Work in Progress: Creating Effective Prompts for "Teaming" Sessions

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Introduction

There are many who want change in engineering education, and that interest has resulted in myriad efforts. The National Science Foundation has awarded over twenty grants oriented toward revolutionizing departments, and these efforts have consistently foregrounded cultural change as part of engineering education change. But where is culture and how do we change it? If culture has to do with shared values, norms and practices, then changing the culture would require changing values, norms and practices. How might groups do that? Are there ways to softly go about the hard work of culture change? One such tool for promoting cultural change could be "teaming."

Teaming is a form of group discussion that requires no preparation for the participants and starts with a simple prompt that can be answered by everyone present. In the first part of the teaming session, each participant responds to the prompt, and then chooses the next person to respond. In the second part of teaming participants discuss what was said and trace what each participant shares. This form of group discussion was conceived by a team of faculty at Seattle University in autumn of 2021 as an experiment and was presented at the 2022 ASEE conference (Turns et al., 2022).

Teaming is currently experimental. The group that developed it internally is still using it after eighteen months. However, while there has been sustained use and experimentation, there has been little formal research (such as research to clearly demonstrate outcomes). To do formal research requires additional uses of teaming, and thus we are interested in efforts that lower the threshold for doing teaming in order to enable more use and thus more understanding of teaming. It is time to (1) consider its wider applicability - the implications section of this paper, and to (2) examine the principles at work in teaming - the research focus of this paper.

While teaming, as we have described it, was conceptualized in a local context by a specific group of people, it clearly can fit into a range of larger discourses. For example, teaming shares much in common with sustained dialogue (Wuerz et al, 2019) via its commitment to listening, to the potential to be changed by what is said, and to the potential for group identification and solving of problems arising from the dialogue. The dynamics of teaming (with the randomness created by the turn taking, the generation of different perspectives and the opportunity for the ideas to interact in the second part of the session) are aligned with thoughts anchored in complexity theory about how new knowledge can be "occasioned" (Davis and Sumara, 2014). It is also possible to see connections between this form of activity and group therapy. Pursuing such connections could enrich and ground additional work on teaming.

We chose to drill down on prompt creation in this paper because, from a practical perspective, creating prompts is a significant part of teaming. In our journey, we spent a lot of time creating prompts, and we wanted to leverage our experience to help others. Further, since the initial prompt for a teaming session is significant in how the teaming goes, we wanted to create ways to ask about the relationship between a prompt and the subsequent session. In other words, we

wanted to create a framework for describing prompts so future research could investigate the relationship of prompts to outcomes.

Key to our focus on the prompts is a notion of teaming sessions as actively *designed*, not passively *had*. We want to retain the idea that a teaming session involves design and create information that can support the important work of designing. One way to support a designer is to offer information about the design space so the designer can choose options from the space with greater fluidity and intentionality. Thus, we are interested in seeing the design space associated with teaming prompts in order to enable a prompt to be designed. This paper asks: What design space for teaming prompts is suggested by a constant comparative analysis of ten teaming prompts?

Approach

To address our research question, we leveraged a form of research that blends grounded theory (Charmaz, 2006) and research through design (Gaver, 2012). Specifically, the process involves identifying instances (or design solutions) to a problem, aggregating information about those instances (traces related to rationale, expectations, etc), and then using a constant comparison logic to surface dimensions through which all of the instances can be characterized. The results of this analysis are the dimensions and their narration along with narratively smoothed descriptions of each of the instances.

In this work, the focus is on the prompts used to ground ten teaming events over the last eighteen months. The collection of prompts is shown in Table 1. These prompts all take the form of a single question. The teaming sessions were all conducted in a single department of a single university, and thus their variation is potentially constrained by this. The prompts were designed iteratively, with prior experiences informing future prompts. Therefore, there was wisdom built into subsequent prompts; wisdom that has not been harnessed formally until now. Seven prompts were designed by the lead author of this paper in consultation with the other authors. The other three prompts were designed by the second author through discussions with two other senior members in the department.

This work leverages three kinds of data. The first form of data is the specific articulation of the prompts. Table 1 shows the set of 10 teaming prompts along with the date that they were used. The second form of data is the documented rationale that was given to teaming participants to explain the prompts. A final form of data is the set of traces that were created as part of the planning of these prompts (primarily traces captured by the first author).

The initial phase of the analysis was conducted by the first author who systematically worked through the ten prompts in order, thinking about how each prompt was similar to and/or different from what had come before. This process leveraged not only the prompt itself but also the traces that captured reasoning that went into the prompt choice. The result of this analysis was then shared with the research team in order to identify and name dimensions that could be used to characterize the prompts and ultimately to select the five dimensions that are presented in this paper.

The researchers in this process (the co-authors of this paper) have varied relationships to the work of this paper, and we have endeavored to take this particular kind of positionality into

account in the work. First, all of the researchers were involved in the design of the prompts that are being researched. Second, a subset of the researchers also participated in the teaming experiences associated with these prompts. Finally, two of the researchers had experiences in facilitating the teaming sessions. We are acknowledging these mixed relationships in order to address the potential perception of bias. In fact, we see our different perspectives as a strength of the work and what helped us to see possibilities. At the same time, our highly systematic approach to this work was part of our effort to create traces that are inspectable.

This approach produces knowledge in the form of dimensions that can be used to characterize a design space. Because the process being followed shares much in common with grounded theory and qualitative research more generally, the trustworthiness considerations are similar (Shenton, 2004). The results are more trustworthy to the extent they are clearly grounded in the data. The results are more trustworthy to the extent that the chain of reasoning that led to the results can be followed.

Table 1. The prompts analyzed for this work in progress

Prompt	Date
#1 Share something that has happened in your teaching since you have been back in the classroom.	10/14/2021
#2 What has it been like to navigate being "back in person?"	11/4/2021
#3 What has it been like navigating student attendance issues in the “back in person” yet “still in Covid” world	12/2/2021
#4 What experiences / thoughts have you had about grading recently?	1/22/2022
#5 Picture one or more students that have inspired you. Share what you are thinking about how/why they inspire you.	3/11/2022
#6 With the immediacy of the pandemic receding, some are suggesting we are back to normal. What has it been like to be “back to normal?	4/22/2022
#7 When you think about your experiences with teaming over the year, what comes to mind?	5/20/2022
#8: What do you want our students to know about you? About our program? Anything about you, not just your role in our program.	9/15/2022
#9: Think about a person or people who cared about your growth or wellbeing and share what that caring was like (or the opposite if that’s what comes to mind).	10/27/2022
#10: As an educator (staff is an educator too), what do you think our students could (or should) learn but is not offered in our curriculum?	1/25/23

Results

This section presents the results of our analysis: five dimensions that can be used to characterize the teaming prompts that were used. These five dimensions are summarized in Table 2. The subsequent discussion explores how the dimensions can be used to articulate research questions that, if answered, would help to further development of teaming and (in a separate implications for practice section) how these dimensions can support practitioners interested in teaming.

Table 2. Dimensions for characterizing teaming prompts.

Dimension	Description and possible values
Targeted	The extent to which a prompt is focused on a specific issue or open to a range of possible responses: very targeted, very open.
Phrasing	How a prompt is phrased in terms of what is requested: sharing a specific experience, sharing a generalized sensation of an experience, offering thoughts about something, identity related prompts, soliciting an opinion.
Emotionality	The extent to which the prompt invites sharing of emotion: low emotionality, moderate emotionality, high emotionality.
Instrumentality	The immediacy with which the teaming discussion is trying to accomplish a goal: low instrumentality, high instrumentality.
Connectedness	The various ways in which a prompt can be connected up to something larger: connected to previous teaming sessions, connected to world events, connected to broader departmental goals.

Dimension: Targeted. A first dimension for explaining the space of teaming prompts is something we have called targeted. The general idea here is that some prompts are *very targeted* while others are *very open*. For example, prompt 2 (what has it been like to be back in person) and prompt 6 (what has it been like to be back to normal) are much more open than a middle level prompt such as 1 (share something that has happened in teaching since being back in the classroom). Contrasting with these not very targeted prompts are examples of prompts that were much more targeted (4-thoughts about grading, 3-navigating attendance, 5-a student who inspired and 7-when you think about teaming).

Dimension: Phrasing. A second dimension for explaining the space of teaming prompts is something we have called phrasing (the structure by which the prompt is phrased). The general idea here is paying attention to the kind of ask that different prompts are making. We see five patterns:

- *sharing a specific experience* (prompt 1 - share something that has happened, prompt 4 - what experiences have you had with),

- *sharing a generalized sensation of an experience* (prompt 2-what has it been like, prompt 3-what has it been like, prompt 6-what has it been like),
- *offering thoughts about something* (Prompt 5-picture… and share what you are thinking, prompt 7-when you think about xxx, what comes to mind),
- *identity related prompts* (prompt 8-what is a part of you that you want students to know about), and
- *soliciting an opinion* (prompt 10-as an educator, what do you think students should learn).

Dimension. Emotionality. A third dimension for explaining the space of teaming prompts is something we have called emotionality. We note that the emotionality of a prompt can range from *low* to *high,* and the sense of emotionality in the prompt can have multiple sources. A prompt seems to have high emotionality when the emotionality is directly in the prompt and cannot be avoided (such as in prompt 5's focus on inspiration and prompt 9's focus on caring). Some of the prompts seemed to have moderate emotionality because the words of the prompt do not highlight a specific emotion, but the subject matter is likely to be associated with emotion (such as prompt 4's focus on grading or prompt 3's focus on attendance). Yet other prompts seemed to be low in emotionality (such as prompt 7's focus on experiences with teaming and prompt 1's focus on something that has happened in teaching). These two examples could clearly elicit responses that have heightened emotion, but could also elicit responses that are more neutral. The key is that responses can be low in emotion. In looking across the prompts, it seems that emotionality can come from the context around the prompt (pandemic, prior conversations), from the wording of the prompt (someone who inspired, someone who cared), and from the topic of the prompt (grading, attendance).

Dimension: Instrumentality. A fourth dimension for explaining the space of teaming prompts is something we have called instrumentality to capture the immediacy with which the teaming discussion is trying to accomplish a goal. Prompts with high instrumentality include prompt 5 (where the ask about "a student that inspires" was part of a larger ABET accreditation effort to reevaluate and rewrite the program educational outcomes) and prompt 7 (where the ask about experiences with teaming was part of an effort to decide the future of teaming). Prompts with low instrumentality include prompt 6 (what has it been like to be back in person) and prompt 9 (who cared about you). In the middle are prompts that are somewhat instrumental such as prompt 3 (the focus on attendance was an attempt to potentially surface issues and create conversations about how to address attendance).

Dimension: Connectedness. A fifth dimension for explaining the space of teaming prompts is something we have called connectedness to capture the various ways in which a prompt can be connected up to something larger. For example, prompt 3 (with the focus on attendance) and prompt 4 (with the focus on grading) were constructed based on ideas that came up in previous teaming sessions. The prompts about being back on campus (prompt 1), back in the classroom (prompt 2), and back to normal (prompt 6) were constructed to create continuity with world events and the general context. The prompts about something you'd like students to know about you (prompt 8) and a situation where you felt cared for (prompt 9) were connected to broader departmental goals.

These dimensions are by far not the only dimensions that could be articulated to see the space of prompts created by the ten prompts we are exploring in this paper. For example, in ideating on

possible dimensions we considered dimensions such as relationality, personal, and volatility to capture variation in the prompts. We chose the five dimensions above because they show promise in helping people craft prompts and see possibilities.

Practical uses of this framework

Our investigation of teaming prompts has been motivated by the practice-oriented goal of wanting to make it easier for groups to engage in teaming-style conversations. By offering information for creating teaming prompts (in our experience, one of the most challenging parts of the work of teaming), we believe that practitioners interested in supporting teaming can arrive at an effective prompt either more quickly or with less iteration than they might without support.

To illustrate the usefulness of this information, we can consider different use cases. Consider, for example, someone trying to imagine a possible prompt. Inspired by the dimension of connectedness, the individual could start by thinking about how prompts might connect to prior events, prior aspirations, prior commitments, or prior discussions had by a group. Inspired by the dimensions of instrumentality, the same individual could start by wondering whether teaming might be a useful (even if potentially indirect) way to move toward a future goal (i.e., a problem that needs to be solved, a task that needs to get done, a situation that needs to be better understood). Such connectedness and instrumentality thinking could provide possible starting points for prompts that could then be refined by thinking in terms of the dimensions of targeted, phrasing and emotionality. In other words, for a given prompt “idea” -- the individual could imagine variations of the prompt that are more or less targeted, that have different phrasings, and foreground or background emotion in intentional ways. To be clear, this form of thinking will not tell the individual which prompt is best for their situation, but the thinking can help the individual engage long enough to make choices that seem appropriate.

In a different scenario, perhaps an individual or group already has the base idea for a prompt and wants to develop it. In this situation, the five dimensions might be used in similar ways--to brainstorm. In this case, the entity in charge of finalizing the prompt could work through the dimensions as follows: would it be better for the prompt to be more or less focused, what phrasing might be a promising way to start, how could the prompt be articulated to either foreground or background emotion, how could the prompt be articulated to foreground or background connection to goals, and finally how could the prompt be articulated in order to establish connections to a larger context of shared interest (or to offer an opportunity for a group to go in a new direction). In other words, the dimensions can be used to turn a minds-eye notion of a prompt into a well-formatted prompt, thus speeding up the creation of teaming sessions.

Clearly there are other use cases. These dimensions could be used to generate a set of possible prompts for a teaming session, such that the set of prompts could then be shared with others who can help select the prompt to be used. This might be a modest form of co-design. A bolder use of the dimensions would be to try to find the space of what is not yet represented. In other words, the dimensions could make it possible for a group interested in novel teaming to discover a novel prompt (as one that does not easily fit into the space defined by the prompt dimensions). It would be great if such novel prompts could be contributed back to the collective effort and expand the ideas future teaming facilitators leverage. Beyond teaming, our five dimensional framework for creating teaming prompts may be valuable to practitioners beyond those involved in teaming as

we have articulated it. We theorize that the framework can benefit anyone charged with facilitating conversation that is intended to be inclusive and community building.

Implications for future research

In addition to providing guidance to practitioners interested in developing teaming prompts, a benefit of the kind of design space analysis presented in this paper is how the analysis can help to identify or imagine research opportunities. Specifically, awareness of five dimensions associated with teaming prompts (targeted, phrasing, emotionality, instrumentality, and connectedness) can support the imagining of potentially valuable research questions that could be asked about teaming. In this section, we illustrate this kind of thinking with three opportunities. In each case, we note that the kind of research suggested could inform the work of the practitioner in deciding among potential prompts, as illustrated in the previous section.

A first research opportunity stemming from our articulation of teaming prompt dimensions has to do with the role of emotionality in teaming and the way that teaming prompts can guide or nudge this emotionality. What we have seen thus far is that prompts can make space for and even guide emotion. We have further noted that exhibiting and sharing emotion plays a role in teaming sessions, although evidence of this goes beyond the focus of this paper. Thus we are motivated to ask: How can emotionality in teaming sessions be nudged or managed by prompts and also how can it mediate outcomes of teaming conversations? If you invite complaints, does it go negative or end up positive? If you invite positivity, what happens next?

A second research opportunity stemming from our articulation of teaming prompt dimensions has to do with the role of storytelling as a way to phrase prompts. Some have argued that storytelling is a gendered way of knowing, and thus a focus on (or at least incorporation of) storytelling ways of knowing has the potential to support inclusion. This leads us to wonder: Would prompts that are phrased as requests for stories (i.e., “share an experience”) affect teaming outcomes such as inclusion?

A third research opportunity stemming from our articulation of teaming prompt dimensions has to do with the granularity of the effort. In the work of this paper thus far, the emphasis has been on the articulation of individual prompts. At the same time, the work we are drawing on has been a sustained engagement with teaming. This suggests that while the creation of individual teaming prompts for individual teaming sessions may be quite important, it is also important to consider the significance of a sustained engagement with teaming. This leads us to ask: how do the benefits of teaming accrue over multiple teaming session periods, and how are the benefits related to the sequence of prompts used during individual teaming sessions.

Conclusion

There are many who want change in engineering education, and that interest has resulted in myriad efforts. Teaming is a form of group discussion that requires no preparation for the participants and starts with a simple prompt that can be answered by everyone present, and is a form of discussion that has potential to play a role in engineering education change. Because generating prompts is a key to teaming and is challenging, this paper explored the question: what design space for teaming prompts is suggested by a constant comparative analysis of ten teaming prompts? The results suggest that targeted, phrasing, emotionality, instrumentality and

connectedness are prompt dimensions that help to make visible the design space of teaming prompts. In addition to describing these dimensions, the paper also discusses practical implications and future research opportunities made possible by identifying these dimensions.

Bibliography

Charmaz, K. (2006). Constructing grounded theory: A practical guide through qualitative analysis. Sage.

Davis, B., & Sumara, D. (2014). Complexity and education: Inquiries into learning, teaching, and research. Routledge.

Gaver, W. (2012, May). What should we expect from research through design?. In Proceedings of the SIGCHI conference on human factors in computing systems (pp. 937-946).

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. Education for information, 22(2), 63-75.

Turns, J., Han, Y. L., Cook, K., Mason, G., & Shuman, T. (2022). Work in progress: Designing a sustainable mechanism for discursively navigating change. In 2022 ASEE Annual Conference & Exposition.

Wuerz, E., Fitzgerald, R., Grenier, M., & Lezzi, O. (2019). Sustained Dialogue Campus Network. Creating space for democracy: A primer on dialogue and deliberation in higher education.