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Brief: Development of Feedback Literacy Through Reflections in Project-Based Learning Teams

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Research Brief: Development of Feedback Literacy Through Reflections in Project-based Learning Teams

Abstract

This theory Research Brief paper aims to introduce an analysis of first-year students' development of feedback literacy through written reflections. Written feedback is an important feature of the workplace and the higher education environment. In project-based learning environments, peer evaluation is a popular tool to encourage the development of professional skills in student teams. However, engineering students, especially in their first year of college, do not typically have training in writing effective feedback, which could compound interpretation challenges. Recognizing this problem, recent studies in higher education have created frameworks of feedback literacy to understand how students can effectively write, receive, and process feedback. Effective feedback has been shown to improve team dynamics, develop self-regulation behaviors, and support the development of other professional skills. This study details the selection of a framework for feedback literacy (Dawson et al., 2024) to analyze reflections written by first-year engineering students in response to peer feedback. The development of a codebook based on the framework is also detailed. This study extends theory from higher education to engineering education by introducing feedback literacy as an important prerequisite for behavioral change from peer evaluation.

Introduction

Engineering is a highly interdisciplinary and collaborative field. Engineers must work with practitioners in other fields to solve sociotechnical problems, create economically viable products, and guide effective policies. Advanced teamwork skills are necessary to collaborate with diverse partners, often spread around the globe. In the workplace, teamwork consists of many behaviors, including engaging in feedback. Giving and receiving feedback through annual reviews, mentorship, or peer review are common practices in the workplace [1]. Unlike the academic environment, engineers do not receive grades with which to measure performance, rather, they must seek out information via feedback. Thus, the ability to give, receive, process, and act on feedback is essential for continuous improvement of engineers in industry. The understandings, capacities, and dispositions needed to make sense of information and use it to enhance work or learning strategies are collectively defined as feedback literacy [2].

To monitor team dynamics and mimic the professional environment, many project-based courses in undergraduate engineering have incorporated peer feedback as a mechanism for students to learn effective teamwork behaviors. Feedback from instructor to student, in various forms (e.g., grades, corrected assignments, meetings), is widespread in education, but peer evaluation provides a different lens for students to view their performance. Peers in the same project group are likely more aware of the inner workings of their team than an instructor, which enables more specific feedback on students' teamwork behaviors. Teammates can provide valuable feedback to students via peer evaluation systems like CATME, but the feedback is only useful if students

receive it, understand what the comments are saying about their performance, and decide to take action to improve [3]. Receiving constructive feedback and translating it into action is difficult for undergraduate students, especially if they have little experience or training [3], [4]. Feedback literacy is defined as a professional skill precisely because it can–and should–be developed through practice and training. However, little attention has been placed on how to support students' feedback literacy in engineering. To effectively engage in the classroom and their future careers, a greater understanding and emphasis on feedback literacy is needed [2].

This research brief is part of a larger study that seeks to understand how students in a project-based, first-year engineering course develop feedback literacy through a process of receiving individualized feedback reports and writing reflections based on the report content. To gain a holistic understanding of feedback literacy, we needed to identify a relevant theoretical framework to shape our analysis of the reflection data. This brief presents a short review of relevant frameworks of feedback literacy, an explanation of our chosen framework, and the process of developing a deductive codebook for the reflection data. This section of the study was guided by the following research question: *How can existing frameworks of feedback literacy be adapted to support the development of teamwork skills for first-year engineering students?*

Background

Feedback is a widespread term in education, but it can have several different meanings. Generally, feedback is defined as the transmission of evaluative or corrective information about an action, event, or process to the original or controlling source [5]. In education, this often originates from the instructor and is directed toward the student as formative or summative feedback. While other sources of feedback have grown in popularity, including from peers, automated grading, and Generative AI, most research on feedback still pertains to instructor feedback. This trend is apparent in engineering education, where only 21 articles with 'peer feedback' or 'peer evaluation' in the title have been published in the PEER repository in the last five years. Conversely, hundreds of articles published since 2020 contain just 'feedback' in the title.

Articles that focus on instructor-to-student feedback tend to focus on creating digital tools for feedback (e.g., [6]) or evaluating the effectiveness of feedback mechanisms for learning and assessment (e.g., [7], [8]). Conversely, papers on peer evaluation or peer feedback are more likely to focus on student perceptions (e.g. [9]), development of teamwork skills (e.g. [10]), or teaching students how to give feedback effectively (e.g., [11], [12]). Research interested in instructor feedback is similar to other literature on assessment, whereas research on peer feedback is generally more focused on student experience and teamwork development. While some papers on peer feedback hint at the ability to process feedback effectively, the phrase 'feedback literacy' is largely absent from recent engineering education research. Coppens

published the only known journal articles that directly study feedback literacy development for engineering students [13], [14]. These articles examined the use of reflective journals as a tool to process feedback from instructors. We are unaware of any studies in engineering education that have investigated feedback literacy for peer feedback.

Frameworks of Feedback Literacy

Parallel to discussions within engineering education, a shift in the dominant theoretical frameworks of feedback has occurred in higher education spaces over the last decade. Traditionally, feedback has been viewed as the responsibility of an instructor to disseminate information to students about how to achieve high-quality work and good grades. This paradigm aligns with practices of passive learning, where the student absorbs information from the instructor with limited agency. As active learning grew in notoriety, David Boud and colleagues in higher education research saw a need for a new theoretical basis for feedback. Boud and Malloy [15] outlined a student-centered view that frames feedback as a process with the student as the primary agent. Information provided by instructors, peers, or colleagues only becomes feedback when it is used to inform a corrective action [15]. How, then, do educators ensure that the information provided to students becomes feedback? Frameworks of feedback literacy attempt to answer this question by defining the necessary behaviors to transform information into feedback and, subsequently, corrective action. This section describes the development of four frameworks of feedback literacy and justifies the researchers' selection of a framework for this study.

Most frameworks and survey instruments of feedback literacy in higher education have been informed by a seminal work from Carless and Boud [2]. In this theory paper, the authors define 'student feedback literacy' as "the understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies" [2, p. 1316]. Feedback literacy was further defined using four main features: appreciating feedback processes, making judgements, managing affect, and taking action. Appreciating feedback processes includes valuing feedback information and recognizing the student's active role in the feedback process. These understandings are necessary prerequisites to the rest of the feedback process because, if students do not value feedback or recognize their role in using the information, they are unlikely to be motivated to take action. Making judgments in feedback hinges on evaluative judgment; students must evaluate the performance of others and themselves to accurately give and receive feedback. Affect in the feature 'managing affect' refers to feelings, emotions, and attitudes. Getting constructive feedback is difficult, and a student must look past their initial reactions to see the utility of feedback information. The final feature of student feedback literacy is taking action. After making sense of the information, students must close the feedback loop by using it to make changes in their work [15]. The chronological arrangement of these four features depends on the student and the context, but appreciating feedback, making judgements, and managing affect generally occur simultaneously and lead the student to take action.

Building upon the work by Carless and Boud, another team of researchers sought to develop an empirical framework for student feedback literacy. Molloy, Boud, and Henderson [16] conducted a survey of more than 4000 university students in Australia to identify salient constructs of feedback literacy. The results largely supported the initial features identified by Carless and Boud, but were organized into seven groups with a total of 31 subcategories. The seven groups are analogous to Carless and Boud's four features: (1) Commits to feedback as improvement; (2) Appreciates feedback as an active process; (3) Elicits information to improve learning; (4) Processes feedback information; (5) Acknowledges and works with emotions; (6) Acknowledges feedback as a reciprocal process; (7) Enacts outcomes of processing of feedback information [16, p. 529]. Notable differences include the addition of group six, which directly addresses the giving of feedback, and the discretization of the 'appreciating feedback' feature into groups one, two, three, and five.

With several feedback literacy frameworks developed by 2020, numerous articles were published with survey instruments to measure student feedback literacy [17]. A majority of the instruments developed use Carless and Boud's features to inform their survey constructs (e.g., [18], [19]), and many add additional constructs. An instrument by Dawson et al. [17] differed from the majority, however, by combining constructs from Carless and Boud [2] and Molloy, Boud, and Henderson [16] to inform a Feedback Behavior Literacy Scale. This instrument differed from existing surveys by focusing on enacted behaviors in the feedback process rather than beliefs about feedback literacy. By combining constructs from two frameworks, Dawson et al. created a streamlined, five-construct conceptual framework of feedback literacy behaviors. The five constructs are as follows: seek feedback information, use feedback information, make sense of information, provide feedback information, and manage affect. The conceptual framework was reviewed by experts and authors of the existing frameworks for coherence and validity.

As our research team evaluated the numerous frameworks of feedback literacy, it was clear that most are not unique theories but rather iterations in a chronological development of theory. Thus, it made sense to adopt a recent framework that benefits from the empirical validation of several previous studies and reviews. The conceptual framework by Dawson et al. [17] presents a synthesized theory informed by the relevant literature, focused on higher education, and has been tested through instrument validation. Furthermore, the reflection data gathered in this study largely includes students' behaviors throughout the feedback process, so a framework centered on feedback literacy behaviors is the best choice. Our work seeks to extend Dawson et al.'s framework to the first-year engineering context, and our specific research question is detailed in the next section.

Application of Theory

To extend the conceptual framework outlined by Dawson et al., the research team examined the framework in the context of the study and developed codes and subcodes that addressed the research questions. The product of this process is a full codebook with example quotes from the reflection data.

Study Context

This study was conducted in a project-based, first-year engineering course at a large, public university in the Mid-Atlantic US. The course is the second in a two-course sequence required for all engineering students at the university. Students complete a semester-long design project in teams of 4-6 students. Peer evaluations were facilitated via CATME, a tool used by the instructor to monitor team dynamics and individual performance throughout the semester. CATME peer evaluation was conducted three times during the 16-week semester (Weeks 7, 11, and 16), and students completed numerical ratings of their peers for five teamwork dimensions and wrote open-ended feedback comments. In a typical semester of this course, CATME comments are not released for students to read.

In Fall 2023, the research team implemented a new peer feedback mechanism to disseminate CATME results to students. Six sections of the first-year course participated, resulting in a sample of 303 students. The researchers used GPT 4.0 to write performance feedback reports (PFRs) based on a detailed prompt and CATME peer comments. The PFR summarized positive and constructive feedback, suggested areas for improvement, and analyzed alignment between the student's self-evaluation and their teammates' evaluations. More details about this process are described in our prior work [20]. Four sections received one PFR based on the comments from their Week 7 evaluation, and two sections received two PFRs from the Week 7 and Week 11 evaluations. After students received their PFRs, they were asked to write in-class reflections about the feedback they received. Students were again asked to reflect on how the feedback had impacted their class behaviors a few weeks after receiving the PFR. Table A1 in the Appendix summarizes the reflection prompts and weeks completed.

The reflections from consenting students were exported from Canvas by the instructors, combined into a single document for each participant, and imported into Atlas.ti for analysis. The purpose of the larger study is to examine the impact of PFRs on the development of teamwork behaviors in the first-year engineering context. The overarching research question that motivated this review of relevant theory is 'How might faculty leverage generative AI to provide personalized feedback to intentionally promote students' teamwork and feedback literacy behaviors?' With the research question and chosen theoretical framework as guides, the researchers worked to develop a codebook for the reflection data. The next section will detail how the framework was used to develop a codebook.

From Framework to Codebook

To analyze the reflection data, the researchers chose to deductively code feedback literacy behaviors. With the five constructs from Dawson et al.'s conceptual framework as a basis (seek feedback information, use feedback information, make sense of information, provide feedback information, and manage affect), two researchers reviewed a sample of reflections to identify salient sub-constructs. In the initial review, we determined that all five of Dawson's constructs were present in the data but not inclusive of all relevant themes. The reflection questions asked specifically about the students' reactions to an AI-generated report, which resulted in responses that directly discussed how students appreciated feedback. Dawson et al. incorporated appreciating feedback into the construct 'seek feedback information', but the ways in which students discussed their appreciation or lack of appreciation for the PFRs were distinct from whether the students sought feedback. To capture these elements in the codebook, an additional code titled 'Appreciating feedback' was added. This code includes the elements of appreciation outlined by Carless and Boud [2] and subcodes specific to the Generative AI component of the study.

Another important element of the codebook was the translation of Dawson et al.'s constructs to peer feedback. Dawson et al.'s study focused on feedback literacy as applied to feedback information from an instructor. Peer feedback in the context of this study differs in a few ways. First, an instructor decides what 'good' work is and assigns grades, while a peer evaluates based on their judgment of 'good' work, which may or may not be correct. In this context, peers are primarily giving feedback on teamwork behaviors rather than assessing the student's knowledge. To accommodate these differences, slight modifications to the construct titles and definitions were made for our codebook. For example, Dawson et al.'s construct 'use feedback information' was narrowed to 'use feedback information to inform teamwork behaviors' in our codebook. These changes align with the overarching research question, which focuses on teamwork and feedback literacy behaviors. The final codebook with subcodes and representative quotes is Table A2 in the Appendix. Six codes are divided into 18 subcodes that directly address the research question. Each subcode represents an attitude or perception about feedback that was prevalent in the reflection data. For example, to capture how students utilize feedback information, the code 'Use Feedback Information to Inform Teamwork Behaviors' was broken into three subcodes that capture (1) what students planned to change about their behaviors, (2) actual changes made, and (3) the resulting impact on the team. We believe that the codebook effectively captures the elements of feedback literacy, as applied to our PFR feedback process.

Implications and Future Work

The extension of feedback literacy theory provides several implications for our larger study and the field of engineering education. The codebook derived from feedback literacy theory has been used to code the reflection data. We found that this codebook is a useful way to understand student perceptions of the feedback they received and how they would implement changes to

their teamwork behaviors. For our larger study, we chose to dive deeper into some of the codes to illuminate the types of changes students were making (e.g., changes to communication practices, time management, etc.). We believe that these theories have significant potential in engineering education, and we encourage researchers and educators to utilize such theories in their work.

The translation of theory from instructor feedback in higher education to peer feedback in engineering education opens several opportunities for researchers and educators. Research in peer feedback literacy is nascent, so there is a plethora of unexplored contexts. Furthermore, several survey instruments have been developed to measure feedback literacy in other fields, so validation in the engineering context is needed to extend these potentially useful instruments. Connections to popular theories in engineering education is another potentially productive avenue. Chong has recently connected Carless and Boud's feedback literacy framework to Vygotsky's sociocultural theories [21]. A stronger theoretical and empirical connection between feedback literacy and students' development of teamwork behaviors is needed to fully comprehend the importance of feedback literacy.

For practitioners, peer evaluation tools are only as useful as students' capacity to process feedback information [22]. The constructs of feedback literacy can inform future pedagogical interventions to explicitly teach feedback literacy and/or incorporate these skills into curricula. One of our previous works, for example, found that a 30-minute training on how to write feedback can create measurable improvements in the quality of qualitative peer comments [12]. Furthermore, to truly encourage self-regulation, students should be incentivized to reflect on areas of improvement and have opportunities to correct. Formative assessments that are accompanied by quality feedback are essential parts of the feedback literacy process, as a key construct of Carless and Boud's framework is *taking action* [15].

Feedback literacy is essential to prepare engineering students to maximize the feedback they will receive in industry and better support them in their career paths. Engineering professionals receive feedback about their work from various technical and non-technical sources. An ability to appreciate the diversity of feedback, make informed judgements, manage affect, and take appropriate actions are all integral steps of the engineering design process [23]. By practicing feedback literacy through peer evaluation in college, students are preparing for engineering practice.

References

[1] B. O'Connell, "Transforming Performance Management into Continuous Feedback," Society for Human Resource Management. Accessed: Jan. 06, 2025. [Online]. Available: https://www.shrm.org/topics-tools/news/all-things-work/performance-management-evolves

[2] D. Carless and D. Boud, "The development of student feedback literacy: enabling uptake of feedback," *Assess. Eval. High. Educ.*, vol. 43, no. 8, pp. 1315–1325, Nov. 2018, doi: 10.1080/02602938.2018.1463354.

[3] M. R. Weaver, "Do students value feedback? Student perceptions of tutors' written responses," *Assess. Eval. High. Educ.*, vol. 31, no. 3, pp. 379–394, Jun. 2006, doi: 10.1080/02602930500353061.

[4] N. E. Winstone, R. A. Nash, M. Parker, and J. Rowntree, "Supporting Learners' Agentic Engagement With Feedback: A Systematic Review and a Taxonomy of Recipience Processes," *Educ. Psychol.*, vol. 52, no. 1, pp. 17–37, Jan. 2017, doi: 10.1080/00461520.2016.1207538.

[5] "Definition of FEEDBACK," Merriam Webster English Dictionary. Accessed: Apr. 24, 2025. [Online]. Available: https://www.merriam-webster.com/dictionary/feedback

[6] P. F. Larrondo, J. Ortiz, and B. M. Frank, "Work-in-Progress: Fine-Tuning Large Language Models for Automated Feedback in Complex Engineering Problem-Solving," presented at the 2024 ASEE Annual Conference & Exposition, Jun. 2024. Accessed: Jan. 07, 2025. [Online]. Available: https://peer.asee.org/work-in-progress-fine-tuning-large-language-models-for-automated-feedback-in-complex-engineering-problem-solving

[7] C. Wallwey, "Development and Employment of a Course Feedback Classification Tool," presented at the 2021 ASEE Virtual Annual Conference Content Access, Jul. 2021. Accessed: Jan. 07, 2025. [Online]. Available: https://peer.asee.org/development-and-employment-of-a-course-feedback-classification-tool

[8] A. Deorio and C. Keefer, "When is Automated Feedback a Barrier to Timely Feedback?," presented at the 2022 ASEE Annual Conference & Exposition, Aug. 2022. Accessed: Jan. 07, 2025. [Online]. Available: https://peer.asee.org/when-is-automated-feedback-a-barrier-to-timely-feedback

[9] K. P. Ditonto, S. Yoo, and B. Lawrence, "Leveraging Incentives, Disincentives, and Peer Feedback to Enhance Student Performance," presented at the 2023 ASEE Annual Conference & Exposition, Jun. 2023. Accessed: Jan. 06, 2025. [Online]. Available: https://peer.asee.org/leveraging-incentives-disincentives-and-peer-feedback-to-enhance-student-performance

[10] I. K. Kumi *et al.*, "How Does Working on an Interdisciplinary Service-Learning Project vs. a Disciplinary Design Project Affect Peer Evaluators' Teamwork Skills?," presented at the 2023 ASEE Annual Conference & Exposition, Jun. 2023. Accessed: Jan. 06, 2025. [Online]. Available: https://peer.asee.org/how-does-working-on-an-interdisciplinary-service-learning-project-vs-a-disciplinary-design-project-affect-peer-evaluators-teamwork-skills

[11] W. Huang, R. Wynkoop, M. Exter, and F. Berry, "Feedback Matters: Self-and-Peer Assessment Made Better with Instructional Interventions," presented at the 2022 ASEE Annual Conference & Exposition, Aug. 2022. Accessed: Sep. 06, 2023. [Online]. Available: https://peer.asee.org/feedback-matters-self-and-peer-assessment-made-better-with-instructional-interventions

[12] K. Drinkwater, O. Ryan, S. Sajadi, M. Huerta, and M. Fisher, “Improving Peer Feedback in Project-Based Learning Contexts: An Investigation into a First-Year Engineering Intervention,” in *2024 ASEE Annual Conference & Exposition*, Jun. 2024.

[13] K. Coppens, L. Van den Broeck, N. Winstone, and G. Langie, “Feedback literacy as a professional competence for first-year engineering students: students’ feedback experiences,” presented at the SEFI 2021, Berlin, Germany, Sep. 2021, pp. 142–150. Accessed: Jan. 06, 2025. [Online]. Available: https://dro.deakin.edu.au/articles/conference_contribution/Feedback_literacy_as_a_professional_competence_for_first-year_engineering_students_students_feedback_experiences/20589156/1

[14] K. Coppens, L. Van den Broeck, N. Winstone, and G. Langie, “Capturing student feedback literacy using reflective logs,” *Eur. J. Eng. Educ.*, vol. 48, no. 4, pp. 653–666, Jul. 2023, doi: 10.1080/03043797.2023.2185501.

[15] D. Boud and E. Molloy, “Rethinking models of feedback for learning: the challenge of design,” *Assess. Eval. High. Educ.*, vol. 38, no. 6, pp. 698–712, Sep. 2013, doi: 10.1080/02602938.2012.691462.

[16] E. Molloy, D. Boud, and M. Henderson, “Developing a learning-centred framework for feedback literacy,” *Assess. Eval. High. Educ.*, vol. 45, no. 4, pp. 527–540, May 2020, doi: 10.1080/02602938.2019.1667955.

[17] P. Dawson, Z. Yan, A. Lipnevich, J. Tai, D. Boud, and P. Mahoney, “Measuring what learners do in feedback: the feedback literacy behaviour scale,” *Assess. Eval. High. Educ.*, vol. 49, no. 3, pp. 348–362, Apr. 2024, doi: 10.1080/02602938.2023.2240983.

[18] Y. Zhan, “Developing and validating a student feedback literacy scale,” *Assess. Eval. High. Educ.*, vol. 47, no. 7, pp. 1087–1100, Oct. 2022, doi: 10.1080/02602938.2021.2001430.

[19] Z. Dong, Y. Gao, and C. D. Schunn, “Assessing students’ peer feedback literacy in writing: scale development and validation,” *Assess. Eval. High. Educ.*, vol. 48, no. 8, pp. 1103–1118, Nov. 2023, doi: 10.1080/02602938.2023.2175781.

[20] S. SAJADI, M. HUERTA, O. RYAN, and K. DRINKWATER, “Harnessing Generative AI to Enhance Feedback Quality in Peer Evaluations within Project-Based Learning Contexts,” *Int. J. Eng. Educ.*, vol. 40, no. 5, pp. 998–1012, 2024, doi: 0949-149X/91.

[21] S. W. Chong, “Reconsidering student feedback literacy from an ecological perspective,” *Assess. Eval. High. Educ.*, vol. 46, no. 1, pp. 92–104, Jan. 2021, doi: 10.1080/02602938.2020.1730765.

[22] A. Forsythe and S. Johnson, “Thanks, but no-thanks for the feedback,” *Assess. Eval. High. Educ.*, vol. 42, no. 6, pp. 850–859, Aug. 2017, doi: 10.1080/02602938.2016.1202190.

[23] C. J. Atman, “Design timelines: Concrete and sticky representations of design process expertise,” *Des. Stud.*, vol. 65, pp. 125–151, Nov. 2019, doi: 10.1016/j.destud.2019.10.004.

Appendix

Table A1. Reflection Questions

Week #	Prompt Questions
7	● What are the key insights you gained from your Feedback Report? ● Were there any surprises in your Feedback Report? If so, why did they surprise you? ● From your Feedback Report, what do you perceive as your strengths in teamwork and which areas could use improvement? ● In what ways did the Feedback Report contribute to your understanding of your strengths and areas for improvement in teamwork? Did the feedback you received align with your self-assessment?
7	● Based on your Feedback Report, what specific actions will you implement to improve your teamwork skills? ● What goals will you set for yourself for the next project phase based on the feedback from your Feedback Report? ● How do you plan to address any constructive feedback in your future team interactions? ● How do you anticipate these changes will impact your team's performance and dynamics in the next project phase?
9	● How have your teamwork behaviors changed or evolved since your first Feedback Report? ● What strategies or actions did you implement to address the areas of improvement identified in your first Feedback Report? How effective were they? ● How will you apply the lessons learned from this experience in your future team interactions? ● How might the feedback you received influence or shape the way you provide peer feedback in future evaluations?
11*	● Did your second Feedback Report reveal any new insights about your teamwork behaviors? ● Based on your second Feedback Report, what further actions will you take to continue improving your teamwork skills? ● How will the insights from your Feedback Reports inform your approach to teamwork in future academic and professional settings? ● Overall, what did you think about the AI-generated Feedback Reports? What are your thoughts about the reports being generated by AI?

*Only the two sections that received two PFRs completed the Week 11 reflection

Table A2. Final Codebook

Appreciating Feedback	**Definition: Feedback literate students: (1) understand and appreciate the role of feedback in improving work and the active learner role in these processes; (2) recognise that feedback information comes in different forms and from different sources; (3) use technology to access, store and revisit feedback.**
Subcode	*Representative Quote*
1. Appreciating feedback (generally)	It gave me insight into what I need to work on and what I am good at. This helps me improve on my teamwork and collaboration ability. (114)
2. Appreciating AI-generated feedback	Regarding the AI-generated Feedback Reports, I find them impressively accurate and insightful. It's fascinating to see artificial intelligence facilitate such constructive reflections on human collaborative processes. (91)
3. Appreciating and recognizing characteristics of quality feedback	In summary, the Feedback Report has given me a clearer picture of my strengths and areas for improvement in teamwork, serving as a constructive guide to enhance my role within the team. (145)
4. Not appreciating AI-generated feedback	I think that AI-generated feedback reports are not significantly helpful since they tend to give generic advice but it would be impossible for a human to read over every students CATME survey and formulate personalized feedback. (58)
Make Sense of Feedback	**Definition: Processing, evaluating, and interpreting feedback information**
Subcode	*Representative Quote*
1. Feedback aligns with self-perceptions	Nothing really surprises me. The weaknesses and strengths that the feedback report commented on are all strengths and weaknesses that I was already aware of. I even mentioned some of these flaws in my own self-assessment. (9)
2. Feedback is surprising or misaligns with self-perceptions	Some surprise feedback was a suggestion that I participate more, and this surprises me because I am used to bigger groups, where not everyone has to participate as much as this. (41)
3. Positive feedback is validating/affirming	I was surprised that leadership was my top quality, because though I take on the role as a leader in most projects, I have never really been called one. (15)

4. Constructive feedback confirms or identifies an area of improvement	…but my negative feedback has reflected my distractedness over the last few weeks, which is absolutely true. I need to approach class with a clearer mind and more focus on the tasks at hand. (33)
5. Disagreement with feedback	I am a bit confused about what my second critique meant (looking to others for feedback and understanding), as I thought I was already doing that. Maybe I am not as open as I thought though, and will definitely think about it as I go forward. (125)
6. Interpretations of contradictory feedback	Something that surprised me was that the report contradicted itself in a way. For example, proactive involvement was listed in both my strengths and weaknesses sections. (122)
Use Feedback Information to Inform Teamwork Behaviors	**Definition: Putting feedback information into action to improve the quality of current and future work**
Subcode	*Representative Quote*
1. Proposed actions to improve or maintain teamwork behaviors	In my group, I will work to more consciously ask for others' ideas and take turns presenting ideas while listening with an open mind. I want to set the goal of compromising my own self-interests at least once or twice a meeting and not get too stuck in feeling an idea is better than another given idea. I plan to work through this in the team environment by working on talking a little bit less…(65)
2. Changes in personal teamwork behaviors	The main problem with my teamwork previously was zoning out during discussions. Also, my teammates thought that I could participate more in the group discussions. I believe that my behaviors have improved since then. I feel like I am participating quite a bit in the group discussions and helping our team progress towards our goals. A strategy I have used to not zone out is to only keep the team meeting document open during discussions to keep me focused on the task. (61)
3. Observed change in teamwork behavior(s) of teammate(s)	Our teamwork's behaviors have changed since our first feedback report by our communication improving significantly. Before our first feedback report we didn't have a group chat to communicate with, but no[w] we do. (79)

Provide Feedback on Others' Teamwork Behaviors	**Definition: Considering the work of others and making comments about its quality**
Subcode	*Representative Quote*
1. Willingness to provide more quality feedback to peers	The feedback I received inspired me to be completely honest during evaluations that way my teammates will be fully aware of what they are and are not doing well. (96)
2. AI-generated models how to provide quality feedback	This will shape my feedback I provide in the future because it made me realize how effective proper communication can be between the team which makes our overall project more efficient. (89)
Manage Affect	**Definition: Persisting in feedback processes despite the emotional challenges they pose.**
Subcode	*Representative Quote*
1. Perceptions of how AI-generated feedback helps with providing and/or receiving feedback	Getting the feedback from ChatGPT will likely help me give better feedback in the future since I can use it as a guide as how to phrase my feedback to others. (151)
2. Managing emotions in engaging in feedback processes	I know I could be stubborn and feel that I am right, but that is simply not being an engineer. I need to know that collaboration is key to success in this class and all facets of engineering…(64)
Seek Feedback Information	**Definition: Eliciting feedback from a variety of sources, including one's own notion of quality and examples of good work**
Subcode	*Representative Quote*
1. Openness and willingness to seeking out feedback outside of the required peer evaluation processes	I think next time I receive feedback, I will be more open to what others have to say as listening to the current feedback has improved my work in the group. (59)