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## **Integrate a conflict resolution session into the freshman engineering problem solving course to improve students' ability to solve interpersonal team conflicts**

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# **Work-in-Progress: Integrate a conflict resolution session into the freshman engineering problem solving course to improve students' ability to solve interpersonal team conflicts**

## **Abstract**

A project-based freshman engineering course entitled “Engineering Problem Solving I” in a freshman engineering program requires students to work in teams to complete several engineering design projects. Many students are lacking in their team dynamics, particularly in handling inter-team conflicts, which can seriously hinder their learning and future coping with conflict. When a conflict happened within a team, students hesitated to enforce their team charters, which defines the project parameters and the team’s standard of conduct. Some students avoided confronting the difficult team members, some waited for the instructor to handle the issues for them while grading their fellow group members with full scores in the peer evaluation regardless of whether they were really happy about their performance.

In addition, the late millennial generation and Generation Z students were criticized to be “more sensitive” and general lack of professionalism when encountering conflict in the workplace. To better equip freshman engineering students with knowledge to handle team conflict, a “conflict resolution” session will be integrated into the existing “teamwork and project management” module in the course. The curriculum design was under collaboration with faculty from both engineering college and business college with expertise in team building and project management. The new “conflict resolution” session that is in the process of design includes: assessment of the students’ conflict management styles based on the Thomas-Kilmann Conflict Mode Instrument as well as design of corresponding role play/real-world case scenario in-class practices.

This course session design aims to improve freshman engineering students’ ability to solve challenging team interpersonal dynamics, particularly resolution of conflict. The assessment of student’s conflict management styles will help faculty understand how freshman engineering students handle conflicts, which can further provide insights for the continuous improvement of the Engineering Problem Solving I course and other FEP courses. In addition, our student’s conflict management style assessment data can be used to compare with existing data and better understand the Generation Z students’ conflict resolution style, which will help engineering education become better prepared and orientated toward new generations of students on campus.

## **Introduction**

This paper describes the course material design aiming to address the teamwork challenges in a project-based engineering course in a first-year engineering program at a Carnegie R1 rated university.

The course objective of the “Engineering Problem Solving I” is to prepare students for an engineering career by providing opportunities to apply mathematics to solve engineering problems, acquire team working skills, practice written and verbal communication skills,

enhance problem solving and design skills, and use a computer as a tool for analysis, design and communication. Students work in teams to complete several engineering design projects. It has brought to the attention of the course instructors that some freshman engineering students are struggling with handling inter-team conflicts, which can seriously hinder their learning experience and future coping with conflict in life and the workplace. When students created their team charters, which defines the project parameters and the team's standard of conduct, many are very confident that they will use them well to maintain the team's performance. However, when conflicts actually happen within a team, many students hesitate to use their team charters, which comprised standards of conduct, to correct unacceptable behavior as they thought. Some students avoided confronting the difficult team members, some relied on the instructor to resolve these conflicts for them while grading their fellow group members with high scores in the peer evaluation regardless of whether they were truly satisfied by their teammates' performance.

Teams are essential because they are greater than the sum of their parts [1], [2]. Individuals can only contribute a limited amount of effort but when combined with other individuals, they often will achieve more than if they worked individually. Because of this reason, many organizations are utilizing teams with increasing frequency. However, with the rise of team use there will also be an increase in conflicts [2]. To combat conflicts in teams, leaders, managers, and team members must be well versed in conflict resolution.

Conflict management is resolving a disagreement, issue, or problem between two or more parties. Conflict management is an easy skill to learn but difficult to master. Depending on the situation and the individual's experiences, training, education, or position in the conflict, they may use any number of resolutions available to them. The five main resolution styles are accommodating, avoiding, collaborating, competing, and compromising [3], [4]. However, each conflict resolution style has its strengths and weaknesses. Knowing when to use one style versus another style takes a short time to learn and could take a lifetime to master.

First developed in 1974, the Thomas-Kilmann Conflict Mode Instrument (TKI) was used to determine an individual's conflict resolution style by asking several short questions which the respondent would answer on a likert scale [3]. Based on the respondent's answers, a determination of the individual's behaviors could be made in regards to assertiveness (satisfying yourself) and cooperativeness (satisfying others) [3]. Depending on the range on the assertiveness and cooperativeness scale, respondents can be rated on the five categories: competing, collaborating, compromising, avoiding, and accommodating. Competing leads to the respondent to seek their own benefit over other's [6]. Those that are competitive are assertive and sometimes uncooperative. Collaborating respondents are assertive and cooperative which leads them to find an outcome that works for all [7]. Compromising is a nearly perfect mix between being assertive and cooperative [8]. Avoiding is a common practice for those that are unassertive and uncooperative. Finally, accommodating is often used by those who are not assertive and very cooperative [9]. The TKI is used by many organizations including the federal government, Fortune 500 companies, nonprofits, and educational institutions [4], [5].

“A significant demographic shift is projected in the composition of the workforce in the United States over the next decade” [10, p. 68]. However, as the fourth (i.e., Millennials) and fifth generation (i.e., Generation Z) arrive in the workforce, they need to successfully obtain an education and some soft skills. One particular soft skill that these students need is conflict management [10]. Conflicts in the workplace negatively impacts retention and worker morale [11]. Management often finds it their greatest challenge when millennials are involved. This is because millennials consider resigning as a viable option and that they will find employment elsewhere when they face adversity [10], [12]. Therefore, learning such conflict resolution skills would be greatly beneficial for the freshman engineering students, not only for their course projects, but also for their future careers.

Students in this course are the late Millennial and Generation Z students, who were considered to be more likely to choose resigning as an option when encountering conflict in the workplace [10]. However, the current conflict management styles of students in each class section are unknown. The objectives of this research are to better understand the conflict management style of freshman engineering students as well as improve freshman engineering students’ ability to solve challenging team interpersonal dynamics, particularly resolution of conflict. Under collaboration with faculty from both the College of Engineering and the College of Business with expertise in team building and project management, a “conflict resolution” session will be integrated into the existing “teamwork and project management” module in the course. Data collected will be used to assess student’s conflict management styles, which can further provide insights for the continuous course improvement and first-year engineering education. The results will be helpful as more and more Generation Z students enter higher education.

### **Design of the “conflict resolution” session**

The design of the “conflict resolution” session in the “Engineering Problem Solving I” course follows the Backward Design Process [13].

#### ***Stage 1: Desired Results***

One objective of this course is for students to acquire team working skills with the learning outcomes to be “function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives” (ABET LO-5) [14]. Therefore, in Stage 1, we identified that the design of “conflict resolution” session will address this objective. Students will have the opportunity to learn their preferred conflict management style. In addition, students will understand how to identify and resolve conflicts within their teams using a variety of resolution styles, which will give the skills necessary for their career and life.

#### ***Stage 2: Assessment Evidence***

In order to ascertain whether students demonstrate the desired understandings, post-project self-reporting on their conflict resolution experience throughout the semester will be collected for evaluation at the end of the course. Other evidence to assess students’ achievement will include: (1) quiz questions related to conflict resolution and (2) post-session survey about the “conflict resolution” activities.

### ***Stage 3: Learning Plan***

The learning activities in the new “conflict resolution” session will include the following two elements: self-assessment of the students’ conflict management styles based on the Thomas-Kilmann Conflict Mode Instrument [3] and in-class real-world case scenario practices on some conflict situations. In addition, at the end of the session, surveys of students’ opinions on these “conflict resolution” activities will be collected to assess and improve the design of the session.

#### ***(1) Self-assessment of the students’ conflict management styles***

In this “conflict resolution” class session, students will first complete an anonymous self-assessment survey using a software Articulate Storyline to find out their own conflict management styles. The survey instruments used for this self-assessment are from Dr. Steven McShane [15], which was adapted from Thomas-Kilmann Conflict Mode Instrument. This assessment included 15 questions with a 1 to 5 likert scale ranging from “1 - Rarely” to “5 - Always”. The 15 questions were grouped (three per group) based on five conflict management styles (competing, accommodating, avoiding, collaborating, and compromising). At the end of the assessment, students will receive numerical scores in all five styles indicating their preferred conflict management styles. The style with the highest score is the preferred resolution style of the student.

#### ***(2) In-class practices of conflict scenario***

A business professor will give a guest lecture to students on the five conflict management styles and make them relatable to the students by giving real life examples. In addition, to reinforce the teaching of the five conflict management styles that are assessed in the TKI, five scenarios will be used for students to practice. Each scenario starts the same with a fictitious engineering intern not performing to the expectations of the team then diverged into different reactions from the other three fictitious team members. The professor will use questions to guide the student discussions to identify the conflict management style that was used and its effectiveness. The professor will also ask what could have been done better to have a more successful outcome for the issue or problem.

### **Data analysis plan**

#### ***Assessment of the students’ conflict management styles***

Anonymous student self-assessment responses on the conflict management styles together with demographic information (e.g., gender, age, major, etc.), collected by an interface created by Articulate Storyline, will be used to analyze the trend of the students’ conflict management styles. These data can be used to find (1) what’s the most common conflict management styles of the freshman engineering students in this class; and (2) is there any difference of student conflict management in gender, age, or major?

#### ***Assessment of students’ performances of desired understanding***

At the end of the course, students will be required to report their conflict resolution experience during the teamwork throughout the semester on the following aspects: (1) Was there any

conflict in your team?, (2) How severe was the conflict?, (3) Do you feel the conflict was resolved appropriately?, and (4) How did you solve the conflict? This assessment includes both qualitative and quantitative questions, and will be used to evaluate students' performance of understanding on the desired topic.

### ***Assessment of the “conflict resolution” session***

At the end of the “conflict resolution” session, a post-session survey will be asked to collect students' response on these activities, including the following three questions:

- (1) Will what you learned from this activity affect the way you work in teams for future engineering projects? Please explain why or why not.
- (2) What did you learn from this activity?
- (3) What did you like about this activity?

The results will be used to improve the design of this session as well as to a qualitative assessment tool to evaluate the effectiveness of this session.

### **Future work and feedback needed**

This project is currently at the stage of finalizing the design. A pilot run in some class sessions will also be conducted. Once the materials are finalized, it will be integrated into the sections taught by the instructor and continuously improved based on the data and feedback collected throughout the course.

Some specific feedback needed at current stage are as follows:

- (1) The software choice:

Articulate Storyline can give students real-time results of their conflict management styles immediately after they finish the self-assessment. The instructor will need to export the data to analyze afterwards to know the trends. If the instructor could know the ranking of students' choices on the five management styles on site, he/she can adjust the focus of case scenario practice activity, making it more tailored to the student body in that class section. For example, if the student body in one section is more avoiding style, it may be more helpful to spend more time on the discussion of the avoiding scenario for this section instead of spending equal amounts of time on the five scenarios. However, Articulate Storyline is not capable of providing such real-time ranking information and the authors are not currently aware of a software or web platform that has such ability.

- (2) The assessment design:

Any advice on improving the current designs of three assessment (i) conflict management style self-assessment with collection of demographic information such as gender, age, and major, etc., (ii) assessment of students' performances of desired understanding, and (iii) assessment of the “conflict resolution” session are welcomed.

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