

Using Escape Rooms to Apply Team Building and Leadership Skills in an Engineering Leadership Development Program: A Work in Progress

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Performing under pressure is common in engineering. Many engineers work in fields with pressing deadlines, on projects where millions or even billions of dollars, public safety, or the lives of the end user of their designs are at stake. Engineering and computer science-based professions account for just under 6% the 800+ high-stress professions reported by ONET [1]. Helping students to develop strategies for performing on teams effectively in stressful situations is essential for their successful goal achievement, productivity and team performance in their future engineering careers [2], [3]. This EL work in progress design paper will introduce a model for a non-traditional engineering leadership development activity. Specifically, this paper will explore the incorporation of a simulated stressful situation (escape room) paired with the introduction of psychometric/behavioral profiling, curated reflective activities, and placement of the event in a scaffolded series of workshops. Through pre- and post-survey evaluations and evaluation of the post-activity reflection exercise, the change in students' attitudes towards teamwork, self-perception of their role on teams, their perceptions of the importance of clear communication with teammates and their comfort level of effectively working on teams will be examined.

The Chevron Leadership Academy at Louisiana State University is a corporate-sponsored, extra-curricular leadership program. As part of this program, students attend a series of workshops covering a variety of leadership development topics. One is a game-based, team-building event—participation in an award-winning escape room activity, 13th Gate Escape in Baton Rouge, Louisiana. The goals of this activity are to help the students apply strategy skills to improve teamwork, to learn how to thrive as a team in a high-pressure situations, and to increase their confidence in their own leadership skills. Recognizing the importance of connecting activities to reflection [4] - [7], this paper offers a preliminary examination of how psychometric and behavioral profiling [8] can be combined with reflective writing and speaking exercises [9] - [11], pre- and post- Likert-based self- and activity assessments, and organization of the activity in a scaffolded sequence of events [12], [13], to lead to an impactful leadership development experience.

Preliminary evaluation of students' responses showed changes in several areas, such as their confidence with assuming leadership roles. Although sharing the results of the reflection was not required, communications with the students after the exercise revealed periods of participant frustration that were mitigated by the group discussions prior to entering the escape rooms. By the end of the escape room activity and its associated self-assessment activities, many students learned the value of strategizing before the event and clearly communicating to groupmates before entering a potentially high-stress situation. Considering the relative abundance of escape rooms that have opened across the country and their popularity with college students, these findings can inspire other EL programs to adapt this non-traditional activity into their curricula.

Introduction

The Chevron Leadership Academy at Louisiana State University is an extracurricular workshop series, which is associated with a donor-sponsored scholarship [14]. The program involves students from specific majors in engineering and business (ISDS, accounting and finance). Students are selected based on committee reviews of applications, which require short answers about previous leadership experiences, as well as other academic and financial considerations. The program defines leadership broadly, to include almost any instance of initiative-taking in a given situation, and it considers the workshops a process by which leadership-related skillsets and qualities can be developed. This fits well with the inclusive, process-oriented approach one might expect from a state-funded institution.

In this Work-In-Progress practice paper, we examined a team-centered escape room activity. Such rooms are popular with corporate and private groups hoping to improve various aspects of teamwork and social interaction [15] - [17]. However, since our aim is leadership and professional development, we employed a more comprehensive pedagogical approach to the activity by preceding the escape room with a series of carefully selected leadership development workshops meant to systematically build the self-assessment, communication, negotiation and conflict resolution skills necessary to develop team-building acumen. Reflection makes meaning of events and their consequences so that students can learn from them [4]. It is important that learners make meaning of events as they occur or shortly after the event has concluded [5] - [7]. It is also important to consider how we might be affected in the future by our experiences, whether it is to build upon these skills, or adjust them to new purposes in the future [9] - [11].

We evaluated the performance of the students in the activity and their relative understanding of their own skills in teambuilding using a behavioral and psychometric evaluation (prior to the event) and combined that with post-activity reflection as well as a Likert-based evaluation of their skills pre and post workshop. While we were confident that the students would find this event enjoyable, we wanted to determine how the students interpreted the lessons from the activity and if the students were able to employ the learning after the workshop.

Methodology

Pre-training

The Chevron Leadership Academy is modeled after professional development programs typically employed in industry to train new-hire full-time engineers and the leadership development fundamentals found in literature [14]. The workshops are scaffolded, each session building upon the previous one and looking forward to the next. The series begins with Emergenetics, a psychometric evaluation program that raises self-awareness to ones thinking, problem solving, behavioral and communication preferences and that of others [8]. These concepts are woven into subsequent topics, encouraging students to build upon their strengths and mitigate weaknesses as they develop skills in other leadership development topics. Workshop topics include conflict resolution, inclusivity training, interpersonal communications, as well as practical activities, like resume review sessions. In addition to the scaffolded sequence by which one activity builds upon the preceding one, the program also scaffolds year by year,

where those who have been in the program longer take on ever more responsible and active roles in delivering content and participating in learning activities.

Location

Our university is fortunate to be located near an award-winning haunted house and escape room, the 13th Gate Escape [18]. In addition to booking parties and other entertainment events, the location also caters to corporate team-building events, featuring accessories like conference rooms, lockers, mini-fridge, and large flat-screens for presentations. These factors appealed to us because we knew from the 13th Gate Escape's reputation that the experience would feature first rate production value and sufficiently challenging puzzles that require a team of at least six people to solve.

Teams

Students were separated into random escape room teams of 6-10 people. More experienced students were scattered among the teams to act as guides to more nascent participants. In some cases, teams also included instructors and/or Chevron mentors. The facilitators created diverse teams by grouping students with contrasting Emergenetics profiles and demographics. The resulting teams were made up of students of varying backgrounds, genders, majors, experience levels, and thinking and behavioral preferences.

Strategy Session

On their assigned day, one to three teams assembled in a conference room approximately one hour prior to the escape room activity for a planning session that included a brief lesson on how to strategize as a team. Each student was given a pad of paper and a pen while each team was given a flip-chart-sized paper and several markers of varying colors. First, students were asked to list 4-5 personal perceived strengths and 2-3 perceived weaknesses that they brought to the group through the lens of their psychometric profiles. Each team collectively wrote their strengths and weaknesses on large flip-chart paper. Each team member was given a different colored marker and told to mark three votes on the flip-chart paper indicating one valuable strength and two troubling weaknesses that may threaten the relative success of the team; typically, 2-3 weaknesses come forth as the most troubling. Students then spent several minutes discussing these weaknesses as a group and brainstorming ways to combat the weakness. Together, they then decided on the best probable action for them to take should this scenario arise. The experienced participants on the team also offered insight to others on the team as to what to expect when they are doing the escape room challenge. Next, the roles for the escape room activity were revealed and the teams use their knowledge of their group members strengths and weaknesses to decide who will fill each role: note-taker and tablet-keeper. Teams also decided if there are other roles they wish to create for the group (e.g. team leader). Finally, each group was asked to share their strategies to the all the participants at the event while waiting for the 13th Gate Escape game masters to arrive, announcing the pending start of their escape room challenge. See Appendix A for a complete list of the questions asked during the strategy session.

Escape Room Activity

Following a safety introduction and a briefing on the functionality of the equipment they are given, each team was lead to their respective, themed escape room. The rooms themselves varied in level of difficulty, but each room had a unique set of puzzles that need to be solved in a particular order in order to move to the next puzzle and, ultimately, escape from the room. Instructors and corporate mentors have also participated in the escape room activities, however, they were careful not to take on leadership roles in the room; rather, their participation was to encourage further team diversity, adding an seasoned professional person to each group. Each team had 60 minutes from the time the door was “locked” behind them to complete this task. Once the students “escaped,” they returned to the event center conference room. (Note that for safety reasons, the door was never truly locked, but the game ended if any person left the room before all puzzles were solved.) Because the groups’ actual escape times varied, there was a natural intermission after the first groups finished their challenge. This allowed another opportunity for students to develop their interpersonal communication skills, a necessary skill set for networking in the professional world, as well as an opportunity to increase interpersonal relationships between the students.

Post-Event Reflection

Once all teams returned to the conference room, the students were lead through a reflection exercise. Each student was given a pad of paper and a pen and given 3-5 minutes to write following a three-part prompt: what, so what, and now what [19]. First, students were directed to write about what happened, next to reflect on the significance of what happened, and then what they would do with what they learned. During the reflection, students were asked to write continuously without stopping to capture as much of their though process as possible. Following the writing session, students were given the opportunity to share their thoughts or what they wrote with the rest of participants. Students were welcome to keep the reflections for themselves or to give their reflections to the facilitators.

Assessment

Students completed self-assessments on their team-building skills and knowledge both before and after the event using a 5-point Likert scale. Students were also asked to rate their experience with the event after the event concluded. Responses were collected via JOTFORM survey. Student responses to these surveys were compared to determine if there was a difference between their knowledge level and attitudes towards team-building before and after the event. Although submitting the hand-written reflections was not required, students were given the option to share their written reflections with the facilitators. Facilitators then used the written reflections to search for similarities in themes, lessons, thoughts and responses.

Results

During the strategy session prior to entering the escape room, students multi-voted to determine what team strengths were the most advantageous for the group and which weaknesses were most likely to inhibit success of reaching their goal. While the goal for every team was to escape their

assigned room in under 60 minutes, secondary goals varied group to group. Some groups opted to measure secondary success by the number of hints used while other groups measured success as “still being friends when the event is over.” By using the multi-voting technique, participants were able to determine what their team values were at a high level. Using this visual representation helped them to see that communication, or the lack of communication was critical to their success. As such, teams devised strategies using their team strengths to combat communication break downs.

Every time students have participated in this program; the excitement and energy were palpable. Students’ mannerisms were more animated entering and exiting the team building escape room event than at other Chevron Leadership Academy events. Students engaged in excited chatter about surprises and unexpected solutions to riddles. To date, everyone has been respectful and courteous before and after the event, with no one grousing about teammates or placing blame for failures. By engaging in a low-risk event, students were able to examine their strengths and weaknesses without having to worry about consequences; which may mean they will be more apt to take chances and try new things in the future.

Of the 15 teams who have participated from 2018 to 2020, 10 successfully escaped. While the event was still meaningful for participants who did not escape in 60 minutes, the completion of a complex task further built student self-confidence. It should also be noted that even losing teams enjoyed some successes by completing a majority of the riddles and puzzles, even if they did not finish them all.

Facilitators informed students that their reflective writing was for a private audience and that they should write freely without worrying about any sort of consequence. The aim was that students would be more fearless in confronting difficult moments, even if those moments involved interactions with the facilitators, if they knew their thoughts would remain confidential. However, once the reflection activity was complete, facilitators informed students of their intention to introduce the escape-room activity in an academic-conference setting and asked if anyone wanted to share insights from their experience with a broader audience; ~70% of the participants opted to allow the facilitators to use their responses in this paper.

As the reflection excerpt selections in Appendix B indicate, nearly every single participant mentioned rather early in their writings about how they worked with their teams as opposed to how they enjoyed the event. Teams that met the 60-minute-escape objective tended to be more positive in their writing, while those that did not escape tended to be more negative or critical of their performance. Regardless, all analyzed responses mentioned some aspect of teamwork and its importance to the event and to their lives beyond the leadership development program. The two most common topics addressed in the reflection exercises were the importance of communication (54%) and the effect of their own strengths and weaknesses on the performance of the team (54%). Approximately 23% of the responses indicated that the participants were surprised by how congenial the team was and that there seemed to be no conflicts to the detriment of the team’s end goal. This seemed to be more prevalent in the responses in groups who escaped, while over 50% of the responses from non-escapee groups mentioned communication breakdowns—not being heard and a lack of opportunity to use their strengths were listed as the main reason for “failure.” Thirty-one percent of responses mentioned the importance of diverse ideas and problem-solving techniques to the relative success of their team,

while 23% mentioned how they were going to implement what they learned in their group activities in class and in their professional careers. During the discussions with the participants, it was apparent that physically having the opportunity to practice what they were learning in the previous workshops was critical to their understanding of how to use these lessons.

In reviewing the pre- and post-assessment data in 2019 and 2020, students seemed to identify themselves as team players before and after the event; the mean shift is negligible between the pre- and post-assessment data. Preliminary analysis of the same data set indicated that students saw themselves as more of a leader, even though choosing a team leader during the strategy session was not explicitly directed. Students were also asked about their perceived ability to communicate with others. In both 2019 and 2020, a slight positive mean shift was noted between the pre- and post-assessments, potentially indicating that students felt that their communication skills improved during the event. This was also seen in the reflection exercise. Nearly every collected response mentioned their ability to communicate or noted ways that the group's communication could have been improved.

Seven teams participated in the 2023 escape room activity. This was the first all in person cohort since the pandemic, and the activity was offered at a later time in the semester compared to the 2019 and 2020 participant groups. Only one group escaped of the seven groups whereas the 2019 and 2020 cohorts had a combined six successful escapes out of 15. One possible explanation for the reduced number of escapes was a gross underestimation of how difficult the escape room puzzles would be. Most of the returning participants from previous years participated in virtual escape rooms. For that activity, all participant groups escaped in less than 40 minutes as those puzzles were far easier than those found at 13th Gate Escape. Although the response data for the 2023 cohort is still being collected and analyzed, initial investigation of the reflections and pre- and post-activity assessments indicate a similar trend with the 2019 and 2020 cohorts as most students self-identify as team players equally before and after the event. Evaluation of the strategy sessions and reflection statements also indicate that the participants find developing and following communication strategies key to being successful in escaping the room and working effectively with their teams.

Conclusion

The results of this activity indicates that escape rooms can be effective education tools for practicing team building acumen. Additionally, using brief, interactive pre-strategy activities with students does help to focus the students' attention on the lessons we were seeking the students to glean from the event. Students were attentive to their own strengths and weaknesses and were able to see their effects in a low-stakes, elevated stress environment. Students immediately reflected on the experience and shared profound learnings that they intended to implement beyond the event.

The event itself did not appear to alter the way students self-identify as team players, but many did admit that they needed to work on their own communication and planning skills to be more effective team players.

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Appendix A

Questions asked during strategizing session:

- 1) What do you notice about the concentration of the dots?
 - a) What traits do your teammates seem to value?
 - b) Does that match your values?
- 2) What assets seem to be most valued on the team?
 - a) What tools do you have as a team to combat potential weaknesses?
- 3) What weaknesses could have the greatest impact on your goal?
 - a) What is your goal?
 - b) How will the weakness impact your goal?
- 4) What strategies should you put in to place to mitigate your goals?
 - a) As a group, clearly define your goal.
 - b) Do you all agree on the goal?
- 5) What are the team roles?
 - a) Will you have a leader?
 - b) Who will be in charge of the time-keeper/hint pad?
 - c) Who will be the note taker?
- 6) How will you tackle challenges?
 - a) Will you divide and conquer?
 - b) Will you all work on one problem at a time?
 - c) How will groups be determined?
- 7) How will your group communicate?
 - a) How will you check in on your progress?
 - b) Is taking time for communication a valuable use of your time?
- 8) How will your group resolve conflict?
 - a) Do you all agree on what conflict is?
 - b) What will you do if a conflict arises?
 - c) How much time should be spent resolving conflict?
- 9) What can you do to play to your team's strengths?
 - a) Who is detailed oriented?
 - b) Who is better at seeing the big picture?
 - c) Who is more in tune with persons/effect of events on people?
 - d) Who is good at organization?
- 10) Do you feel prepared?

Appendix B

Excerpts of Reflection responses:

Student A:

“We worked really well together. Everyone had breakthroughs and got their own clues solved. It was really enjoyable and I feel a sense of accomplishment and enjoyment. I’ve always been curious about how I would respond in a “detective” or mystery / clue solving situation. I feel I did better than I expected. Never before have I realized how important different points of view are [emphasis student’s]. What I may be stuck on is obvious to someone else.

“I want to do this with my friends now. ... I enjoy the problem solving / clue following mindset I was in the whole game. It’s the same feeling I get when solving / designing engineering things but without the stress.”

Student B:

“...Most of the time we worked as a whole group or in 2 groups. I feel like that helped us the best having as many minds tackling a situation and to have different perspectives. I feel that everyone in the group equally contributed to the success of the team and nobody butted heads / got frustrated / didn’t speak out. All team members were focused on communication and big picture – meaning we were able to admit when we couldn’t figure it out and wanted help.”

“I felt that I kept the communication strong in the team and encouraged everyone to speak out. I noticed that I can get too excited though and that can be distracting / overwhelming to others.”

“I can use this experience on a professional and personal level as it shows the importance of trust in your team members, communication, playing to people’s strengths, and having excitement in a task. Personally, I know that I can focus on big picture so I can work on smaller things, such as things that are task-oriented to play at that weakness. I found myself not being too keen on certain smaller details and worried about hurrying and finishing on time. Thinking this way can cause errors in a project if I’m not focused on details.”

“Before the escape room we talked and were friendly with each other which helped us to feel more comfortable when we were completing the room. I think that played a big part in our teamwork and communication.”

Student C:

“I think I can use this experience in figuring out all the different ways people react to situations that involve high pressure and a tight deadline. It also helped me learn what my weaknesses and strengths are in communicating with a team.”

Student D:

“It would definitely help understanding how to work as a team under pressure and in high stress situations. When to take risk and managing time in a good manner. Also, to have a lot of communication.” (grammar errors written verbatim)

Student E:

“I think the added stress of the time limit made us less aware of our surroundings. ... I am going to try and behave calmer in stressful situations and be more vocal as well.”

Student F:

“I was pretty worried about arguing between teammates on what to do and where to go. Fortunately, there was actually none of that! It was an incredibly cooperative environment and we all got along very well despite having not worked together much before. I thought I personally was going to struggle because I typically like to know everything that’s going on. I consciously tried to avoid that weakness and it worked out great! Definitely something to keep in mind for the future.”

Student G:

“I will use this experience to learn to always listen to what people have to say, and help others that are in need of it, even if they don’t ask.”

Student H:

“The game was fun. Some of the rooms were very small which made me uncomfortable. Sometimes we had too many people working on one thing.”

“I felt very relaxed. I did my best when I was relaxed. Sometimes I felt like I couldn’t do anything because I would just get in the way. I think we should have split tasks better.”

“In the future I will try to be more vocal. I will also try to use less clues. I plan on being more vocal in groups and also trying to delegate tasks to everyone each time we start something new.”

Student I:

“So we did not win. Why? 2 Reasons: too little time, too little speed...Our speed was key... We were unused to each other. We all double-check behind each other instead of trusting each other. I think we didn't pass around information quite as well as we should have.”

Student J:

“Overall, the big picture here is that when things get chaotic you want to step back and collect yourself. try and take it one step at a time. Communication between team members is key here. If one person is one step behind or head, the group will not succeed.”

Student K:

“It is really really hard to effectively communicate with everyone and see everyone as equals because of the time constraint... I have to push myself to speak up and take charge in the midst of chaos among other team members.”

Student L:

“Takes a village to solve the task at hand... Teamwork is important. Listening to everyone's opinion is important and not being afraid to admit you were wrong is important.”