

A Conflict Management Game in Project-Based Learning

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Abstract: In project-based learning environments, students often face team frustration and conflicts, necessitating the development of conflict management skills. This study examines how integrating a game-based learning approach impacts students' perspectives on managing conflicts in game development project courses. Drawing on theoretical frameworks related to project-based learning, conflict management, and serious games in conflict resolution education, a case design is employed in higher education that incorporates the game "Cards of Conflict". Document analysis of student reflection notes is utilised to assess the outcomes. The results demonstrate heightened engagement among participants during the game session, leading to awareness and understanding of conflict managing principles. This encompasses the what, the why's, and the how's of conflict management, as well as the diverse perspectives of peer students.

Keywords: Game-based learning, Serious games, Project-based learning, Conflict management, Game development, Higher education, Team-based student work

1. Introduction

The issue of Information Technology students experiencing frustration during their university studies is a widely recognised and well-known problem (Hansen and Eddy, 2007; Chan-Lin, 2008; Huff and Clements, 2017). This frustration can arise from various sources, especially when students collaborate on group projects (Kolås and Munkvold, 2017). Research has shown that student frustration should be considered an academic emotion in learning environments. The term "Academic emotions" is used to address emotions directly linked to academic learning, classroom instruction, and achievement (e.g. enjoyment of learning, pride of success, or test-related anxiety" (Kolås and Munkvold, 2017; Pekrun et al., 2002). One possible strategy to prevent frustration from turning into negative emotions is scaffolding (Vygotsky, 1978). Scaffolding can be a helpful approach in project-based learning to prevent students from feeling overwhelmed and facilitate their personal growth. Scaffolding is a metaphor used by Wood, Bruner and Ross (1976) where they seek to operationalize the concept of the zone of proximal development (ZPD). ZPD indicates the distance between what a student can do with and without help (Vygotsky 1978) and how one by supporting the learner – step by step (scaffolding), will guide and help them become self-regulated learners. Regarding conflicts among students, providing better strategies for handling team conflicts is one possible scaffolding approach. The present study explores a game-based scaffolding approach, Cards of Conflict (CoC), to answer the research question (RQ): *In what ways do CoC influence students' perspectives on managing conflict in project-based courses?* CoC is a novel discussion-based serious game designed and developed at [redact] that introduces conflict scenarios that may arise in student projects.

2. Theoretical Foundation

The theoretical foundations of this study focus on project-based learning, conflict management, and serious games in higher education.

2.1 Project-Based Learning

Project-based learning is an inquiry-driven teaching approach involving students in creating knowledge by having them complete significant projects and develop practical, real-world products (Guo et al., 2020). It is an approach in education to ensure that students learn not only hard skills, like cognitive knowledge and professional skills, but also soft skills, problem-solving and teamwork, which are needed in their future workplaces (Guo et al., 2020). According to Sindre et al. (2018), project-based learning in higher IT education can vary based on nine different characteristics, for example, to cover part of or a whole course; range from one to many courses; having a "theory first", a "theory-project" or a "project first" approach, involving non or other stakeholders, be organised individually or in teams, using a variety of assessment methods, being the same project or unique or self-selected by students and ranging from a well-specified to flexible process and/or product. The creative media industry emphasises the importance of future candidates' interpersonal/social and communication skills. Teamwork is widely used as a work approach and where the mentioned skills are fundamental (Curda, 2021;

Manevska et al., 2018; Tyson, 2020). Conflict often emerges within collaborative project-based teams, so conflict management is a concrete skill when learning interpersonal/social skills.

2.2 Conflict Management

Donohue and Kolt (1992) define conflict as “a situation in which interdependent people express (manifest or latent) differences in satisfying their individual needs and interests, and they experience interference from each other in accomplishing these goals” (p.4). They also claim that conflicts are a fundamental part of human life and that we can use it to build better lives if we know how to manage them. Even though many assume conflicts are harmful and should be avoided, Algert et al. (2021) claim that conflict is neutral and that how one engages in the conflict can be perceived as constructive or destructive. They further conclude that “the key to managing conflict is to expect, understand and embrace conflict in a manner that allows it to benefit individuals and the organisation” (Levin and Rolfsen, 2015). Levin and Rolfsen describe how conflicts are crucial to developing an effective team and refer to Lencioni’s model of dysfunctionalities in teams, where “fear of conflicts” is emphasised.

Teaching students effective conflict resolution skills can draw upon various models and approaches. For example, Fisher, Ury, and Patton (2011) present a highly regarded step-by-step approach to resolving conflicts and achieving mutually beneficial agreements. Based on the principles of the Harvard Negotiation Project, their method emphasizes separating individuals from issues, focusing on underlying interests rather than rigid positions, and generating creative options for shared benefits. Another influential framework is Levin and Rolfsen, (2015) five-stage approach, which consists of *Denial/Avoidance*, *Compulsion*, *Negotiation*, *More Information Leading to Problem-Solving*, and *Reframing of Reality* (Levin and Rolfsen, 2015).

While numerous conflict management models exist (Lynch, 2001; Slaikeu & Hasson, 1998; William et al., 1988), many share similarities. The Thomas-Kilmann conflict model was chosen as the foundation for the CoC framework based on a review of previous research and expert recommendations from the field of educational psychology. This decision aimed to provide students with a well-rounded and effective approach to handling conflicts and fostering collaborative problem-solving.

2.3 Serious Games in Conflict Resolution Training

Conflict resolution is essential for navigating social interactions, as conflicts are inherent in human relationships. Developing effective conflict management and resolution skills enables individuals to address disagreements constructively and positively (Cheong et al., 2015). However, teaching conflict resolution has proven difficult due to creating authentic learning environments and predicting how people behave in real-world conflict situations (Campos et al., 2012). Simulation and game-based learning scenarios have been proposed as potential solutions for teaching conflict resolution skills to both adolescents and adults as these often are designed to trigger emotions and engagement. Serious games, designed with a primary purpose beyond entertainment, often focus on teaching new skills through engaging and challenging experiences (Susi et al., 2007; Landers et al., 2017; Roy and Zaman, 2017).

Several reasons support the use of serious games in education and learning. Games are interactive, allowing participants to experience the consequences of their choices and receive direct, formative feedback essential for learning (Lieberman, 2006). Games can also foster social interactions, providing opportunities for skill development and collaboration (Trepte et al., 2012). Many games naturally incorporate conflict resolution as players collaborate to resolve disagreements and create a positive gaming experience (Cheong et al., 2015). In some game contexts, players must negotiate and find mutual solutions to problems, with cooperation often leading to better chances of success. These situations offer safe environments for learning conflict resolution skills without resorting to violence or negative behaviours (Bartels et al., 2013).

Various design approaches exist for teaching conflict resolution through games. One example involves using a chatbot as a conflict mediator in role-play scenarios within a virtual environment (Emmerich et al., 2012). This approach emphasises collaborative learning but faces challenges due to the chatbot's limited language comprehension. Another approach involves human facilitators guiding conflict resolution role-plays (Powers and Kirkpatrick, 2013). While more resource-intensive, human facilitators enable valuable oral briefing and debriefing sessions, crucial for knowledge transfer in serious games (Crookall, 2011; Taylor et al., 2012). Requiring participants to write debriefing reports also promotes reflection on their actions in simulated conflict situations, integrating their game experiences with real-life lessons (Powers and Kirkpatrick, 2013).

3. Methodology

This research aims to investigate the influence of CoC on students' understanding of conflicts and associated strategies. The study was designed as a case study (Merriam, 1998) concerning a CoC. The case was discovery-led, not based on existing theories (Martyn, 2010) and explored using a game session in a higher education course. The study used student reflection assignments as primary data. A secondary data source, observation records scribed by Author 2 during the CoC play session, were used. The notes, however, were used as a reference point during the thematic analysis and had a superficial part in the study outcome.

During the study, students played a game called CoC, which aimed to orient and equip them to handle conflicts in student projects. The research was conducted using the following materials and methods.

3.1 Participants

The study involved a diverse group of 19 first-year undergraduate students who were enrolled in an international game development program at a Norwegian university. These participants, consisting of four females and fifteen males, had an age range between 19 and 31 and represented a mix of nationalities and backgrounds, reflecting the global nature of the game industry. As aspiring professionals in the field, they brought with them a range of interests, skills, and experiences related to game design, development, and play.

3.2 Game Artefact

CoC is a serious game designed to equip students to handle conflicts that may arise during a project. The game design is research-based, incorporating the concept of conflict resolution strategies (Xia et al., 2020) and the Thomas-Kilmann conflict model's five modes of conflict management: *Accommodating*, *Avoiding*, *Compromising*, *Competing*, and *Collaboration* (2021). CoC presents 12 realistic conflict scenarios, each with possible solutions focusing on Thomas-Kilmann's five modes and strategies for managing conflicts. The game requires students to work in teams to discuss and agree on the best conflict resolution strategies.

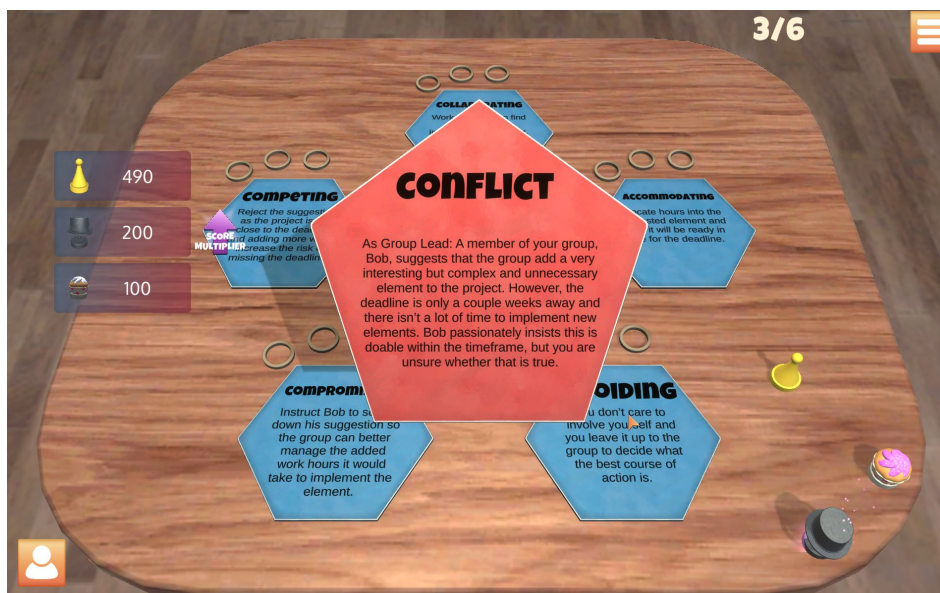


Figure 1: The CoC interface showing one the conflict scenarios and five conflict managing strategies

In the CoC game, the instructor acts as the game master and leads the session for participating teams. Each group is presented with a typical scenario that students could enter during the studies and five possible ways to resolve the conflict. The students have a limited time to discuss and reach a decision. The teacher then asks each group for their choice and provides the correct solution, which may have multiple correct answers. Points are awarded accordingly, and the scoreboard is displayed before moving on to the next scene.

3.3 The Game Session

The students' first meeting with the game was playing it together in a game session led by the teacher. The game session began with an introduction to CoC and reasons for its importance, followed by an explanation of the five conflict management styles using examples. Students were randomly divided into four groups for the game session. The instructor read the conflict scenarios and the possible solutions out loud. The students were further

given around 1 minute to discuss and agree upon one of the solutions, which upon the right solution was revealed and in-game points were added to the different teams. Post the joint CoC session, the students were given an individual assignment to reflect upon the experience of playing this game.

3.4 Student Reflection Assignments

Students participating in the study completed an individual written assignment reflecting on their experiences playing CoC on two occasions (in-classroom and individually), where their debriefing reports promotes reflection on their game experiences with real-life lessons (Powers and Kirkpatrick, 2013). In the student assignment, they were instructed to provide insights into how the encounters with CoC influenced their perception of conflict and their experiences working in project-based student teams. The assignment covered various topics, such as their prior experiences with conflicts and conflict management in project-based courses, their impressions of playing the game within a classroom setting compared to playing it individually, and their overall experience of participating in the exercise. To facilitate deeper reflection, students were granted access to the game while working on their reflection notes, allowing them to replay the game individually to examine further and analyse their thoughts and experiences.

The student's reflection assignment notes were then evaluated using a document analysis as described by Bowen (2009). Examining the students' experiences through this comprehensive reflection assignment aimed to provide valuable insights into the game's effectiveness in improving students' understanding of conflict management and enhancing their ability to work collaboratively within project-based teams throughout the semester.

3.5 Data Analysis

Student reflections from game session notes were subsequently analysed using a thematic analysis approach (Braun and Clarke, 2006) to the coding and categorisation process. The analysis primarily focused on identifying similarities in the participants' game experiences. Author 2 observational data was then employed for comparative purposes, juxtaposing observational data with students' reflection notes. The data underwent three coding and categorisation phases. The initial phase of reading their responses provided a glimpse into their perspectives and potential categorisation. In the second phase of reading, coding and analysis, the categories were further clarified, enabling the enumeration of occurrences within each category. The coding, clustering, analysis, and author discussions unfolded iteratively, ultimately merging the initial categories into more broad, overarching categories. In the third phase, the iterative analysis process encompassed inductive and deductive coding, resulting in two themes emerging from the data set.

4. Result

Two main themes regarding CoC initially impact students' perspectives on conflicts concerning project-based game development. Findings indicate that CoC influences student social interaction during gameplay, raising comprehension and self-awareness of conflict management (Figure 2).

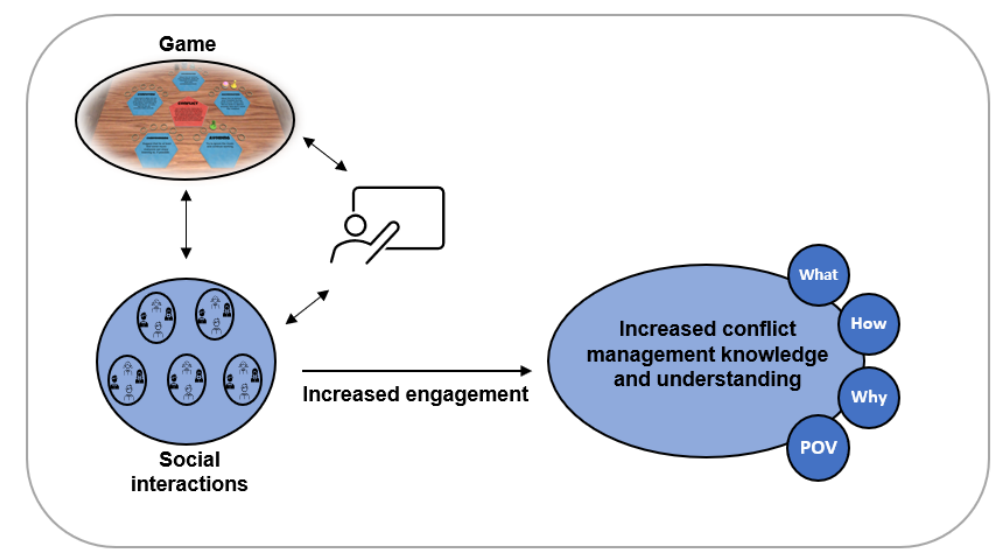


Figure 2: Potential knowledge acquisition trajectory for CoC

4.1 Rising Awareness and Comprehension

There is evidence to suggest that the CoC had an impact on the students' overall understanding of conflicts. The thematic analysis of their reflections reveals an awareness of the reasons behind conflicts arising in student-run projects. Additionally, it highlights the importance of recognizing multiple perspectives and finding ways to reconcile with team members' standpoints in order to effectively address conflicts.

"Personally, before playing the game, I would have only used some of the methods listed and would never have considered something like competing or avoiding as an adequate solution, but the game and discussion helped open my mind to the possibility of using those conflict styles." Excerpt 1

"More prepared on how to deal with other peoples' issues [...] In the play session, I learned how there are different approaches to a conflict and more than one side to a conflict which you can take [...] the game and discussion helped open my mind to the possibility of using those conflict styles." Excerpt 2

The student's reflections display that CoC enriched their comprehension concerning conflict by presenting different strategies. The students also shared that their comprehension of addressing conflicts in teams has improved in terms of using broader methods and applying targeted conflict management strategies. This has led them to gain a more profound appreciation for the importance of mastering these strategies in resolving conflicts.

"It also taught me why or how different choices would affect the team and who should take which choices." Excerpt 3

"All together I learned that there is no sure way to solve any conflict. Instead, it is a complex series of equations trying to factor in the needs of every member, and what resources are available to you." Excerpt 4

The students' reflections suggest that the CoC session helped broaden their understanding of conflict origins, leading to the realisation that an issue might require more than one clear-cut solution. Recognising that there are various approaches to managing conflicts within teams has enriched their knowledge of the subject.

4.2 The Value of Diverse Perspectives and Collaborative Learning in Conflict Resolution Training

There are indications that the CoC had a permissive impression on the students' overall understanding of how to address conflicts within student projects. Their reflections emphasize the significance of participating in transparent group discussions and embracing collaborative learning environments when tackling conflict resolution. CoC also seems to have influenced the students' conceptions of skill development and knowledge acquisition concerning their peers. The participants expressed opinions that discussing the topic of conflict resolution with other individuals was beneficial as CoC forced them to take the perspective of the 'other'.

"What I probably learned the most from this experience might not have come from the game itself, but the people surrounding me. You often forget that people think differently than you, but that doesn't mean that only one way is the right way. It reminded me to be more mindful in how others perceive things." Excerpt 5

The students also reflected on the importance of being introduced to group conflict and conflict management early when pursuing a project-based learning approach in game development courses. Likewise, they should be introduced to that communication and social interactions with project peers are valuable tools for dealing with project conflicts.

"It should be targeted at students who will be working a lot in teams and presented on a big screen in a big auditorium. This is because large group activities like this are more fun than working alone, and way more memorable." Excerpt 6

Since the students, in retrospect, also played the game alone, they became aware of the value of group discussions and experiencing other persons' points of view.

"Playing on my own makes me realize how important an actual discussion with others is and seeing their perspective." Excerpt 7

"I feel like it is more effective in a group setting, if only because you can discuss the options with other people and get the pros and cons of each resolution style in a way the game itself does not provide. I do not get much out of playing it alone." Excerpt 8

The excerpts highlight the students' attributed significance of transparent group discussions to gaining insight into others' viewpoints in the context of conflict resolution and personal growth. The Excerpt 7 emphasises the value of engaging in discussions with others, as it allows individuals to broaden their understanding by considering diverse perspectives. This reinforces the idea that interpersonal communication is crucial in enriching one's knowledge and fostering empathy towards the project's peers-viewpoints. Moreover, the Excerpt 8 reiterates the effectiveness of group settings in learning about conflict management, as it enables participants to weigh the pros and cons of various resolution styles through collective discussions. The participant acknowledges that playing CoC alone provides different benefits, as it lacks the opportunity for meaningful dialogue and shared insights. This further underscores the importance of collaborative learning environments where individuals can benefit from their peers' collective wisdom and varied experiences.

5. Discussion

In this section, we delve into two themes that emerge from the Results in section 4 reflecting our findings in our theoretical foundation presented in Section 2, which encompasses Project-Based Learning, Conflict Management Strategies, and Serious Games for Conflict Management Training. We will explore these themes in the context of the theories and concepts discussed earlier, offering a comprehensive interpretation of their relevance and application. This will accumulate a broader understanding of how these ideas can be effectively implemented in real-world situations.

5.1 Raising Awareness Of Needs and Interests in Conflicts and Resolution Strategies

The participants' reflections align closely with Donohue and Kolt's (1992) definition of conflicts, illustrating that through the game, they became more aware of people's interdependence, who express diverse needs and interests, and experience interference from others in accomplishing their goals. Similarly, their reflections echo Algert et al. (2021), asserting that conflicts are essentially neutral, and the manner in which parties engage determines whether the conflict becomes constructive or destructive. Furthermore, the students' reflections also show similarities with Fisher, Ury, and Patton's (2011) framework, which emphasizes separating individuals from issues, concentrating on underlying interests instead of rigid positions, and generating creative options for mutual benefits.

The findings emphasize the significance of applying well-established conflict resolution principles to promote collaborative problem-solving and enhance understanding among individuals. This is indicated through the student's reported impression of having a deeper comprehension of their peers' needs and interests through their participation in the CoC sessions. CoC appears to have played a role in this, as students engaged in group discussions to determine their course of action in the game. By moving beyond individual reflections, they discovered that different team members held unique interests and perspectives, thereby enriching their learning experience.

5.2 Conflict Resolution Skills Through Collaborative Gaming

Previous research has underscored the challenges in creating an artificial environment that is both authentic and engaging for students (Campos et al., 2012). In the case of CoC, using authentic scenarios that students recognized from their project-based learning courses led to group discussions in which all students actively participated. Employing authentic scenarios increased the relevance of the presented conflicts and the subsequent discussions, feedback, and solutions. Furthermore, our findings support Trepte et al. (2012) and Bartels et al. (2013) arguments concerning the benefits of games in providing safe environments for training students in conflict resolution through social interactions, collaboration, and iterative skill development.

The collaborative gameplay process stimulated heightened engagement and fostered more dynamic in-group and in-classroom discussions, resulting in deeper reflections upon review. This finding is consistent with previous research, which demonstrates that game-based learning with quick responses and immediate feedback enhances engagement and ultimately improves learning outcomes (Hilliard and Kargbo, 2017; Plass et al., 2016). Figure 2 illustrates how the game and the process seem to have contributed to the participants' engagement and learning outcomes.

5.3 Implications for Project-Based Learning

CoC can be used as a proactive approach to hindering possible growing conflicts in project-based teamwork and should therefore be implemented as part of the project-based courses. Using theory from the field of conflict management, the game teaches conflict management styles and gives a good foundation for in-depth discussions and increased understanding. Organising the learning environment as a game-based learning

environment, with participants in teams, seems beneficial to teach the topic of conflict management and can help improve the learning environment in general and hence the students' learning outcomes. As previous research shows, it is hard to simulate a conflict environment. This game adds to the toolbox of games that can facilitate pedagogical approaches to the matter.

6. Conclusion and Limitations

This study aimed to examine how game-based learning, using CoC as an example, impacts students' perceptions of managing conflicts in game development project courses. Analysis of the students' reflective notes suggests that CoC contributed to increased awareness and knowledge of conflicts in project-based learning and social interactions within student teams, fostering engagement and promoting more in-depth discussions and reflections.

CoC's design, featuring authentic conflict scenarios and prompt feedback and solutions, aligns with prior research on designing such games to enhance participant engagement and potential learning outcomes. It is essential to recognise that the same game may not yield the same level of engagement with different groups. The implementation process is crucial, and if the game is implemented differently, the experience may change, potentially resulting in less efficient engagement and learning outcomes. Consequently, adapting the game's implementation to the target audience is necessary.

There are several limitations to consider as well. A larger sample size would be beneficial to generalise the findings to a larger population. The study's findings may be context-specific and limited to the higher education institution and the game development course in question. Additionally, the participants' backgrounds as game development students and their personality traits (and gender) may have influenced their perspectives on using the CoC game. The game may not be as engaging or effective for other student groups, which could limit the generalizability of the findings. Lastly, self-report measures like the students' reflective notes may be prone to bias or errors.

7. Future Research

Based on our findings, we see various trajectories for further research. Further investigation into the effectiveness of CoC in conflict management education using randomised controlled trials or other experimental designs. Moreover, broadening the study's scope to include a more diverse array of participant populations, specifically individuals with differing levels of interest in games and prior knowledge in conflict management, offers an exciting prospect for continued investigation. Exploration of the long-term impact of CoC on students' conflict management skills by following up with participants after the game-based learning intervention has ended. Moreover, investigating the distinct mechanisms by which CoC enhances a sense of growth and heightened awareness of conflicts and conflict resolution skills, encompassing elements such as improved engagement, purposeful dialogues, and reflective thinking, would substantially contribute to the advancement of serious game research.

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