retention and academic success. The paper also includes the results of a student survey on their perceptions of the class families approach. It further discusses some of the challenges associated with this approach.
My preference is Lessons Learned- lightning talk.

Introduction

Although engineering is considered as a promising career path with demand for engineers always exceeding the supply, a lot of students struggle to persist through their undergraduate degree programs resulting in students dropping engineering programs or changing to non-engineering majors. A lot of research has been conducted in this area identifying sundry reasons for this including academic, social and personal reasons. One reason identified is the critical transition from high school to college. It needs to be noted that the traditional engineering students join their respective colleges of engineering directly after high school, having lived with their parents, had the company of their childhood friends and community support. From that environment, they get uprooted to a totally new place. Majority of the engineering students take their discipline specific courses starting from sophomore year and experience heightened challenges because of the transition from foundational courses to more rigorous, discipline specific courses [1]. This is considered as the time when they often reevaluate their majors because of the academic stress among other reasons [2].

Literature shows that student retention and success remain critical challenges in higher education, particularly among underrepresented and first-generation college students [3]. Several studies have highlighted the importance of class groups or support groups in the academic performance of students. [4] reported that collaborative learning in small groups was identified as a major reason for higher achievement and better retention of contents in a study conducted among first year students. Another study [5] conducted on the benefits of collaborative learning

and reported that it helps students in multiple ways such as “greater productivity, more caring, supportive, and committed relationships; and greater psychological health, social competence, and self-esteem”.

In addition to the academic support provided by peers, research shows that working in class groups provide an emotional support to assist students to navigate the challenges and hence in improving student retention. Some other studies [6] reported that non-academic factors such as emotional and social wellbeing significantly influence college performance and retention. A study on student engagement in first-year university [7] based on seven calibrated scales of student engagement. The study reported that the students who participated in class groups were more likely to stay enrolled due to the support from those groups. [1] conducted a study on the risk of attrition for engineering students and reported that students who do not feel a sense of belonging are more likely to leave the engineering program. The study also reported that supportive communities such as class families, mentorship groups, affinity groups for underrepresented students can help with this matter. Out of these, one thing we can help as faculty is fostering a sense of belonging in the course and the engineering program.

A growing approach in education is the adoption of "Class Familia" models, which emphasize community, belonging, and a shared sense of purpose among students. These models are based on the cultural concepts of family and collective support, harnessing communal values to create supportive and inclusive academic environments. The idea of class families is not a new one. Familismo is a multidisciplinary term widely researched in sociology, anthropology and psychology. It is based on the universal concept of “familism”, which refers to strong feelings for the family with emphasis on mutual support, desire to promote the family goals, and the coexistence of the group ([3], [8]).

Familismo teaching was used as a pedagogical approach [3] for helping minority students transition from their home cultures into the academic environment, particularly in first year writing classes. They noticed that “students felt empowered and motivated to thrive in a context which feels more familial and less threatening”. I closely observed the changes made in that course and communication with the author about the results were very reassuring. I decided to give it a try after I moved to my new university.

Lessons Learned from Teaching with Class Families

In my teaching, I have implemented "class families" to foster strong, long-lasting connections among students throughout the semester. Unlike ad hoc group formations typically based on seating habits or changing project needs, my class families are stable groups persist for all lecture and lab activities throughout the semester.

Formation of Class Families

Literature on group activities suggests that class families sharing common interests are more likely to develop a sense of interconnectedness and mutual support. However, as I introduced this approach in a sophomore course—typically attended the semester after students

declare their majors—I lacked detailed insights into student interests at the start of the term. Therefore, I allocated students randomly into class families during the first lecture, ensuring these groups remained consistent throughout the semester. To maintain coherence between lecture and lab activities, class families were formed accordingly.

To familiarize students with the concept of class families, I included a discussion in the first lecture to explain the importance of class families and provided recommendations for maintaining them. Students were encouraged to exchange personal contact information and create social networking groups (e.g., Messenger or WhatsApp) for communication- for relaying class content, coordinating attendance, sharing notes, and supporting members during absences.

I also encouraged students to select class family names, preferably related to the course content. This exercise sparked enthusiastic discussions, as name selection was on a first-come, first-serve basis. This activity served as an ice breaker among class families in the first class. The students were required to visit the course lab that is located off campus (a short distance from the main campus) and take a selfie in front of it to post on the learning management system. Several class families chose to make this trip together, and some used ride sharing to come to lab later in the semester.

Class families sat together in all lectures, and I used tools like Kahoot or TurningPoint clickers to answer questions in between the lecture. Families were allowed to discuss answers among themselves, which fostered healthy competition to achieve top scores. Weekly quizzes on previously covered materials were another avenue for collaboration and discussion within class families.

Enhanced Learning and Retention of Content

The course required understanding of concepts and significant memorization, which many students struggled with. Introducing in-class exam review sessions within class families significantly improved information retention compared to prior semesters.

The class families were also required to deliver a 10-15 minute presentation on a topic of their choice, related to the course but outside the syllabus and worth sharing with the class. The students researched together on finding topics, debated their ideas and reached a consensus and developed presentations and proudly shared with their peers.

In the lab, families worked together on experiments and submitted group lab reports. To ensure accountability, each report included a breakdown of individual contributions. This structure discouraged uneven work distribution and promoted equitable participation.

Improved Attendance

Attendance in this class remained consistently high compared to many other sophomore classes in our department where faculty often reported students disappearing toward the end of the semester. In my opinion, the group dynamics of class family structure and a sense of accountability to peers, likely contributed to consistent attendance.

I first implemented this approach in a sophomore class in 2022, and the results were striking. Outside of class, I observed these groups socializing in the department student lobby and forming strong peer connections. When I taught the capstone design course a couple years later, the students were allowed to form their own groups. I was pleasantly surprised to see that the students from class families continued to work together in the same groups. Many of them also informed that they did internships together, registered for other courses together and this made me realize the lasting impact of these early connections.

Challenges and Improvements

Along with the positive feedback, some challenges emerged. One student in the senior class reported feeling overburdened with work in the sophomore class as other class family members were not as cooperative and that student pulled a lot of weight for the weekly quizzes and lab reports. Unfortunately, this issue was not brought to my attention during that semester, which prevented timely intervention. Reflecting on this, I realized the need to emphasize open communication during the initial discussion about class families.

Questionnaire Survey

A questionnaire survey was conducted to collect data on student perceptions regarding class families in a sophomore class. The survey was administered after getting IRB approval, and 70 % of the class participated in the survey. Selected results are included in this paper. Figure 1 shows the student responses regarding whether class families approach helped them feel more engaged in the course.

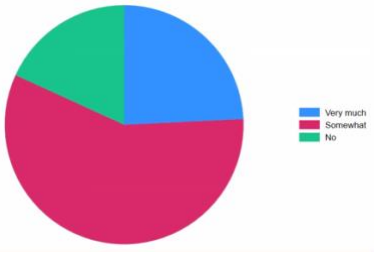

Figure 1. Engagement in class

Figure 1 shows that 31 % students reported that class families approach helped “very much” to get involved in the class, while 52% indicated it “somewhat helped” with class engagement. Figure 2 shows the student responses regarding whether class families approach helped their success in other courses through study groups.

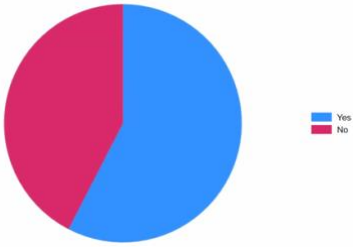

Figure 2. Success in other courses

58% students reported that class families approach contributed to their success in other courses, mainly because of the study groups formed in class, while 42% indicated it was not beneficial. Figure 3 shows students perceptions of the emotional/ social support provided by class families approach.

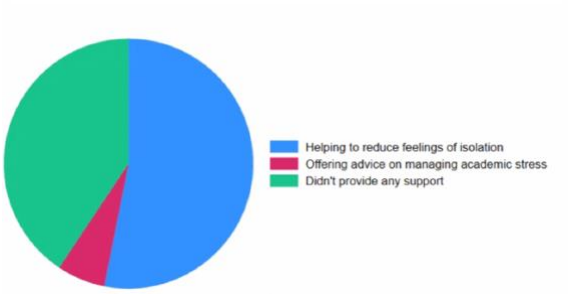

Figure 3. Emotional/social support from class families

Figure 3 shows that around 53% students reported that class families provided encouragement during difficult times, which helped to reduce the academic stress. Figure 4 shows the results of the question on their opinion about the challenges associated with class families approach.

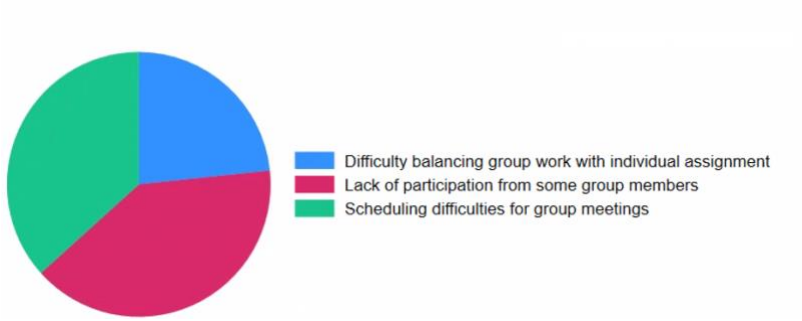

Figure 4. Challenges associated with class families approach

When asked about the challenges associated with the class families approach, students expressed concern about the lack of participation of some group members and also mentioned about scheduling difficulties for group meetings outside the class. Students were also asked their opinion about using the class families approach for the same course in future, and 100% students responded favorably, although 46% students suggested to use it with some modifications. A content analysis was conducted to identify trends in the suggestions. The majority of students had no suggestions, but among those who did, common themes included the following- flexibility in selecting the group members instead of having the instructor assign them randomly, incorporating peer grading to ensure fair assessment and accountability, and offering extra credit activities to help strengthen group bonds.

Conclusion

In my experience, class family model has proven to be an effective strategy for fostering collaboration, improving learning outcomes, and building lasting relationships among students. While challenges like uneven work distribution can arise, they can be mitigated through clear guidelines and proactive communication. Based on these experiences, I plan to refine the approach further and continue using it to enhance student engagement and success.

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