EOTA: A METHOD FOR IMPROVING PEER FEEDBACK IN THE GAME DESIGN CLASSROOM

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Abstract

Peer feedback is an essential part of the iterative game design process. Peer feedback requires students to develop a range of skills, both to provide high quality feedback to others and to reflect on the feedback they receive. Students also often engage in reflection activities as a team, requiring even more skill development for effective peer feedback exchange to occur. Students often struggle to develop the skills necessary for giving and receiving feedback effectively. This paper presents the EOTA method, a pedagogical approach designed to elicit formative feedback during in-class playtests of student games. We discuss our experiences using the EOTA method in university-level game design classes and identify how the EOTA method can help address issues that often arise in peer feedback exchange, such as supporting student engagement, improving *quality* of student feedback, and helping students reflect on feedback received.

Introduction

For game designers, peer feedback is a critical part of the iterative design process (Fullerton, Swain, & Hoffman, 2008). Designers in industry must integrate feedback from teammates, and often seek additional input from colleagues outside their immediate team. Feedback from players is also critically important to the game design process because games are emergent systems, which are difficult to fully understand until they are played (Salen & Zimmerman, 2004). The game design classroom provides opportunities for students to engage in peer feedback during live critiques, such as project presentations or live playtests, and to respond to peer feedback during their iterative design process.

Peer feedback requires the development of a range of student skills (Butler & Winne, 1995; Liu & Carless, 2006). In their role as game designers, students must learn to listen carefully to the feedback they are getting, to interpret and analyze it, to critically evaluate it, and finally to incorporate it into their designs. In their role as feedback providers, students must learn to provide relevant and high-quality feedback on game designs and prototypes. Mastering these skills benefits students' learning; feedback receivers improve their self-regulated learning abilities (Butler & Winne, 1995) and develop self-assessment skills (Liu & Carless, 2006), while feedback providers learn to recognize what good

work looks like and to correctly interpret standards and criteria (Nicol & Macfarlane-Dick, 2006). Additionally, peer feedback provides benefits for instructors, as they can see students' reasoning about games, and can scale feedback processes beyond what they personally can provide (Kulkarni, Bernstein, & Klemmer, 2015).

In practice, however, students struggle with both delivering and receiving constructive feedback on game design. These struggles are not unique to game design, but rather reflect larger challenges around the peer feedback process. Prior research has shown that peer feedback faces issues with student engagement, feedback quality, and how feedback is reflected on and used in the iterative design process (Ertmer et al., 2007; Kulkarni et al., 2015; McMahon, 2010). However, these issues can be mitigated with the appropriate design of pedagogical methods and/or educational technologies (Shannon, Sciuto, Hu, Dow, & Hammer, 2017).

This paper presents one such pedagogical approach, the EOTA method. EOTA is designed to elicit formative feedback during in-class playtests of student games. It uses an end-to-end approach, considering *before feedback*, *during feedback*, and *after feedback* as opportunities to intervene in the peer feedback process. Finally, it addresses three key issues in peer feedback: supporting student engagement in the peer feedback process, improving the quality of peer feedback that students provide, and helping students reflect on the feedback they receive from peers.

Literature Review

We draw on existing literature about peer feedback in the design classroom to identify benefits and challenges of peer feedback that affect game design students.

Peer Feedback in the Design Classroom

Giving and receiving feedback is an essential skill for design students (Beyer & Holtzblatt, 1997; Fullerton et al., 2008). Peer feedback provides an opportunity for students to get more feedback (Topping, 1998) and faster feedback (Kulkarni et al., 2015) than if the instructor was the only feedback provider. This is particularly important in game design classrooms, when students need feedback to rapidly iterate game prototypes. Peer feedback is also an essential aspect of playtesting, or using feedback from play to guide game design (Choi et al., 2016; Fullerton et al., 2008). Peer feedback provides opportunities for students to learn to incorporate player feedback into the next iteration of a game.

Benefits of Peer Feedback for Stakeholders

The peer feedback process has three stakeholders: feedback providers, feedback receivers, and instructors. Each stakeholder benefits from peer feedback in different ways. Feedback providers learn to recognize what "good" work looks like and to correctly interpret standards or criteria (Nicol & Macfarlane-Dick, 2006). Providers also learn to focus their feedback on a student's work, rather than on the student's personal characteristics (Gibbs & Simpson, 2004). By reflecting on feedback given by others, feedback receivers improve their self-regulated learning skills (Butler & Winne, 1995) and self-assessment abilities (Liu & Carless, 2006). Instructors benefit because peer feedback lowers their burden to generate comments for the entire class in a timely manner (Topping, 1998). Prior work shows that peer feedback can be equally as effective as expert feedback (Cho & Schunn, 2007;

Topping, 1998), and peer feedback allows students to get a high quantity of feedback and a more diverse set of feedback, which enhances their learning experience (Beyer & Holtzblatt, 1997).

Challenges of Peer Feedback

Whether peer feedback is conducted as a verbal, written, or digital process, researchers have identified three key challenges to learning from peer feedback.

First, students often struggle to engage in the peer feedback process. During verbal critique, only a few students have the opportunity to speak, and the conversation may become dominated by one or two voices. Written or digital critique can be time consuming for students (Ertmer et al., 2007), which may cause them to begrudge the peer feedback process (Kulkarni et al., 2015).

Second, students may not learn to improve the quality of feedback they give. While prior work shows that peer feedback varies in quality (McMahon, 2010), it has not shown that students improve over time. In addition, all three feedback methods limit the number of perspectives feedback providers are exposed to (Beyer & Holtzblatt, 1997; McMahon, 2010), so struggling students are not shown what better feedback looks like.

Third, students may not know how to reflect on the feedback they receive. Peer feedback is only helpful if reflected on (Gibbs & Simpson, 2004), but typically students are not supported during reflection. Prior work in digital feedback systems has struggled to help students reflect on feedback and integrate feedback into future work (Kulkarni et al., 2015).

The EOTA method seeks to address the challenges of engaging students in the peer feedback process, helping students improve the quality of feedback they provide, and helping students reflect on feedback they receive.

The EOTA Method

The EOTA method is a set of pedagogical activities designed to enhance the peer feedback process. It is meant to be implemented in support of feedback provision during live in-class playtests of student games. However, EOTA is an *end-to-end process.* It begins before peer feedback is provided, with training activities to help students engage in effective peer feedback. It continues during the provision of live peer feedback during in-class playtesting. Finally, after designers receive their feedback, it includes methods to help students reflect on feedback they received and integrate it into their designs.

EOTA is a non-digital method; no technology is required to participate. EOTA can be applied to digital and non-digital games. For the purposes of this paper, we assume that in-class playtests involve paper prototypes, either of digital or non-digital games. However, the method can be used for digital games as long as students can see both the playtester(s) and the screen.

Finally, we clarify how we will use a few key terms. These terms are important because in peer feedback, students serve both as feedback *receivers* and as feedback *providers*. We therefore distinguish students by these roles. ***Designers*** are students in their role as feedback receivers; their game is playtested by peers, and they must interpret the feedback they receive as they iterate their game. ***Players*** are the students who played the game. ***Peers*** are students who observed the playtest. Both

players and peers take the role of feedback provider. ***Students*** refers to all students in the class, regardless of role. Finally, ***instructors*** can include faculty, teaching assistants, or other course staff.

Before Feedback: Norm-Setting Through Low-Stakes Design Activities

The EOTA method begins with training students to value and engage with the feedback process. It uses short-form, low-stakes design activities that require students to create imperfect work, and treats them as both opportunities to practice gaining critical distance from a game and opportunities to practice giving and receiving feedback. For example, in Five Spoons, teams of students must create a game given insufficient time and challenging materials (five spoons, plus one item from each person's pockets or bag). Designers must then iterate their game multiple times, each time with additional constraints and less time for the design process. The final round of iteration is a frantic one-minute scramble to make decisions and change the rules.

After each round of design and/or iteration, one or more teams of designers are selected to share their game with the class. All teams must share their game at least once. The instructor then models providing one piece of helpful feedback per game, and explains what about that piece of feedback made it helpful. Optionally, instructors may also model unhelpful feedback.

At the end of the entire activity, the instructor explains how this process will play out in the rest of the class. As designers, students will share work in progress and will be expected to hear critical feedback. As peers, students will be asked to provide high-quality feedback. Finally, the instructor led the class in applause and welcome all students to the game design community.

The Five Spoons exercise makes it impossible for students to succeed in any conventional way. Students must show imperfect work to the class. Students also know that all other students were also faced with an impossible task and are showing imperfect work. This can help detach student egos from their projects and prepare them to hear feedback (Boud & Molloy, 2013). By closing with a celebration, students receive positive reinforcement for sharing work-in-progress, for being non-defensive about their game, and for participating in a feedback process (Värlander, 2008). These factors can support student engagement with peer feedback.

Additionally, students-as-peers have the opportunity to hear the instructor model high-quality feedback and reflect on what makes it successful. In addition to learning about high-quality feedback in the context of a real project, Five Spoons lowers the stakes for providing critical feedback, and can help peers be more willing to provide critical feedback in the future. These factors can improve the quality of peer feedback (Nicol & Macfarlane-Dick 2006).

Instructors may create their own low-stakes design activities as part of the EOTA process, using the following principles:

1. Activities should be ungraded. Creating external stakes for students will make them more, not less, attached to having a "good" outcome (Craven, Marsh, & Debus, 1991).
2. Activities should be short. The more time students invest, the higher the expectations. Students should not continue working on their designs beyond a single class period.
3. It should be impossible to succeed at the design activity in any conventional sense, which

lowers the stakes for the design activity (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011).

4. Instructors should model helpful feedback, and reflect aloud on why it is helpful. Instructors can also share examples of unhelpful feedback with reflection, if time permits (Nicol & Macfarlane-Dick 2006).
5. Instructors should end the activity by celebrating and applauding the imperfect work, and welcoming students into the community of game designers.

During Feedback: Experiences, Observations, Theories, Advice

As noted earlier, the EOTA method is meant to be used with in-class playtests of student games. This portion of the method describes what happens at the in-class playtest sessions.

Ideally, one team of designers playtests at a time. The instructor should arrange the room so that all peers can see the game-in-progress. However, for larger classes or if time is short, teams can playtest in parallel. The instructor can select an initial set of teams to playtest their games, and assign each team a group of players and peers such that every game has 1) sufficient players and 2) at least three peer observers. Students maintain one role through the full EOTA process, then rotate roles when they move on to the next game.

Before the first playtest of the class session, the instructor should remind the class about the purpose of the feedback session. Designers are there to learn, not to advise on strategy or to get players to play 'correctly.' Designers will be evaluated on how much they learn, not on how well their game meets their expectations. Players and peers should be specific, concrete, and kind when providing feedback. They will be evaluated on how effectively they help the design team accomplish their goals.

The first portion of the playtest often involves players learning the rules. Ideally, designers will have provided the rules to playtesters in advance. However, if players need to learn the rules during the playtest session, designers should teach rules *within* the context of play. For example, the designers might give players the rules just-in-time during a sample game round, instead of reading all the rules aloud and expecting players to remember what to do.

During play, the designers are permitted to answer player questions about the rules, or correct a misplay. However, if the designers begin discussing strategy or helping players play "correctly," the instructor should intervene. For example, "The rules say you must discard two cards" is allowable, but "if you discard two cards then you can gain more territory" is not. The instructor should judge when the playtest is complete.

When the playtest is complete, the feedback process begins. Designers should take notes on everything they hear, but should not record the conversation without the class's permission. From this point onwards, designers may not speak, except to say "Thank you," unless explicitly told to say something by the instructor. If designers are asked a question, they should note down the question, not answer it in that moment. Designers should not get involved in the feedback or treat it as a conversation. Listening without responding can be difficult for student designers, and instructors should be prepared to enforce this rule repeatedly. Peers and players should address their comments to the group rather than directly to the designers, which will help designers decenter themselves and stay detached from their design.

The EOTA feedback process includes four stages: players describing their *experiences*, players and peers describing things they *observed*, players and peers developing *theories*, and players and peers delivering *advice*. Within each stage, instructors should use a strategy for calling on students that maximizes the diversity of student perspectives. A "numbering" approach can be particularly effective. In numbering, the instructor asks students to raise their hands and counts them off; the instructor does not move on to actually taking comments until the desired number of hands have been raised. Students will get a chance to speak when the instructor calls their number. If more students raise their hands during the discussion, the instructor can flash a number at them with their fingers or quietly assign them a number without interrupting the group. The instructor should not let students interrupt each other or jump the line, as those behaviors will reduce the diversity of comments. With these things in mind, the instructor leads the following four feedback phases, as described in Figure 1:

Experiences. **Only players** may speak. They may describe their strategy, their behavior, or their internal experiences during the game. They can explain why they made the choices that they did, but should not theorize about other players or offer advice about the game.

Observations. **Peers and players** may speak. They should describe things they noticed, focusing on observable behavior or on specific moments of gameplay. They should not theorize about why they observed what they did, only provide data.

Theories. **Peers and players** may speak. Using experiences and observations, participants may now theorize about why they saw what they saw. During this phase, the instructor can encourage students to make reference to game rules and to class readings as appropriate. The instructor should reflect back and/or rephrase student theories as needed, but should not allow other students to start a discussion of those theories.

Advice. **Peers and players** may speak. Based on the theories derived by the group, participants may now make suggestions for how the designers should iterate their game. The instructor should encourage students to phrase their comments in the form of, "In order to X, you could Y." By linking proposed changes to imagined outcomes, peers will make it easier for designers to determine whether they want to follow up on a given design proposal. During this phase, the instructor should steer participants away from building on or iterating each other's proposals. Having people raise their hands at the beginning, before they hear one another's comments, will help with this.

<table>
<tr><th colspan="2">Phase</th><th>Players</th><th>Peers</th><th>Designers</th></tr>
<tr><td rowspan="2">Collect Data</td><td>E - Experiences</td><td>Describe personal strategy or explain choices they made while playing.</td><td>Silently listen.</td><td rowspan="4">Silently take notes. May say “thank you” (but nothing more) in response to feedback.</td></tr>
<tr><td>O - Observations</td><td colspan="2">Describe observable behaviors they noticed during specific moments of gameplay.</td></tr>
<tr><td rowspan="2">Share Ideas</td><td>T - Theories</td><td colspan="2">Using experiences and observations, theorize about why they saw what they saw.</td></tr>
<tr><td>A - Advice</td><td colspan="2">Based on the theories derived by the group, make suggestions for how the designers could iterate their game.</td></tr>
</table>

Figure 1. Explanation of the EOTA method. The EOTA method structures peer feedback after in-class playtests by providing scaffolds for what type of feedback to give at each stage.

If students try to contribute something that belongs in a later phase (e.g. advice during the observation phase), the instructor should cut them off and ask them to hold it for later. If students contribute something that belongs in an earlier phase (e.g. an observation during the theory phase), the instructor should note that they have done so but accept the contribution. For example, the instructor might comment, “Thanks, that is a great observation that will help us continue to build theory.”

All students who raised their hand at the beginning of a given phase should have the opportunity to share their insights so that designers can get as many different perspectives as possible (Beyer & Holtzblatt 1997). Instructors should use their judgment about when to move to the next phase and warn students when only a few more comments will be taken.

At the end of the process, the instructor may synthesize key themes from the student feedback and summarize to designers. They should always thank the designers for sharing their game and lead the rest of the class in applause.

Using this method during in-class feedback sessions helps *engage* students in the feedback process. By collecting multiple experiences, observations, and theories before moving on to advice, this method captures a breath of perspectives and prevents peers who are verbally fluent from dominating the entire feedback process (Beyer & Holtzblatt 1997). It also reduces students echoing and/or arguing with one another by making them pre-commit to comments before they hear what others have said, and by having the instructor explicitly interrupt such behavior. By conducting the feedback sessions during class, it both expresses to students that feedback is valuable and encourages them to participate without an additional burden of finding time outside of class (Kulkarni et al. 2015).

The EOTA method demands that peers engage with evidence (experiences and observations) before ideas (theories and advice). By the time they are allowed to theorize or advise, peers have many concrete observations to draw on to justify their feedback. Additionally, framing feedback as “theories about observed phenomena” can help peers be critical, as the focus of the feedback moves from the designer and the game to the experiential and observational data collected by the group. This process

therefore supports feedback that is both critical and justified, which are key elements of high-quality feedback (Gibbs & Simpson 2004).

Similarly, this process provides designers with both evidence and ideas. In feedback methods where peers primarily provide suggestions, suggestions may not align with the designers' goals, or the designers may not have enough information about the ideas underlying those suggestions to use them effectively. The EOTA method takes a different approach. Because peers build a body of evidence before offering ideas, designers gain insight into what provoked particular suggestions. Designers can also use the underlying observations or experience reports even if the suggestions are unhelpful. This supports designers in *reflecting* on feedback, and incorporating the feedback into their design (Gibbs & Simpson 2004).

After Feedback: The Process Document

The value of formative feedback on game design projects is in how the feedback is used during the iterative design process. At the end of each game design project, student design teams are required to submit a process document along with their game. This document provides insight into how students used feedback and iterated their game.

In contrast to a postmortem, which summarizes lessons learned, a process document is expected to show artifacts from the design process and to expose the team's reasoning about how those artifacts were created, evaluated, and iterated. Reading a process document helps the instructor understand *how* a design team reached their final design, and should expose the team's thinking as much as possible. A sample assignment for a process document might be:

Explain how you made what you made. Show your iterative design process and how you changed your design over time. What unsuccessful designs did you explore? What made you decide not to pursue them? Document your playtest process, particularly showing what you expected to learn and how you designed your playtests. What technical challenges did you face, and how did you overcome them? Include sketches, photographs, or other visuals as necessary to show your process, e.g. iterations of your project over time.

While there is no specific requirement to use information from the in-class playtests, teams must write about how playtesting and feedback informed their design.

It is important that process documentation is graded. A grading rubric for process documents should involve evidence of the team's critical thinking, the inclusion of materials from multiple phases of the game's design, and any work that may not be evident in the final product (e.g. because the materials were cut for scope reasons or did not survive playtesting).

Process documents require designers to select which feedback they will report on, as the design team typically has a limited amount of time to produce the process document and a limited amount of space in the document itself. This selection process forces designers to evaluate the quality of feedback they receive; in turn, the insights from this evaluative process can help them improve the *quality* of their own feedback in the future (Nicol & Macfarlane-Dick 2006). Teams must also *reflect* on the feedback received as part of the selection process, as they determine how to incorporate it into the story of their design process (Gibbs & Simpson 2004).

Initial Observations from Classroom Deployments Context for Previous Classroom Deployments

As described in Figure 2, we believe that the EOTA method supports these aspects of the peer feedback process based on observations from a decade's worth of game design classes involving hundreds of students. During this time, the method has been iteratively developed and adjusted to address problems observed in the classroom, such as a few opinionated students dominating the discussion and reducing the diversity of the feedback. Additionally, we have experimented with using pieces of the method separately, which has allowed us to see the way these activities amplify one another when used together.

	Engagement	**Quality**	**Reflection**
Before feedback: All participants get norm-setting	Reduce fear of failure	Demonstrate high- and low-quality feedback	
During feedback: All participants use EOTA	Diversify participation & perspectives	Increase provision of justified and critical feedback	Provide many levels of data for teams to use
After feedback: Receivers create process document		Select feedback to respond to	Requires reflection on feedback use

Figure 2: Value of the EOTA method. The EOTA method addresses three common challenges of peer feedback: engagement, feedback quality, and reflection.

As part of our iterative development process, we observed student behavior during feedback sessions. This included both qualitative data (e.g. the nature of student comments) and quantitative data (e.g. the number of students who contributed to class discussion). We discussed this pedagogy with course staff, and requested feedback on the EOTA method from students. Finally, we evaluated student process documents, which included student reflections on what feedback they found useful and how they iterated their games as a result.

To date, classroom deployments of the EOTA method have included both digital and non-digital game design classes; class sizes ranged from 18 to more than 40 students and have included both graduate and undergraduate students. With one exception, which had only 20% female students, classes have been gender and racially diverse. All classes were taught at the university level, in four different departments across two universities. One university maintains an active games program, while at the other university, the classes being taught were the only game courses available.

Observed Benefits of the EOTA Method

Increased Student Engagement. Across this range of contexts, our observations to date suggest that the EOTA method engages a larger and more diverse group of students than more typical discussion-based feedback, including some students who otherwise do not participate in class discussion. This includes both a larger number of distinct observations about the game, and a larger number of competing theories or design directions.

Improved Feedback Quality. The quality of the feedback is also improved compared to open-ended feedback. When using EOTA, feedback providers refer to specific observations and experiences when building theories or providing advice. Feedback providers make fewer assumptions about the team's goals. They focus on explaining what they observed, rather than telling the team what they ought to have been trying to design for. In team process documents, teams almost always report iterating their game using the low-level feedback (experiences and observations) gathered during in-class playtesting, whether or not the class's synthetic work on theorizing and advising was helpful.

Higher Receptiveness to Criticism and Risk. We have also observed that EOTA can help students be more willing to engage with critical feedback. There are several possible failure states when students receive critical feedback. First, students may choose "safe" projects that they think will not be critiqued harshly by their peers. Second, students may be resistant to hearing and integrating feedback from players, peers, and/or experts. Finally, students may treat feedback as a to-do list, rather than critically selecting a response based on their own design goals. While these manifestations are quite different, they stem from the same issues: fear, defensiveness, and a lack of confidence in the student's identity as a designer. Low-stakes design activities, framing critical feedback as explanations of evidence, and rewarding students for critical thinking during the design process can help address these issues. During the iterative development of EOTA, we have observed that students become more willing to take risks, not only with their ideas but also with their personal choices. For example, students are more willing to take on new roles within their project group, such as volunteering to be a team's developer when they have limited prior experience. Students are also more willing to pivot their projects based on peer and/or expert feedback, to playtest work-in-progress, and to submit their projects to game design competitions and festivals. Overall, fewer students choose "safe" or boring ideas, and more students are willing to try experimental and exciting work, knowing that they can still be a successful game designer (and student!) if it fails.

Conclusion & Future Work

In this paper, we have presented the EOTA method, which works to address three major challenges of peer feedback: how to engage students with the process, how to improve the quality of peer feedback, and how to support designers in reflecting on the feedback they receive. Before feedback, low-stakes design activities can help students feel comfortable with the feedback process, and understand the difference between high- and low-quality feedback. During live peer feedback at in-class playtests, students use the EOTA method to structure feedback provision, which helps diversify participation, increase the amount of critical and justified feedback, and provides many levels of data for the team to use. Finally, design teams must create graded process documentation, which requires them to select high-quality feedback to engage with and to reflect on how to use it in the story of their game.

While we present this method in the context of live playtests during game design classes, it can be adapted to other types of project-based classes, with minor adaptation. For example, the EOTA method assumes that projects are interactive, and that players will have some insights not shared by observers. For projects where all peers have the same experience, such as watching a video, the "experience" and "observe" stages can be collapsed into one. Additionally, elements of this method can be used separately to target individual aspects of the peer feedback process. For example, Five Spoons has been used in a rapid prototyping class, as well as in an educational technology design class where students designed a learning activity instead of a game.

As future work, we look forward to a more formal validation of the impact of the EOTA method. We have a dataset that includes records of student feedback, process documents from game design projects, and the final versions of each game. We will also interview other game design educators who have used these methods in their classroom.

We also plan to extend our work to the game industry. In particular, we will explore the contextual differences between classrooms and workplaces, such as increased power distance between peers, and investigate how those differences affect EOTA. In the meantime, we hope that these activities are useful for improving feedback and supporting iterative design.

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