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The Effect of Gameplay on the Creative Self-Efficacy of Educators in Hypothetical Classroom Management Situations

Cover Page Footnote

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Background

In the ever-changing emotional, psychological, and physically evolving landscape of education, educators must continuously develop creative skills to meet the needs of their learners and manage their classrooms effectively. Despite this need, many preservice teacher preparation programs fail to adequately prepare teachers for the complex classroom management scenarios they will encounter (Doran, 2020). Classroom management is multifaceted and requires educators to use proactive and creative reactive strategies to maintain a safe, supportive, and engaging learning environment. In response to this critical issue, this study examined an innovative approach to nurture the creative self-efficacy of preservice teachers in response to classroom management scenarios using educational gameplay. This approach involves interactive learning, which has been shown to improve educators' responses to classroom behavioral issues (Bada & Olusegun, 2015) through educational gameplay. In contrast to more traditional forms of learning, learning during play stimulates multiple learning resources and can create connections that last longer for most (Resnick, 2017). Moreover,

educational games can spark creativity (Dyson et al., 2016) and enhance preservice teacher learning experiences (Johnson & Kim, 2021). This study examined the potential of incorporating educational gameplay as a supplementary strategy in preservice teacher preparation programs. In addition, this study analyzed the effect of gameplay on the creative self-efficacy of preservice teachers, both before and after gameplay.

Literature Review

Preservice Teacher Preparation

Preservice teacher preparation programs generally include coursework to prepare future educators to effectively plan lessons, deliver instruction, manage classroom behaviors, specialize in a content or field, and meet teacher licensing requirements. Educators often encounter a gap between what they are prepared for in preservice programs and the actual demands of the job (Doran, 2020). New teachers often find themselves serving in high-need schools or positions (Doran, 2020), and the skills to effectively serve these communities can take years of experience to develop. Preservice teachers reported feeling unprepared to effectively analyze and use

data to develop instruction, classroom management, strategies for students with behavioral needs, special education-related needs, and relationship-building with students and families (Doran, 2020). While new teachers may be exposed to ideas and concepts in their coursework, the types of schools in which they complete their fieldwork may be the most important part of preparing them for student teaching (Doran, 2020) and their first year of full-time teaching. There is a gap between studying classroom management in theory, expiring it to some degree through fieldwork and student teaching, and being fully responsible for the behavior of a class. Many teachers report needing more training in student behavior and special education (Doran, 2020).

Effective classroom management considers various factors that impact students' behavioral and academic needs. For example, it is not common among preservice teacher preparation programs to include comprehensive training around social-emotional learning and culturally responsive teaching techniques and strategies (Donahue-Keegan et al., 2019). While classroom management and discipline are considerable and important parts of an educator's practice, most teacher preparation programs focus mainly on instructional knowledge and skills (Donahue-Keegan et al., 2019). These gaps lead to high levels of teacher attrition and poor student outcomes (Donahue-Keegan et al., 2019). The learning curve between preparation programs and the first year of teaching is vast, especially considering the types of schools in which teachers are trained versus the schools in which they may find jobs.

Obstacles Within Classroom Management

Classroom management and discipline are significant areas of consideration for educators. Classroom management is highly

complex, nuanced, and situational. How educators address challenging student behaviors has much to do with the perspective they use to view their students (Ahmed, 2020). Educators may address challenging student behaviors through active listening and talking about the issue, identifying the root cause of the behavior, utilizing rules and consequences, or a combination of these techniques (Ahmed, 2020). Preservice teachers may not receive sufficient training in various methods to address student behaviors or practice making effective on-the-spot decisions for handling behavioral issues. This can lead to a sink-or-swim culture during the first few years of teaching, where teachers are forced to learn how to approach difficult situations independently without adequate support or guidance.

In examining teacher self-efficacy, the idea that one can educate and teach effectively, meaningfully, and positively impact student outcomes is an important indicator of teacher attrition. Preservice teachers may not feel they have adequate preparation for effective classroom management techniques (Bently-Edwards et al., 2020). Effective and high-quality teachers have strong classroom management skills, including cultural and social-emotional competencies (Bently-Edwards et al., 2020). Developing creative self-efficacy in managing classroom behaviors is necessary to prepare and retain effective teachers.

Creative Environment and Creative Self-Efficacy

To address classroom challenges, Peter-Szarka (2012) discussed what a classroom environment should include, specifically, a creative climate where teachers can foster creative potential and academic learning. With the shift in focus toward creativity, teachers are tasked with

more than just education; now, they must provide a creative environment (Hui et al., 2015). This environment allows for deeper and more meaningful learning to occur.

Teaching creativity does not come with clear 'ready-made solutions'; fostering creativity takes time and practice (Beghetto & Kaufman, 2014). Beghetto (2010) suggests that the focus should be on teacher development to support students' creative potential. Teachers need confidence or creative self-efficacy to create a creative environment where academic and social-emotional learning can occur safely. Creative self-efficacy is confidence in one's ability to produce creative outcomes (Royston & Reiter-Palmer, 2017; Tierney & Farmer, 2002). Teachers with higher creative self-efficacy foster a more creative environment (Huang, 2022). Ozkal (2014) concluded that teachers with higher self-efficacy engaged in more behaviors that fostered creativity. Training for pre-service teachers should include creativity in their coursework. A classroom that fosters creativity has the potential to meet not only basic academic needs but also deeper levels of critical thinking, problem-solving, and classroom management.

Educational Gameplay and Game-Based Learning

Duncan (2020) urged the need to change negative student engagement trends in school settings after finding many instances of research with similar discussions of low student engagement leading to decreased attendance, academic achievement, and increased drop-out rate, and boredom. Tsai et al. (2020) found it difficult to encourage students to achieve higher learning motivation, using only the traditional modes of memorization and repeated practice. Low learning motivation can negatively impact a learner's understanding and ability to apply

knowledge to new and novel situations. Lower learning motivation can also cause students to lose interest in learning content and a willingness to further their studies and explore the subject independently. Research has shown that the elements and mechanics of gameplay stimulate behavioral engagement (Plass et al., 2015) and improve students' motivation for learning (Tsai et al., 2020). Through educational gameplay, it is possible to increase learner motivation and engagement and increase the ability to generalize learning outside an isolated classroom experience.

Lee (2019) stated that research studies confirmed that gameplay enhances learners' intrinsic motivation by engaging players in the fictional game world, which increases learners' interest and enjoyment during the learning process. The idea of incorporating gameplay for educational purposes is not an innovation (Ke, 2016; Agogo & Anderson, 2019; York et al., 2021) and has proven to be a strong method for motivation and engagement. The use of educational card games (Agogo & Anderson, 2019), board games (Martindale & Weiss, 2020; Tsai et al., 2020), and digital games (Lee, 2019) for teaching and the gamification of educational learning concepts has become an emerging teaching trend. The teachers' perspectives on game-based learning were neutral. While Meletiou-Mavrotheris and Prodromou (2016) found that pre-service teachers have a positive impact on utilizing gameplay and game-based learning as an instructional tool after participating in game-based learning training, evidence shows a concern that current studies lack details regarding pedagogical scaffolds for teachers to integrate the teaching context (York et al., 2021). For teachers to effectively implement a strategy, they may benefit from experiencing it as learners. Incorporating gameplay and game-based learning into

teacher preparation programs could increase the utilization of this teaching strategy.

The Organization for Economic Co-operation and Development (OECD) listed creativity as a core competency required for the 21st century, as cited in Lee (2019). Researchers believe that creativity can be cultivated through education (Hsiao et al., 2014), and incorporating gameplay, an effective learning tool, in an educational setting can help foster student creativity to become innovative problem-solvers (Martindale & Weiss, 2020). Teachers will become the facilitators when the vision of games transforming education and using gameplay in the classroom becomes recognized and normalized (York et al., 2021). However, little empirical evidence has been presented on the potential of gameplay or game-based learning to foster innovative pre-service or in-service teachers in teacher preparation programs or professional development.

Intervention

This experimental research used a pre and post-test to examine gameplay's effectiveness in nurturing preservice teachers' creative self-efficacy before and after gameplay. Participants were randomly assigned to either the experimental or control group within the class, following the three-cluster block randomized assignment model. Participants in the experimental group were asked to complete the pre-survey, review the reading material, participate in 30 minutes of gameplay, and complete the post-survey. The control group was asked to complete the pre-survey, read the reading materials, participate in a short discussion, and complete the post-survey.

Researchers evaluated participants' pre and post self-report surveys of creative self-efficacy using the creative self-efficacy subscale of the Short Scale of Creative Self (SSCS) (Karwowski, 2018). Participants in

the intervention group played a card game developed by the researchers in prior research to provide scenarios in which educators could intervene with possible student social-emotional/behavioral challenges with effective interventions. This game is geared toward educators and creates a higher-stakes environment for educators to problem-solve challenging student behaviors. While playing the game, participants engaged in conversations and reflections on how to best deal with challenging student behaviors and student social-emotional needs in the classroom. The discussions during gameplay focused on what the teacher could implement in the moment in response to challenging student behaviors.

Methods

Research Objective

This research aims to examine the effect of gameplay on educators' creative self-efficacy in hypothetical classroom management situations. In this study, we were interested in how playing a game designed to simulate problematic classroom behaviors would affect pre-service teachers' feelings about their ability to handle classroom management scenarios. Furthermore, the researchers were interested in determining whether game-based learning could be an intervention to address the gap between teacher preparation and the real-life demands of educators.

Research Questions and Hypothesis

How does gameplay affect educators' creative self-efficacy in hypothetical classroom management situations?

Hypotheses: The difference between pre-post scores for preservice teachers participating in gameplay and the control group $\neq 0$.

Null Hypotheses: The difference between pre-post scores for preservice teachers participating in gameplay and the control group = 0.

Sample

We recruited 47 preservice teachers from a teacher preparation program at a mid-size Rocky Mountain region University to participate in the study. Participants were preservice teachers enrolled in undergraduate educational technology and educational psychology courses taught by graduate students, including the researchers and departmental contacts of the researchers. The Institutional Review Board approved this study of our institution.

The sample included male (10) and female (34) and non-binary/other (3). The 47 preservice teachers were divided into three categories based on their future teaching range: primary school (22), secondary school (21), and K-12 (4). This grouping allowed for the examination of any possible differences between categories. The sample was randomly distributed into gameplay (24) and control (23).

Participants were recruited by purposeful sampling through snowballing, researcher access, and connection to preservice teacher course instructors. One researcher, who was also a course instructor, was self-recruited and asked to identify other instructors in preservice teacher courses. The research team also recruited course instructors within their graduate departments who taught courses for preservice teachers. The research team explained the experiments to the course instructors and was granted time to request individual preservice teachers' consent to participate in the experiment during their class time. Once consent was obtained, the participants either participated in the game-based experiment, joined the control group, or completed a pre and post-survey. If consent was not obtained, participants were

assigned to the control group and were not required to participate in gameplay. Information provided by the participants was available only to the investigative team.

Research Protocol

The participants were provided with electronic consent forms. Those who chose to participate indicated their choice on the consent form and then were randomly assigned to either the experimental or the control group. First, all participants completed the survey. The groups were then divided into different classrooms. The control group was given a packet with reading materials on social-emotional learning and possible interventions. The intervention group played one round of gameplay. Once each group completed their task, both groups took the post-survey, which was the same as the pre-survey. Those who chose not to participate were given reading as part of their regular coursework without taking the surveys.

Instruments

The Short Scale of Creative Self-Efficacy

The SSCS comprises 11 items in total, and the six items selected were the subscales for creative self-efficacy, which included the following items: (3) "I know I can efficiently solve even complicated problems," (4) "I trust my creative abilities," (5) "Compared with my friends, I am distinguished by my imagination and ingenuity," (6) "I have proved many times that I can cope with difficult situations," (8) "I am sure I can deal with problems requiring creative thinking," and (9) "I am good at proposing original solutions to" (Karwowski et al., 2018, p. 48). The scale is measured on a 5-point Likert scale (1 = definitely not, 2 = probably not, or higher, 3 = possibly or higher, 4 = probably yes, 5 = definitely yes). The internal consistency is similar to Creative Self-efficacy (CSE) $\alpha = .87$ (Karwowski et al., 2018). Shaw et al.

(2021), using the graded response model (GRM) and item response theory (IRT) conclude that the items fitted a single latent construct model of CSE. Differential item functioning (DIF) between males and females was not found (Shaw et al., 2021). The scale showed good convergent validity, with moderate to large correlations with other CSE measures (Shaw et al., 2021). There was no violation of unidimensionality for pairs of items (Shaw et al., 2021). Researchers slightly adjusted the prompt to direct participants to think about their creativity self-efficacy in terms of classroom management as well as adjusted the Likert scale from the terms of "definitely not" to "definitely yes" into the terms "strongly disagree" to "strongly agree" (Appendix A).

The Card Game

The card game (Appendix B) was created by the researchers and is designed to foster teachers' creativity when applying classroom management strategies. In the game, players win the round if an uninterrupted path constructed by players leads to the winning goal of the gold standard class. Players must make their way through the classroom behavioral challenges to teach the class and implement effective interventions. Players used emotional path cards with positive emotions to travel to the end goal. Players can prevent a direct path or delay the game's progress using path cards related to negative emotions. Players can use challenging behavior cards to disable another player's ability to progress in the game, and the strategy cards are used to resolve a challenging behavior by justifying how and why the strategy is effective in resolving the challenging behavior. This gameplay allows preservice teachers to apply their classroom management knowledge, make quick, on-the-spot decisions, and justify why they would use one intervention or strategy over another.

Reading Materials

The reading materials for both the control and experimental groups included classroom management strategies and classroom behavior challenges defined and retrieved from the PBIS World Official Website (PBIS World, 2022), which was given to both groups to provide a common understanding of potential student behaviors and teacher intervention strategies. Challenging student behaviors and classroom management strategies were the same as those encountered by players during gameplay.

Statistical Analysis and Results

This study conducted a paired sample t-test using all 47 responses, but no significant results were found. However, a difference in differences analysis (see Figure 1) was performed, revealing a negative trend ($DD = -0.70$) between the control and gameplay groups in terms of their pre to post-SSCS scores. This suggests that the game intervention had a negative effect on creative self-efficacy scores compared to the control group.

The items in the gameplay group had mixed results pre and post-intervention. Item 4 ("Many times I have proved that I can cope with difficult situations") had an overall increase of .08. Item 6 ("I am good at proposing original solutions to problems") also showed an increase of .12, from pre to post. The other items either remained constant or were decreased. Item 3 ("My imagination and ingenuity distinguish me from my friends") decreased slightly -0.04 from pre to post. Item 5 ("I am sure I can deal with problems requiring creative thinking") decreased the most with a -0.25 difference from pre to post. The control group showed some slight gains from pre to post-intervention. Item 1 ("I know I can

efficiently solve even complicated problems") had the greatest gain of 0.26 from pre to post. The only item that decreased was Item 2 ("I trust my creative abilities"), which decreased by -.017 from pre to post.

The following table shows the difference in differences and means for pre- and post-scores in both the intervention group (gameplay) and the control group. For item 1, the intervention group remained the same, while the control group's creative self-efficacy increased. Item 2 shows that both the intervention and control groups decreased but at different slopes. The control group showed a steeper decline. For Item 3, the intervention group showed decreased creative self-efficacy, while the control group showed an increase. The

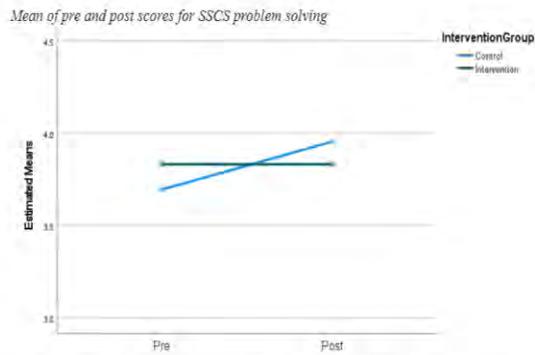
results of item 4 show that the intervention and control groups increased creative self-efficacy in parallel. For item 5, the intervention group showed decreased creative self-efficacy, while the control group showed increased creative self-efficacy. Lastly, in item 6, the intervention and control groups showed increased creative self-efficacy, but the control group had a steeper gain. From the results, we reject the null hypothesis and find a relationship between the experience of gameplay and the self-reported feeling of self-efficacy related to the use of classroom management techniques among the participants of this study.

Table 1
Differences in Differences of Creative Self-Efficacy Scores

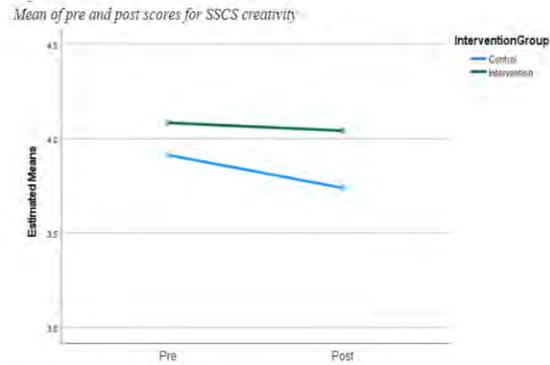
Item	Pre Game	Post Game	Difference in Game	Pre Control	Post Control	Difference in Control	DD
1. Problem Solving	3.83	3.83	0.00	3.70	3.96	0.26	
2. Creativity	4.08	4.04	-0.04	3.91	3.74	-0.17	
3. Ingenuity	3.46	3.42	-0.04	3.00	3.13	0.13	
4. Coping	3.71	3.79	0.08	4.00	4.09	0.09	
5. Creative Problem Solving	4.17	3.92	-0.25	3.65	3.74	0.09	
6. Original Solutions	3.75	3.83	0.12	3.52	3.65	0.13	
Total	23	22.83	-0.17	21.78	22.31	0.53	-0.70

**Note.* Difference is calculated by subtracting pre from post. DD= Differences in Differences

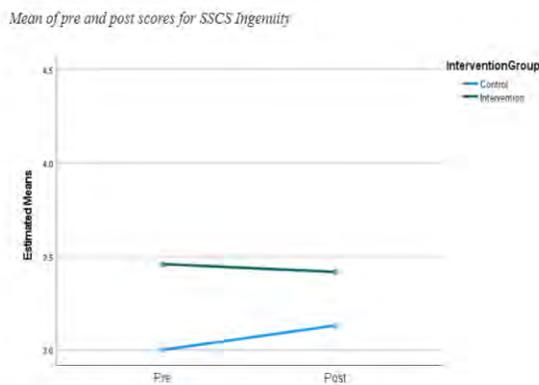
Figure 1



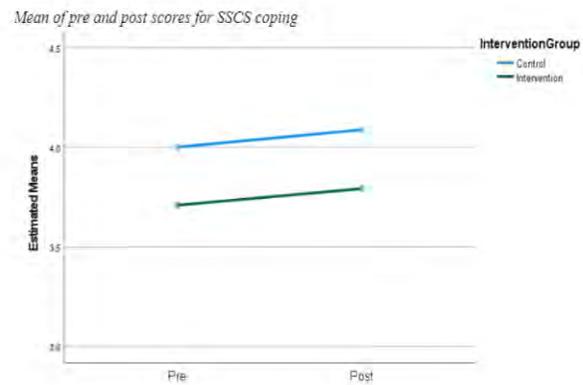
Note. The figure depicts pre and post scores for both intervention and control groups on Item 1.



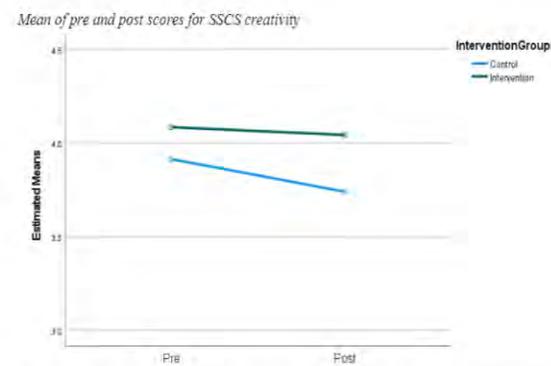
Note. The figure depicts pre and post scores for both intervention and control groups on Item 2.



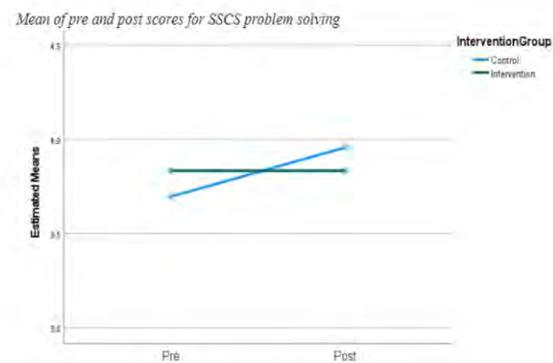
Note. The figure depicts pre and post scores for both intervention and control groups on Item 3.



Note. The figure depicts pre and post scores for both intervention and control groups on Item 4.



Note. The figure depicts pre and post scores for both intervention and control groups on Item 2.



Note. The figure depicts pre and post scores for both intervention and control groups on Item 1.

Discussion

In this study, we measured the creative self-efficacy of pre-service teachers. The pre-post measure of creative self-efficacy provided an opportunity to see how gameplay influences creative self-efficacy. We believe that the results align with ideas from Doran (2020) that fieldwork is important because it gives one an opportunity to apply learning. The preservice teachers in the intervention group had to apply their knowledge to situations and provide a rationale for their actions, which could demonstrate that their knowledge or understanding was lacking. These field experience simulations are an important bridge between classroom learning and real-life applications. This idea may have contributed to those in the gameplay group scoring lower on self-efficacy than those in the control group. The preservice teachers may have realized through the exercise that they were not as prepared to handle the situations as they believed.

In contrast, the control group only read the information in a packet. This may have increased their creative self-efficacy because they had a new information resource but were not required to apply it to a real scenario. Like Doran's (2020) findings, teachers report a disconnect when they have academic knowledge about classroom management but not real-world applications. In addition, similar to the ideas of Resnick (2017), learning during play is a much more effective form of training because it can create long-lasting connections to real-world applications. Further, researchers have found that educational games can induce creative thinking (Dyson et al., 2016) and enhance the preservice teacher learning experience (Johnson & Kim, 2021) through an applicable learning exercise.

The intervention group showed a decrease in creative self-efficacy compared with the control group. The null results for the paired samples t-test would support the findings of Yeh et al. (2012) that the delivery of learning tasks is ultimately the same, either with or without the game. It should be noted that the intervention group started at a higher score, possibly indicating a ceiling effect in which they had little room to improve.

Limitations and suggestions for further research

The limitations of this study include its small sample size. Only 47 pre-service teachers participated in the study. Another limitation is the time required for the gameplay. Those who participated in the game were given only one round of play before the post-test. As practice can improve self-efficacy, multiple rounds over a long period may yield useful results.

Additionally, the control groups were run by the instructors to avoid influencing the treatment group, but the gameplay was run by different researchers due to scheduling conflicts. Future research should expand the number of participants to examine the influence of smaller sub-groups, such as non-binary pre-service teachers. Moreover, future research could increase the duration of gameplay time and more rounds of play to fully understand the effect of utilizing social-emotional problems and interventions from the game to examine social-emotional learning in pre-service teachers.

Conclusion

The need for more innovative teacher preparation methods, particularly for social-emotional, classroom management, and culturally responsive practices, is paramount, particularly in post-pandemic classrooms. Many students are returning to

in-person classrooms after years of remote learning, which presents new challenges and needs for educators to utilize highly effective and engaging methods. Research has highlighted gaps in preservice teacher preparation (Doran, 2020) and the reality of the daily demands faced by educators. Through a game-based approach, preservice teachers can simulate the experiences they will encounter in their field experiences, student teaching, and eventually in their first year as educators. This research found the need for preservice teachers to experience a variety of training methods to help them become more self-aware of their abilities and practice the application of their learning prior to entering the classroom.

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Appendix A: Pre and Post Survey

Demographic Questions

1. Gender
 1. Male
 1. Female
 1. Non-binary
2. What age students will you be teaching?
 1. Primary (elementary)
 1. Secondary (high school)

(Pre-survey prompt) Below you will find several sentences used by people to describe themselves. Please decide to what extent each of these statements describes **your classroom management experience**. There are no good or wrong answers.

(Post-survey prompt, experiment group) Below you will find several sentences used by people to describe themselves. Please decide to what extent each of these statements describes **your gameplay experience today**. There are no good or wrong answers.

(Post-survey prompt, control group) Below you will find several sentences used by people to describe themselves. Please decide to what extent each of these statements describes **your experience with the class activities today**. There are no good or wrong answers.

I know I can efficiently solve even complicated problems

1 Strongly Disagree, 2 Somewhat Disagree, 3 Neither Agree or Disagree, 4 Somewhat Disagree, 5 Strongly Agree

I trust my creative abilities

1 Strongly Disagree, 2 Somewhat Disagree, 3 Neither Agree or Disagree, 4 Somewhat Disagree, 5 Strongly Agree

My imagination and ingenuity distinguish me from my friends

1 Strongly Disagree, 2 Somewhat Disagree, 3 Neither Agree or Disagree, 4 Somewhat Disagree, 5 Strongly Agree

Many times I have proved that I can cope with difficult situations

1 Strongly Disagree, 2 Somewhat Disagree, 3 Neither Agree or Disagree, 4 Somewhat Disagree, 5 Strongly Agree

I am sure I can deal with problems requiring creative thinking

1 Strongly Disagree, 2 Somewhat Disagree, 3 Neither Agree or Disagree, 4 Somewhat Disagree, 5 Strongly Agree

I am good at proposing original solutions to problems

1 Strongly Disagree, 2 Somewhat Disagree, 3 Neither Agree or Disagree, 4 Somewhat Disagree, 5 Strongly Agree

Appendix B: Card Game Instruction

Components Needed to Play:

Cards: Role (10), Goal (3), Emotional Path (45), and Action (24).

Rules:

>> Start by separating the cards into Roles, Goal, Emotional Paths, and Actions.



Role Cards:

(10 cards: 3 Students, 7 Teachers)

>> Take the following role cards, returning the rest to the box.

3 players: 1 Student, 2 Teachers

4 players: 1 Student, 3 Teachers

5 players: 2 Students, 3 Teachers

6 players: 2 Students, 4 Teachers

7 players: 2 Students, 5 Teachers

8 players: 3 Students, 5 Teachers

9 players: 3 Students, 6 Teachers

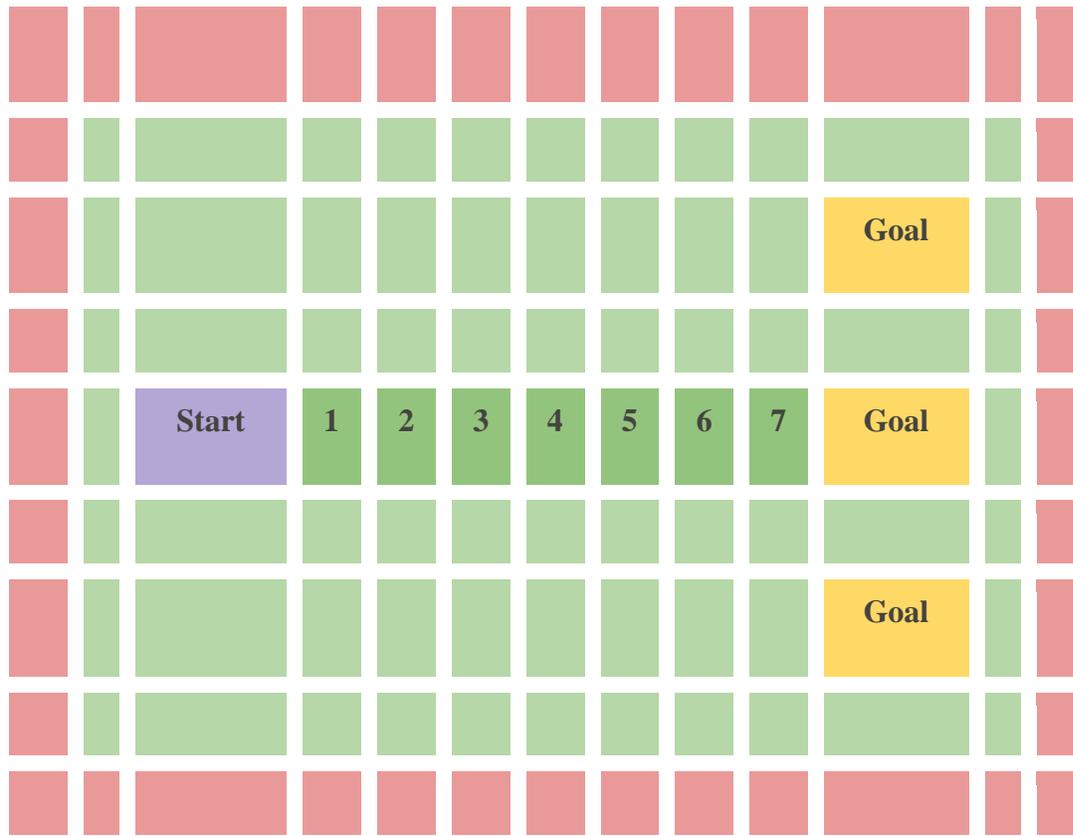
10 players: 3 Students, 7 Teacher

>> Shuffle role cards and deal with one card to each player, who looks at it and place it face down on the table. Place the remaining cards aside.

Goal Cards:

(3 cards: Gold/ Silver/ Silver)

>> Shuffle the 3 goal cards and put them face down on the table with a card space between them vertically and 7 card spaces between the Start card (face up) and the middle goal card.



Emotional Path cards (45 cards:)

	x1	START		
	x34	Teachers and students put positive emotion cards to the class to reach the gold standard class goal.		x10 Teachers and students put negative emotion cards to the class to disrupt reaching the gold standard class goal.

Action Cards:

(24 cards: 9 student challenge, 9 teacher strategy, and 6 Peak a goal cards)

<p>Student Challenge</p> 	<p>x9</p>	<p>Challenging behaviors preventing teachers from teaching the class</p>	<p>Peak a Goal</p> 	<p>X6</p>	<p>Peak one out of the three goals</p>
<p>Teacher Strategy</p> 	<p>x9</p>	<p>Resolve the Student Challenge and continue teaching the class. Teachers must justify why the selected teacher strategy can resolve the Student Challenge.</p>			