LEADERBOARD DESIGN PRINCIPLES INFLUENCING USER ENGAGEMENT IN AN ONLINE DISCUSSION

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ABSTRACT

Along with the popularity of gamification, there has been increased interest in using leaderboards to promote engagement with online learning systems. The existing literature suggests that when leaderboards are designed well they have the potential to improve learning, but qualitative investigations are required in order to reveal design principles that will improve engagement. Accordingly, this qualitative study aims to explore students' overall perceptions of popular leaderboard designs in a online discussion. Using two leaderboards reflecting performance in an online discussion, this study will evaluate multiple leaderboard designs from student interviews regarding the potential of each leaderboard to improve user engagement.

Keywords: gamification, leaderboards, online discussion, user engagement

INTRODUCTION

Leaderboards have become commonplace in gaming systems and, more recently, in non-gaming systems to increase user engagement with electronic systems. Gamification involves the use of game design elements for non-game applications [15]. While "serious" games are designed for a purpose other than pure entertainment, gamification involves the application of game-like elements such as leaderboards, digital badges, and point systems to increase engagement and tap the learner's normal drive for achievement [15] [12]. Deriving from the discipline of psychology, gamification is said to induce a state of "flow" in the user via the design of the optimal user experience [24] [6] [42] [47]. Flow is attained when the mind and body are in complete absorption in the task at hand. Regardless of the methodology used, the goal of all game elements is to have a positive effect on the user's motivation to engage with the system [16].

However, the specific game element used to increase motivation has not been conclusive. There remains a lack of awareness on the effectiveness of each particular type of game element as the majority of research in gamification has employed multiple gamification elements while using a single measurement of engagement [4] [5] [34]. Thus, more studies are needed that offer specifics on the factors leading to engagement for each type of game element used in various settings.
Leaderboards are currently among the most popular elements of gamification [1] [36]. By ranking players according to their relative success in achieving a task, leaderboards are said to increase engagement by providing a sense of competition in which the user's performance in completing the task is placed in relation to the performance of others [6] [20]. However, the research has been mixed showing that

leaderboards can actually result in decreased engagement [22] [26]. A significant reason for the negative outcomes is related primarily to improper leaderboard design [13] [27] [39].

In general, the research on the design of leaderboards has been classified into three main categories: global, relative, and team based [13] [49]. Global leaderboards represent the traditional type of leaderboard displaying all users and their scores. Leaderboards designed in this manner inherently reward players at the top with a sense of accomplishment as opposed to players at or near the bottom of the leaderboard [41]. In contrast, relative leaderboards display users along with their rank with only the users that are immediately below and above them. In team-based leaderboards, a user is assigned to a team and the leaderboard provides a ranking of the team's performance which sometimes may also include individual users scores on each team. In order to move the discipline of gamification forward, rigorous studies are needed that compare various leaderboard designs in terms of actual engagement with the information system.

Moreover, while there is considerable quantitative research supporting leaderboards and engagement [4] [16] [17] [22] studies examining qualitative aspects of leaderboards in online discussions are sparse. Quantitative metrics do not draw a complete picture of users' subjective experiences and the quality of their user experience [42]. Accordingly, the aim of this study is to address this gap by exploring users overall perceptions of different leaderboards used in a gamified, online discussion board.

The present study extends previous research regarding the gamification of an asynchronous online discussion board [4]. In that study, a quantitative approach demonstrated a leaderboard that is added to an online discussion board resulted in improvements to both behavioral and cognitive engagement [4]. The method was evaluated in two sections of an online, graduate business information systems course which were identical with the exception that experimental course used a leaderboard in the online discussion. The present study will use the artifact in Bovee et al. 2020b to create the leaderboards which will then be evaluated in this study as a case study using interviews and reports on the discussion as data sources. Qualitative methods are appropriate for accomplishing this study as these methods provide a means for accessing unquantifiable facts about the perceptions of leaderboards used in an online discussion.

Given the negative impact on engagement associated with global leaderboards for those appearing at or near the bottom of the leaderboards [41], relative and group leaderboard designs were selected as the focus for this study. Both leaderboard designs will undergo a qualitative descriptive account of participants' perceptions of each game design element as it relates to engagement and learning. This study contributes to the extant literature by evaluating user perceptions of popular designs of leaderboards used in online discussions and providing novel insights into the design of leaderboards in information systems.

The remaining sections of this dissertation proposal are as follows. First, the section "Literature Review" presents related studies on leaderboards and engagement in online discussions. This is followed by the section "Theory and Methodology" which describes the theoretical foundation and methodology used for evaluation of the leaderboards. Next, the section "Expected Results, contributions, and discussion" presents the expected results of evaluation.

LITERATURE REVIEW

Leaderboards

Leaderboards can be defined as a "visual display that ranks players according to their accomplishment" [40]. In general, leaderboards reflect the performance of users in comparison with other users promoting social-comparison as a means to improve the outcome of a particular task. While, overall, leaderboards have been shown to improve engagement with the system, negative outcomes can result in the form of less engagement [22] based on the design decisions used in creating the leaderboard. In general, the research on the design of leaderboards has been classified into three main categories: global, group or team, and relative based as summarized in table 1 [12] [47].

Table 1: Types of Leaderboards

Global Ranking	Group/Team Ranking	Relative Ranking
All users	A group of users	Users with similar scores

Global leaderboards

Global leaderboards represent the traditional type of leaderboard displaying all users and their scores. Leaderboards designed in this manner inherently reward players at the top with a sense of accomplishment as opposed to players at or near the bottom of the leaderboard [41]. Jia et al. [26], for example, investigated preferences of leaderboards where the user's name was shown at the top, middle or near the bottom in different domains. Players at the top of social leaderboards reported positive perceptions of the leaderboards and players at or near the bottom reported negative perceptions. In addition, users in second, fourth, or seventh position on the leaderboard reported higher satisfaction than individuals in other positions on the leaderboard [26].

Cwil et al [12] examined if global leaderboards were preferred over other forms of presenting the information as in a traditional table. Respondents were asked to compare two different methods of score presentation – a traditional one (table-based) and one in the form of a ranking. Results demonstrated that the majority of users preferred/found it more motivating when results are presented in a leaderboard rather than in a traditional table.

Relative leaderboards

Relative leaderboards allow users to see their rank as compared with similarly ranked users scoring below and above them. Consequently, users will feel less discouraged when ranked lower. However, this type of leaderboard provides no mechanism to provide ranking information for all users. Landers et al [29] demonstrated relative leaderboards increase task performance as opposed to global leaderboards. Ninaus [38] found similar results and prescribed redesigning global leaderboards in a way that the position in the leaderboard does not demotivate the weakest players. In this design, all users interact with "sliced" leaderboards that depict they are performing relatively well and reaching the next top level or grouping is not impossible.

Group/Team-based leaderboards

In team-based leaderboards, a user is assigned to a team and the leaderboard provides a ranking of the team's performance which sometimes may also include individual users scores on each team. Consistent with the findings of global leaderboards, Ninaus et al [38] found individuals on highly performing teams were more motivated by the leaderboards. Students in poorly performing teams did not contribute to

leaderboard motivation. Hollig et al [25] examined team-based leaderboards in relationship to personal competitiveness of the user finding highly competitive individuals regard team-based leaderboards with more value than less competitive users.

In summary, while leaderboards have the potential of stimulating greater engagement by rewarding users with the presentation of their results of an activity, careful design decisions must be made to reward participants effectively. For example, the type of ranking should be adjusted to maximize acceptance of the technology and intrinsic motivation. Global leaderboards have been shown to have the potential of actually discouraging user acceptance as people with a low ranking may find it impossible to reach the top of leaderboard [26] [46]. In contrast, relative and group leaderboards may offer positive outcomes as the smaller number of individuals appearing in the leaderboard make it more motivating for users to perceive it is possible to make it to the top [12] [26]. These instantiations of leaderboards often show the user how close he or she is to attaining the next best score among a smaller group of users.

Engagement in online discussions

Asynchronous online discussions represent a critical aspect of the online learning process. Low student engagement, in the form of low quantity and quality of posts, has represented a significant challenge to overcome for instructors [16] [17]. While previous quantitative methods have shown leaderboards to be effective in improving behavioral engagement in terms of improving total posts and replies in online discussions [2] [3], the author could find no research examining affective engagement of different types of leaderboards within the context of online discussions.

Leaderboards provide external motivation to engage with discussions via constructive competition toward a goal [16]. As the user engages with the game, the motivation to engage can shift from extrinsic to intrinsic [13] [44]. Self Determination Theory [17] [31] and Flow Theory [11] describe this as a process in which one identifies with an activity's value and integrates it into their sense of self. In applying flow theory to gamification of asynchronous discussions, students are more likely to be motivated to engage with the discussion by clear goals [32], challenging content, and appropriate feedback. When expectations are not set or vague, students struggle with both the amount and type of content in posts [14].

Based on the aforementioned detailed literature review, there remains a lack of awareness on the effectiveness of various design elements of leaderboards due to the fact the majority of research in gamification has employed multiple gamification elements while using a single measurement of engagement [2] [33] [34] [45]. Moreover, while the leaderboard represents one of the most popular game elements in the research, there is limited research showing the effectiveness of various design elements of leaderboards. The amount of research is even less when evaluating different design elements of leaderboards from a qualitative perspective.

Accordingly, the purpose of this project is to answer the following research questions:

> *What are the contributing factors in leaderboard design principles that will maximize user engagement?*
> *What are student perceptions of leaderboards used in an online discussion board?*

THEORY AND METHODOLOGY

Flow Theory

The concept of flow theory has long been applied to designing the optimal user experience and, more recently, to the design of game elements such as leaderboards [24] [7] [42] [46]. Deriving from its roots in psychology [11], flow is considered as an optimal experience of mind and body with complete absorption in the task at hand. Gamification and, indeed, many of life domains have been successfully applied to flow [28]. Csikszentmihalyi [11] offers nine dimensions that, together, represent the optimal psychological state of flow. These conceptual elements are 1) challenge-skill balance; 2) action-awareness merging; 3) clear goals; 4) timely feedback; 5) concentration on task; 6) sense of control; 7) loss of self-consciousness; 8) time transformation; and 9) autotelic experience. The three elements, challenge-skill balance, clear goals, and timely feedback are pre-conditions of flow [11] and, thus, represent critical elements for the design of the leaderboard. First, challenge-skill balance represents the perception of both high levels of both the challenge of the situation and the skills needed to meet the challenge. The flow channel (see figure 1) depicts the negative results that occur when one is above the flow channel (anxiety results) or below the flow channel (boredom ensues). Second, clear goals represent unambiguous direction on performing the task at hand. Finally, timely feedback on performance of the task is needed to maintain flow.

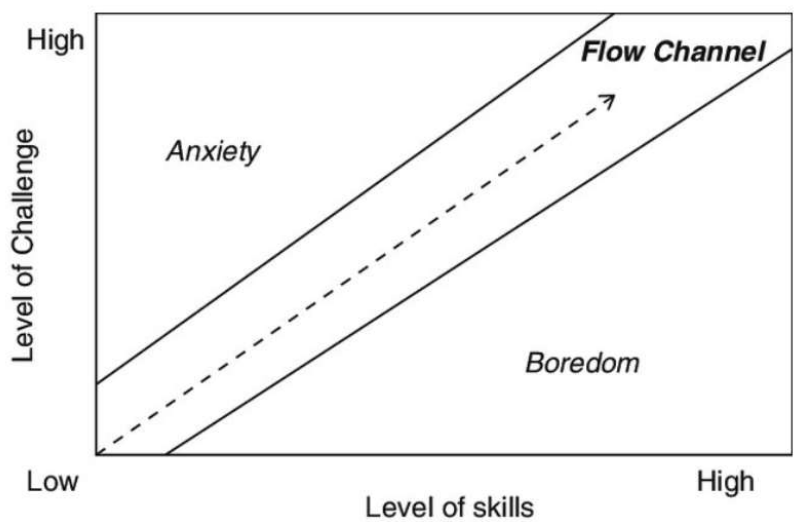

Figure 1: Flow Channel (Csikszentmihalyi, 1990

Using flow theory [11] as the theoretical foundation, Bovee et al. [3] developed a method for the gamification of an online discussion [3]. The method contained three main components: a database to import discussion board data, a webpage displaying either a leaderboard, digital badges, or points to gamify the discussion board, and a series of reports to assist both researchers and instructors using the tool. In the present study, the same method will be used to create two leaderboards which will then be evaluated in a case study using interviews.

In Bovee et al., [3] the artifact was designed according to three foundational elements of flow theory [11] [37]. In the present study, the same three elements of flow theory were used to design two leaderboards in a manner that should induce a state of flow resulting in improved engagement with the discussion as summarized in Table 1. First, in order to achieve a state of flow, the leaderboards must have clear goals to allow proper focus on the task at hand [9] [11]. The two leaderboard designs used in this study, relative and group, were each designed with clear goals. The goal of the relative leaderboard is to

reach the next level. Students using this leaderboard were displayed along with students performing at the same level and encouraged to reach the next level. The goal of the group leaderboard is to reach the top of the leaderboard.

Second, in order to achieve flow, the leaderboard must be presented frequently and made available at any time to ensure the individual will not end the state of flow by losing concentration [9] [37]. Thus, in the present study, a web-based version of the two leaderboards will provide timely feedback to the students seeking information on their performance in the game. In addition, each participant will receive multiple emails throughout the 10-day game showing their position on the leaderboard and encouraging participants to either reach the next level (for relative leaderboards) or reach the top of the group (for group leaderboards).

Finally, a third element of flow theory is inducing an appropriate level of challenge to ensure there is confidence to complete the task but yet the task induces complete immersion in the task [9] [11] [37]. In order to achieve the appropriate level of challenge, multiple factors were considered. First, global leaderboards were rejected for design due to their inherent ability to create unrealistic challenges for participants appearing at or near the bottom of the leaderboard. Second, the group leaderboard was designed with a limited number of participants (less than ten) in each group to increase the possibility the challenge to reach the top of the leaderboard seemed feasible. Finally, the relative leaderboard was designed with an appropriate challenge by ensuring the next level could be achieved with no more than 2 additional posts or replies to the discussion.
In the next section, specific details of the game are discussed as well as the supporting elements of the artifact.

Table 2: Elements of flow theory and associated design decisions

Elements of Flow	**Design Elements**
Clear goals [9] [11]	The goal of the relative leaderboard is to move to the next level. The goal of the group leaderboard is to reach the top of the leaderboard in that group.
Timely Feedback [9] [38]	Students informed at least 3-5 times per week via email of their current position on the leaderboard. Second, students will be able to, at any time, access the online leaderboard to receive feedback on game performance.
Challenge-skill balance [11] [38]	Group leaderboards limited to a small number of participants (less than ten) and relative leaderboards allowed for reaching the next level with a maximum of 2 additional posts/replies.

METHODOLOGY

The study employs qualitative research methods to investigate the relationship between leaderboard design elements and user engagement. This study uses a qualitative inductive research method to examine perceptions of leaderboards used in an online discussion. Qualitative procedures are used to provide a means for accessing unquantifiable facts about the perceptions of leaderboards used in an online discussion. As a result, the qualitative techniques enable the researcher to share in the understanding and perceptions of this popular game element from the perspective of the end user. The qualitative method developed for this research is appropriate for discovering reasons that describe user interactions with a leaderboard.

There are several factors that underlie the importance of using qualitative methods in order to enable an examination of the factors that impact user engagement with an online leaderboard. First, there is a need to identify context-specific measures of user engagement rather than relying on context agnostic instruments. Second, gamification research needs to collect perceptions of game elements to improve engagement, not just measurements of the outcomes derived from using a game element. Finally, it is important to avoid assuming a single cause of relationships between dependent and independent variables because rich insights can be obtained by looking at the interrelationships of the independent and dependent variables [27]. The qualitative method used in this study provides information that reveals what students think about the quality, meaning, perception and context of leaderboards.

A representative artifact [3] that encompasses the various design elements of concern is used. The focus for the present study is to use the artifact in Bovee et al., [3] to a) deploy two different leaderboards (group and relative) and b) use qualitative semi-structured interviews to evaluate each leaderboard for their efficacy in improving user engagement in online discussions. The following sub-sections describes the artifact, experimental setup, and study design.

The artifact

In Bovee et al. [3], an artifact was developed which imports online discussion data into a database where it can then be exported to a leaderboard for the purpose of improving user engagement in the online discussion. In that study a single leaderboard was used in an online discussion to demonstrate improved cognitive and behavioral engagement over online discussions which did not employ a leaderboard. The present study will use the same artifact to create two popular leaderboards (group and relative) which will be evaluated by participants through semi-structured interviews for design principles that improve engagement.

Figure 4 depicts the process for creating the relative and group leaderboards from data exported from the discussion group.

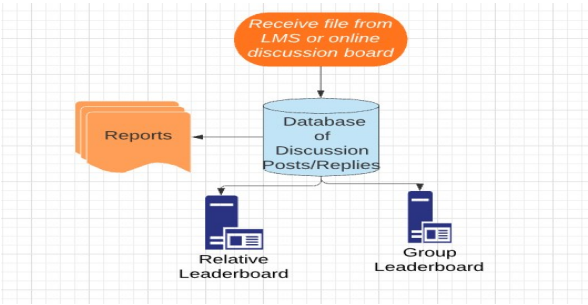

Figure 4: Gamification of online discussion board

First, data will be imported into the database using the export a CSV file from the online discussion area. Second, two versions of a leaderboard will be created from the database: a relative leaderboard and group leaderboard. Finally, reports regarding discussion data will be used in this case study to analyze the discussion data for information related to improving leaderboard design principles.

Experimental setup

Subjects enrolled in online courses at a private university will participate in the project. Students will be randomly assigned to either the relative or group leaderboard. For the relative leaderboard (see figure 5), students will be displayed in a small group (less than 10 students) that share similar scores based on total posts and replies in the online discussion.

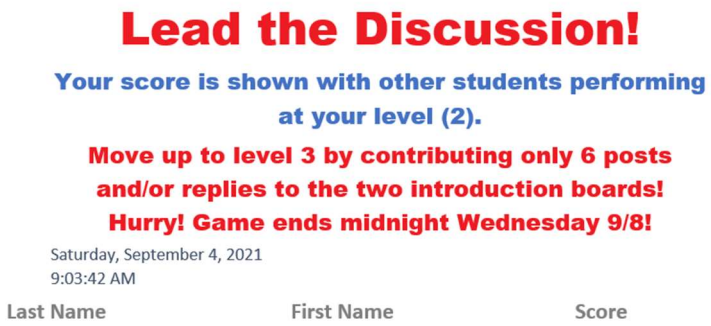

Figure 5:Relative Leaderboard

Students will be assigned to each level based on their total posts and replies. In addition to reporting which level each student has attained, the relative leaderboard will display a message encouraging students to keep posting by indicating how many posts/replies are needed to attain the next level. There will be a maximum of two additional posts/replies for students to reach the next level ensuring the challenge is challenge is both realistic and appropriate [11].

For the group leaderboard (see figure 6), each subject will be displayed within a small group (5-10) other subjects based on the first letter of last name.

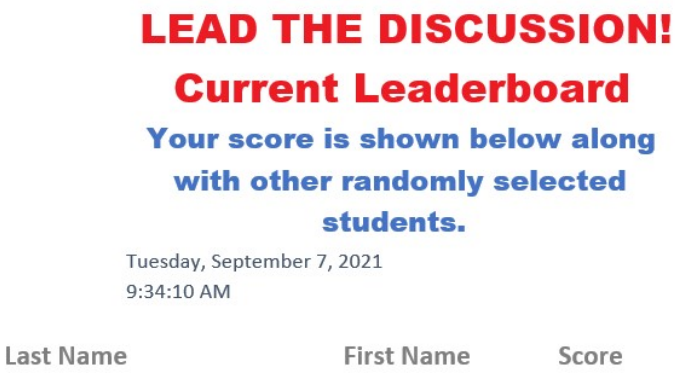

Figure 6: Group/Team Leaderboard

This design ensures a random assignment of students that does not relate to performance in terms of number of total posts and replies. Participants will have immediate access to either leaderboard via a link provided in emails sent during the 10-day game period.

All subjects will be asked to engage in an asynchronous online, video discussion board that will take place over ten days. All subjects will be informed that the goal of the game is to lead the discussion in terms of total posts and replies. Topics in the discussion board will be related to information technology issues and will be the same for all subjects. Subjects will be informed at the start of the week that periodic updates will be sent via email showing the user's performance in the game based on total posts and replies.

All subjects will receive daily emails to "lead the discussion" in terms of total posts and replies. Half of the subjects will be assigned to courses which receive updates via a relative leaderboard and the other half will be assigned to courses using a group leaderboard. For subjects assigned to the relative leaderboard,

the subject's name will appear among a small list of other students who have similar scores and are all relatively close to achieving the next level. Levels will be established based on the total posts and replies of all students. Students in this group will be encouraged via emails that they are close to the next level and to continue to post and reply.

Students assigned to the group leaderboard will also receive emailed updates on performance in the game based on total posts and replies. Students in this group, however, will be shown in a leaderboard with a small number of other students sharing the same letter of the last name. This design will ensure each subject is randomly assigned to a group of other users with varying degrees of performance in the game. Students in this group will be encouraged via emails to reach the top of the leaderboard in his/her group.

Research Design

Analysis of the leaderboard designs will be conducted using a single case study using students in online courses at a private university. The topic of the discussion board will be related to gamification. The Eisenhardt case study approach [18] will be used along with data collected from semi-structured interviews and reports about the discussion data.

Data Collection

Data collection will be interpreted using the theoretical background of flow to inform the interview questions and analysis of the data. Using Eisenhardt's case study approach [18], interviews and discussion reports will be the primary data collection method and open coding for data analysis. The Eisenhardt research method is designed to produce in-depth descriptions of perceptions of leaderboards as related to engagement in the online discussion. Using a seven-step approach (see figure 7), the research strategy focuses on understanding the dynamics present in a setting.

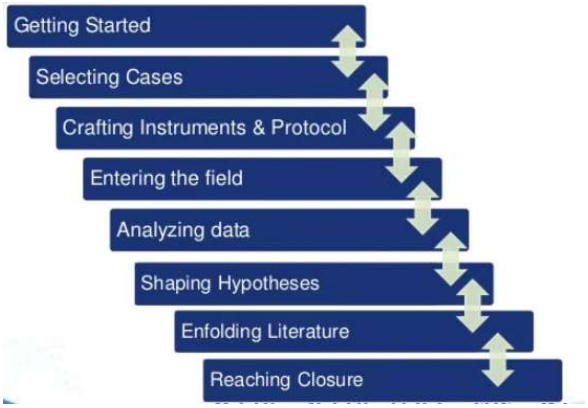

Figure 7: Research Methodology

This approach is in line with generally accepted approaches to develop relationships or theory from cases [18] [48]. The Eisenhardt method was selected for three reasons: 1) using constant comparison with literature it can generate new relationships or theory, 2) emergent theories will be likely testable using constructs that are measurable, and 3) relationships, models, or theories can be generated because the theory building process is linked to data and other evidence [18].

As suggested by Morse [36] multiple techniques will be used in data collection for the purpose of triangulation: transcripts from asynchronous video interviews, transcripts from synchronous interviews, and descriptive reports on the discussions. Semi-structured interviews will be used to obtain first-hand information on participants' perceptions of the design of each leaderboard game element used in the online

discussion as related to improving engagement. The questions were developed using flow theory [11] as the theoretical foundation. The three conditions used to design the leaderboard; clear goals (CG), appropriate challenge-skill balance (ASB), and timely feedback (TF) were converted into a series of questions designed to collect important data on the students' perceptions of each leaderboard game element as related to inducing a state of flow: clear goals, an appropriate skill balance, and clear feedback. See Appendix A for the interview guide.

In order to develop the questions, the researcher operationalized each of the three elements of flow and converted the element into resulting questions. Table 2 below depicts the mapping of questions to the appropriate elements of flow theory.

Following the 10-day game timeframe, students will be recruited for interviews based on discussion post activity and feedback from instructors. Participants will include individuals who decided to participate in the game as well as those who did not. This is designed to capture the various opinions on the use of each leaderboard game element as well as reasons why the presence of a leaderboard may result in not engaging with the game. Since the interviews will be semi-structured, questions will be modified occasionally, and sometimes new questions will emerge based on the conversation with the students. Unexpected answers may lead to further discussion adding more depth to the data collected through this source. Participants will be interviewed once at the end of the experimental period (ten days) to determine whether, and to what extent, the leaderboard they experienced motivated and engaged them. The interview will highlight those aspects of the leaderboard that were most/least engaging and also indicate which elements motivated them the most/least. Researchers will be careful to incorporate member checking [48] throughout the discussions by repeating answers, using a reflective listening strategy, and asking them to verify answers for accuracy. All interviews will be transcribed to allow for further analysis and review.

Table 2: Mapping of interview questions to elements of flow

Elements of Flow	**Interview Questions**
Clear goals [9] [11]	What were your general impressions of the emails containing the leaderboard displaying your position in the game 'Lead the Discussion!'? How did the presence of a leaderboard in the online discussion factor into your decision to complete additional discussion posts and/or discussion replies? What were your general impressions regarding the goals or instructions expressed in the game?

Challenge skill balance [9] [38]	What about the leaderboard promoted your motivation and engagement in the online discussion? What about the leaderboard undermined your motivation and engagement? Did your placement on the leaderboard have any impact on your decision to complete additional posts/replies? Can you explain? If you had a choice, would you choose a gamified discussion board or a traditional assignment? Can you explain?
Timely feedback [11] [38]	Were the emails displaying your position on the leaderboard sent in a timely manner? Did the presence of an online version of your leaderboard promote your engagement or learning in the online discussion?

Data Analysis

Data analysis will consist of the analysis of transcripts created from multiple synchronous and asynchronous interviews. Within the transcripts, various "Labels of meaning" will be identified and placed next to each relevant occurrence. Occurrences will include events, behaviors, actions, emotions, perspectives, and interactions. Categorization of the coding will be completed in two phases.

First, the data obtained from the interviews will be coded into broad categories. Next, the interview data be analyzed using Corbin & Strauss' [8] open coding method. Open coding will be used to conceptualize raw data by naming and categorizing the phenomena through close examination of the data. During open coding, data will be broken down into discrete parts, closely examined and compared for similarities and differences.

Second, the data representing events, behaviors, actions, emotions, perspectives, and interactions that are found to be conceptually similar in nature or related in meaning will be grouped under abstract concepts that best represent the phenomenon. According to Strauss and Corbin [8], although events or happenings might be discrete elements, the fact that they share common characteristics or related meanings enables them to be grouped. Categories, according to Strauss and Corbin [8], represent these higher order concepts that can be grouped. Given the purpose of this study, categories serve to explain how students perceive the leaderboard game element and the effects it has on engagement with the online discussion.

Reliability of these groupings will be achieved through theoretical sensitivity, iterative coding and theoretical sampling. Theoretical sensitivity is required to enable the researcher to interpret and define data and thus develop relationships, models or theories that are grounded, conceptually dense and well-integrated [8]. Sources of theoretical sensitivity are the literature, professional and personal experiences. Additional reliability will be achieved through the iterative use of open and axial coding to bring out the

concepts and discover any causal relationships or patterns in the data. Along with the groupings of abstract concepts (open coding) and identification of causal conditions (axial coding), that lead to the occurrence or development of a phenomenon, additional coding will be carried out iteratively using theoretical sampling. Theoretical sampling adds further reliability of data through identifying concepts that have proven theoretical relevance to evolving relationships, models or theories. Glaser et al. [20] state that the researcher does not approach reality as a tabula rasa but, rather, assumes a posture that will help him or her abstract significant categories from the data based on the constructs identified in the literature.

Limitations

Analysis of the leaderboard designs in this study used a single case study of students enrolled in online courses at a private university. The topic of the discussion board was related to gamification. Future research should consider using the same methodology to evaluate if the type of course has the same effects on student outcomes. For example, qualitative courses such as management principles may benefit more from this type of gamification.

Expected results, contributions and discussion

While leaderboards, in general, have been shown to be effective in improving engagement in a number of contexts, qualitative data on the effectiveness of different designs elements of leaderboards is still unknown. Accordingly, this study aims to make several contributions to the information systems literature. First, the project fulfills a significant need for more studies which use qualitative methods to evaluate leaderboard game design elements. Second, since relative and group leaderboards are starting to show potential as the best practice in leaderboard design based on quantitative methods [12] [26] this study is expected to determine, student perceptions regarding leaderboard design principles that will result in increased engagement.

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APPENDIX

Student Interview Questions

1. What is your age (18-24, 25-34, 35-44, 45-54, 55-64, 65+)
2. (CG) What were your general impressions of the emails containing the leaderboard displaying your position in the game 'Lead the Discussion!'?
3. (CG) How did the presence of a leaderboard in the online discussion factor into your decision to complete additional discussion posts and/or discussion replies?
4. (CG) What were your general impressions regarding the goals or instructions expressed in the game?
5. (CSB) What about the leaderboard promoted your motivation and engagement in the online discussion?
6. (CSB) What about the leaderboard undermined your motivation and engagement?
7. (CSB) Did your placement on the leaderboard have any impact on your decision to complete additional posts/replies? Can you explain?
8. (CSB) If you had a choice, would you choose a gamified discussion board or a traditional assignment? Can you explain?
9. (TF) Were the emails displaying your position on the leaderboard sent in a timely manner?
10. (TF) Did the presence of an online version of your leaderboard promote your engagement or learning in the online discussion?
11. Is there anything related to the use of leaderboards in improving user engagement that I haven't asked that you think might be important for me to know?