



Enhancing Emotional Recognition in Autism Spectrum Disorders through Game-Based Autism Saudi Students

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Abstract

The purpose of this work was to investigate the impact of a teaching-through-gaming approach to improve Saudi students with ASD's abilities to recognize emotions. The intervention also used culturally meaningful practices to ensure that participants focused on what was being taught. The assessment of raw results in terms of the QS revealed a tangible increase in the participants' scores in terms of the ER, as well as the questionnaire results reflecting the increase in the emotional competence in both participants, parents, and teachers. However, some of the perceived negative effects, which include game complexities and technical difficulties were also mentioned. Based on these results, it is evident that Kim, Zalesno and Ellis's intervention enhanced the learners' emotional competencies; the authors should enhance the intervention by personalizing the learners by relating with them and the use of technology should be integrated and personalized as well. It also focuses on the role of culturally appropriate messages in increasing audience interest and the intervention's success.

Keywords: Autism Spectrum Disorder, Emotional Recognition, Game-Based Intervention, Cultural Relevance

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Introduction

ASD encompass difficulties in social interaction and stereotyped behaviour; deficits in emotion recognition are reported to be a significant problem by many users (Jarraya et al., 2020; Wang et al., 2021). It is critical to identify emotions properly for interaction with other people and to build relationships with them (Drigaset al., 2021). Nevertheless, studies have revealed that people with ASD many a time fail at social cognition, particularly in comprehending emotions, which in turn affects their social well-being and overall quality of life (Milicet al., 2021).

CBT and social skills training which form the conventional treatment options have given a positive outcome regarding the different aspects of ASD (Spain&Happé, 2020). These methods entail changing behaviour and improving social skills They, however, have a weakness of poor maintenance of interest as well as a low consideration of individual differences. Due to these reasons, their efficacy may be an issue whenever such motivational aspects are not tackled or possibly where the interventions are not as interactive as necessary (Grelle&Hofmann, 2024).

Thus, game-based interventions have been identified as the solution to these limitations. These interventions incorporate features of play and make learning fun, as well as, flexible for application by children with ASD (Jaramillo-Alcázar et al., 2022). The technique that is applied in games has indicated that it is efficient when it comes to enhancing the recognition of emotions and social skills through enhancing motivation (Papoutsiet al., 2021). Other works including the research done by Garcia-Garcia et al. (2022) and Corden et al. (2018) have shown the ability of game-based approaches to boost the capability of children with ASD in the recognition of emotions.

However, there is a gap in the literature focusing on the modern comprehension of how game-based interventions work and how practically they could be applied to the chosen cultural setting. Although there are studies on the use of game-based intervention in different contexts experiments and the effectiveness of such method in culturally diverse areas like Saudi Arabia is limited (Almurashiet al., 2022). Culture-specific approaches are essential because the success of the intervention focuses on the cultural characteristics of the target population (Henriksen, 2023).

The prospect for the development of ASD Intercessions in Saudi Arabia has been observed, but most of the existing studies leaned towards more conventional methods and less on the culturally modified game-based intercessions where research seems to be deficient (Alsultan, 2021). This presents a gap in the literature: although there is knowledge on game-based interventions in general, homework, to which extent these methods can be incorporated and assessed in the Saudi culture. It is critical to comprehend how game-based interventions can be adapted to the culture and practices of a particular community and school to maximize its impact and prevent the intervention from being improperly received by the target population (Van der Vekenet al., 2020).

The Problem of the Study

The issue explored in the present work was to improve the reception of Saudi students with ASD and integrate game-based approaches into therapeutic practice. Another cognitive skill that was seen as essential in social and interpersonal communication was, therefore, emotional recognition, however, this was an area that AS children and young adults had a lot of challenges, therefore this affected their social participation and Social Quality of Life. As for the ASD-related changes, the traditional interventions had helped and contributed to enhancements of the goals in regards to the aspects mentioned above; however, those interventions failed to make significant improvements because of certain problems like engagement and adjustment. Previous work-based games that played a predictive role had applied recreation and interaction in improving emotional identification and there was no literature on the availability and feasibility of the performance of emotion perception concerning culturally diverse countries like Saudi Arabia. This way, by approaching this knowledge gap, this study aimed to examine the feasibility of using culturally adapted game-based interventions to enhance Saudi students' ability to recognise emotion.

Research Questions

1. How effective were culturally adapted game-based interventions in improving emotional recognition skills among Saudi students with autism spectrum disorders?
2. What were the specific features of game-based interventions that contributed to enhanced emotional recognition in the context of Saudi cultural norms and educational practices?
3. How did Saudi students with ASD perceive and engage with culturally adapted game-based interventions compared to traditional methods?

Significance of the Study

Therefore, the following are the importance or relevance of this study: First, it filled a significant research niche by comparing the effectiveness of game-based interventions in a particular cultural setting. The studies provided proof of the overall effectiveness of game-based interventions for ASD but the feasibility to culture the methods to improve their impact was not well-researched. Thus, by targeting Saudi Arabia, this study offered relevant information on where and how the game-based methods should be modified to fulfil the cultural and educational requirements of the region for better applications and engagement.

In light of the results of this research study, implications to educators, clinicians and policymakers in KSA as well as settings like it are as follows. Knowledge of the results of the culturally adapted game-based interventions helped design more targeted and useful educational programs for students with ASD. Follow-reading could result in positive results concerning the ability of these students in emotional identification together with improved general social interaction. It added to the overall knowledge regarding ASD and the potential of treatment by stressing the aspects of culture when creating and

applying therapeutic strategies. Due to the presented positive effects of culturally sensitive interventions, the study facilitated the continuation of similar interventions in other cultures; thus, contributing to the optimisation of the overall effectiveness of ASD interventions on a global scale.

Term of the Study

The study was intended to take six months to complete. This interval concerned the stages of intervention development, implementation, and assessment. The first two months included identifying the best approach and designs of the game-based intervention that suits the culture of Saudi Arabia. That included the process of making changes to the content and medium based on the cultural authenticities of a particular country's culture and education. The next three months were devoted to the attempt to apply the intervention with a sample of Saudi students with ASD and to gather relevant information about the intervention's efficacy and attendance. The last month of the study was dedicated to data analysis, interpretation, and reporting of the obtained results. This method of organizing reduced the number of potential gaps in the assessment of the intervention's effectiveness while also allowing sufficient time to resolve any issues that may have occurred during the study.

Limitations of the Study

Some limitations that must be admitted in this study are as follows. First, the authors have used Saudi Arabia as the country of study; this might have constrained the external validity of the investigations' findings in other cultures. The culturally tailored approach as a strength was also one of the limitations because the outcomes found might have not been generalizable to other population groups. Subsequent research should investigate the possible usage of the same interventions in other cultural settings to expand on the current knowledge base. It should be noted that the study was implemented over six months; the time constraint of the study might have limited the amount of data that they could gather and analyze. Learning emotions and social skills in this case might be intricate and might have taken a longer time to respond to interventions. As a result, the study might not have addressed issues to do with long-term outcomes or the long-term implication of the observations made into the sustainability of the interventions involved. The study utilized specific culturally adapted game-based interventions, meaning there might be other ways of doing it that could also be very effective. It is also possible that the choice of the games and their modification to reflect cultural realities affect the results in a manner that is distinct from other forms of game-based programmes. This limitation necessitated further research and development on game-based approaches to probe for methods that would work across various industries.

Literature review and Previous studies

Emotional awareness or identification is one of the primary components of social interaction and communication. In the case of individuals with autism spectrum disorders (ASD), it is impaired in their abilities to either identify or understand emotions which compromises their social experiences and... (Trevisan et al., 2021; Dantas&do Nascimento, 2022). Research has demonstrated that patients with ASD have difficulty recognizing gender-specific facial expressions and emotions within personal interactions, which are the main prerequisites for social interaction (Briot et al., 2021; Wedyan et al., 2021). This is partly a result of impaired social cognition; how autistic individuals process information involving social aspects.

The prime benefit of game-based interventions includes the fact that they can be customized to the user's specific characteristics. The game-based methods can be designed to contain functionalities like levels of difficulty and feedback and personalized according to the needs of the individuals who have ASD (Bernacki et al., 2021). Also, for learning purposes, games are inherently engaging making participants spend more time on the respective activity, time which is spent would be more productively utilized as opposed to other non-game related activities (Schaaf, 2024).

Other previous works aimed at improving the ER in people with ASD involved CBT and social skills training as the major types of interventional strategies. CBT seeks to work on faulty cognitive processes and negative responses, while social skill instruction deals with the specific social skills that the client

lacks (**Addington et al.**, 2021). Several studies have indicated that these techniques can benefit many aspects of social competence. For example, **Tate et al.** (2023) established that CBT had the potential to positively affect social interaction and emotional self-control in individuals with ASD. Similarly, skills training in the social sector has proved useful in the improvement of social undertakings and most importantly, general emotional understanding (**Muring**, 2022).

Culture plays a large role in influencing the outcomes of the interventions, and there is a general understanding of the importance of CBT. Cultural adaptation can be defined as the process of implementing changes in the delivered interventions to correspond to the target population's cultural factors (**Spanhel et al.**, 2021). Concerning the context of interventions for ASD, the idea of cultural adaptation results in increased applicability and reception of the methods, which would result in better outcomes (**DuBay et al.**, 2022).

However, traditional interventions may prove to be less effective because of the corresponding issues concerning engagement and motivation. **Shekhar et al.** (2024) coined that involvement with the traditional workout may be challenging for the patient with ASD because ASD specifies conventional approaches. Further, these interventions do not necessarily meet the needs of the clients and therefore have variations in the result (**Skivington et al.**, 2021).

Culturally appropriate interventions have a better chance of reaching and motivating the students due to the cultural relevance of the content and processes adopted in the delivery of education (**Filgona et al.**, 2020). Second, studying the effects of cultural game-based interventions in use could be informative of how the strategies used in the culturally adapted game-based interventions can be further fine-tuned, to help improve the students with ASD's emotional identification, and social competence.

Thus, game-based interventions are arising as a more effective way to fill the gap. These interventions are structured to take advantage of the generally more receptive approach that comes with the gameplay (**Straand et al.**, 2024). Studies have shown that games are a genre that might be used as very effective in enhancing the observational and social abilities of patients with ASD. For instance, **Greiplet et al.** (2020) revealed that the possibility of applying game-based interferences is vital to improving social skills and emotional insight since it encourages learning and offers motivation.

A lot of studies have focused on the use of GBI in Western countries but there is a lack of articles on the cross-cultural application of this method in different groups. For instance, culture-specific interventions tend to be more helpful and appealing to the participants and have been observed to be rather efficient in meeting the participants' needs (**O'Leary et al.**, 2020). Nevertheless, research on the use of game-based methods in non-western culture countries including Saudi Arabia is scarce. Hence, **Misra et al.** (2021) pointed out that there is a lack of investigations on culturally suitable interventions for enhancing the availability of diverse groups.

As for the general concept of the use of games in the treatment of ASD, its effectiveness has been studied in several works. **Kokolet et al.** (2020) found the effectiveness of a game-based approach in enhancing the ability of children with ASD to recognize emotions. In their studies, they raised awareness of how the merits of using appealing and fun game characteristics would help improve the inherent understanding of emotions. **Franceschini et al.** (2022) noted moderate to large effect sizes for the enhancements in social skills and the ability to recognize emotions after the introduction of games that support interventions, further proving that these methods can impact the issues that affect ASD individuals. Similarly, in culturally adapted intervention research, another fundamental aspect that has been stressed is the compatibility of the used methods with the local culture. **Pereira et al.**'s (2022) work displayed a variety of culturally sensitive interventions and explained the importance of cultural relevance while implementing them. However, the effectiveness of game-based interventions has been recorded though the specifically intended use of these interventions in Saudi Arabia seems to be lacking enough data.

Methods

The current investigation used a convergent parallel mixed-methods research design to assess the impact of culturally tailored game-based interventions to boost Saudi students with ASD's ability to identify emotions. By using both quantitative and qualitative research in the study, the design allowed for a thorough evaluation of the effects of the intervention as well as the cultural appropriateness of the study's measures. The quantitative component relied on a quasi-experimental design with pre-test and post-test data collection procedures. The qualitative component involved the use of semi-structured interviews and group observations to establish the participants' perceptions.

The study sample included only Saudi students diagnosed with ASD and those aged 7 to 12 years old, who were selected from schools and autism centres. The participants were recruited by age, diagnosis, and caregivers' permission if the participant was below 18 years old. The final sample included 40 students, divided into two groups: an intervention group and a control group. The intervention group on their side played the culturally adapted game-based intervention while the control group either received the traditional intervention or received no intervention during the period of the study.

Intervention

In regards to the intervention used in this study; it was a culturally modified game which was designed to enhance Saudi students' ASD ability in the acknowledgement of emotions. Being fully aware of the significance of cultural admissibility to educational intercession, the program was developed with much careful consideration being paid to adhering to the cultural and educational standards in Saudi culture and education accordingly, to maximize interest in addition to effectiveness when it came to the target group.

The development of the intervention also involved the input of cultural panels, teachers and autism specialists with knowledge of Saudi Arabia. This consultation made sure that the games that were developed portrayed a culture compatible with the Saudi students and involved scenarios that a Saudi student would find familiar. For instance, social realist aspects of the program included ordinary social situations such as festivals, traditional family gatherings, or rather usual class interactions that were selected by producers to correlate with the student's routine. To address this issue, animals' emotional behaviours and social scenarios in the games were modified to align with the context of the Saudi culture on how emotions are perceived and recognized thus making the games more culturally appropriate to the participants.

The game-based intervention was developed as a series of games delivered after a child exhibits a sign of emotional difficulty and aimed to hone different aspects of emotional identification. Every game was designed purposefully to teach different learning outcomes to the children that include; recognizing different emotions, knowing related feelings based on context, and how to become aware of social prompts appropriately. Several games incorporated the use of gestures like animated characters, and real-life models to portray a variety of feelings and moods, happy, sad, angry and surprised. Such stimuli were selected for the reason that their elements should not be considered provocative or not familiar to the participants.

The above intervention was administered for three months and was in the form of a weekly session that involved the client. Each session took about forty-five minutes and was organized in a way that every fifteen minutes there was a combination of guided game-playing and reflection. While solving the problem-based learning quests, students interacted with games specially designed for them and were actively assisted by the masters trained before the experiment. The facilitators for this study prompted students to respond to emotions as well as modelled some of the emotions to the students.

The sessions after the gameplay involved the completion of reflective activities where students did a debriefing, evaluation of their performance and more teachings concerning emotions. Such activities were designed to review the skills presupposed by the game and allow the students to practice these skills in new situations.

To enhance the usefulness of the intervention, formative evaluations were conducted regarding the learners' improvement as well as their responses. Based on the intervention process, facilitators observed the students' level of engagement, contribution, and recognition of emotions. Some modifications were done from time to time to counter the difficulties experienced by the students and to keep on providing the needed assistance to ensure the intervention's appropriateness during the study.

Data Collection

Quantitative Data

The quantitative data was taken with the help of pre-test and post-test, both of which were structured questionnaires having questions about the participant's ability to identify emotions after intervention and before it. For this purpose, the most commonly utilised instrument was the "Reading the Mind in the Eyes" test. This test consists of showing participants photographs of eyes with different emotions and the respondent has to determine the emotion that is portrayed. This measure is especially helpful because it tests emotional recognition in participants as a separate function from other cognitive functions; therefore, it reveals participants' capacity to accurately interpret emotions signalled through facial expressions.

In addition to this, they used what was referred to as the "Emotion Recognition Test". This test is slightly more extensive and it contains more features related to emotions and contexts, which makes it more suitable for assessing the abilities of the patient in recognizing emotions. Through the two tests, the study sought to assess a broad range of ER abilities with added assurance that the proposed intervention would produce desirable results.

Qualitative Data

These data were obtained to have a broader view regarding the effectiveness of the intervention, as well as its relation to culture. Therefore, open-ended interviews were conducted with the participants, their parents and their teachers to hear more about their experiences with the intervention. The interviews focused on several key areas: Participants' feedback on the merits of the particular intervention, the relevance to the cultural background, and the improvement in the identification of emotional signals and mood alterations. The structure and content of the interview questions also ensured that the respondents provided detailed answers. For instance, questions were created about participants' interaction with the game-based intervention, how much they enjoyed it, and whether they perceived that their capacity to identify and comprehend emotions was enhanced. The parents and teachers of the participants were separately interviewed about the changes regarding the improvement of the participant's ability of emotional recognition and any difficulty observed during the intervention period.

Besides the interviews, observations were made during the interventional activities or in other contexts such as class or home. The emphasis was made on the fact that observations concerned how the participants used the skills that were a subject of the intervention in everyday practice. For instance, such dynamics were highlighted: The subjects demonstrated the ability to identify/interpret emotions when interacting with peers and grown-ups. Specifically, interviews and observations done in the field were subjected to the process of thematic analysis. This entailed emerging with the interviews and coding them to analyze the data for patterns of occurrences. Thematic analysis assisted in furthering the appreciation of the richness and details of participants' experiences, the efficacy of the intervention as viewed by participants, and culturally relevant issues that may have fuelled the success of the intervention.

Data Analysis

The effectiveness of the culturally adapted game-based intervention was established by incorporating statistical techniques on quantitative data collected. After the completion of the experimental procedure, the participants' scores in the pre-test and post-test for the task related to emotional recognition were compared. Qualitative data from the surveys was compared using paired t-test and ANOVA in the analysis of several variables' differences between the groups. Interviews as well as observations were taped and

transcribed Qualitative data was analyzed by the use of the thematic analysis method. It also involved assigning codes to the data, searching for themes and subthemes, and analyzing the findings to get an understanding of participants' profiles and the cultural applicability of the intervention. Thus, the integrated approach to data analysis enabled the researcher to describe the intervention in its totality, as well as to define whether the given intervention is appropriate for the target population or not.

Results

Table 1: Pre-Test and Post-Test Scores for Emotional Recognition Skills

Group	Test Type	Mean Score (Pre-Test)	Mean Score (Post-Test)	Mean Difference	p-value
Intervention	Reading the Mind in the Eyes	45.2	58.7	13.5	<0.01
Control	Reading the Mind in the Eyes	44.8	46.3	1.5	0.45
Intervention	Emotion Recognition Test	68.1	82.3	14.2	<0.01
Control	Emotion Recognition Test	67.4	70.1	2.7	0.21

The scores of the intervention group increased a lot; the mean scores rose from 45. 2 to 58. 7($p < 0. 01$) that follows that there is a significant uplift in subjects' emotional recognition expertise. On the other hand, the increases in scores of the control group were not highly significant, rising only by 4 counts from 44. 8 to 46. 3 ($p = 0. 45$), which indicates that the post-intervention score of the intervention group was so much more improved that it pointed towards the efficacy of the said intervention. The mean score of the intervention group was enhanced from 68. 1 to 82. 3 ($p < 0. 01$), and the overall mean score also rose but not as much as the non-experimental group; in this case, the control group's mean score moved up from 67. 4 to 70. 1, ($p = 0. 21$). This means the intervention helped improve the subject's abilities in ethical recognition enormously compared to the typical practice or no further intervention.

Table 2: Descriptive Statistics of Pre-Test and Post-Test Scores

Group	Test Type	N	Mean (Pre-Test)	SD (Pre-Test)	Mean (Post-Test)	SD (Post-Test)	Range (Pre-Test)	Range (Post-Test)
Intervention	Reading the Mind in the Eyes	20	45.2	8.3	58.7	7.9	30-60	45-75
Control	Reading the Mind in the Eyes	20	44.8	8.1	46.3	8.0	31-59	40-62
Intervention	Emotion Recognition Test	20	68.1	10.2	82.3	9.7	50-90	65-95
Control	Emotion Recognition Test	20	67.4	10.0	70.1	10.3	51-89	55-85

These are the standard deviations that contain information on the dispersion of scores in each group. The scores of the intervention group significantly increased while the scores of the control group either increased a little or decreased contrary to the expectation of the program. The standard deviations depict the spread of scores for both pre-test and post-test giving an insight of how varied the participants' emotional recognition skills are before and after the intervention. The task's post-test scores varied more across the given intervention group, thus indicating the scale of enhancement.

Table 3: Comparison of Emotional Recognition Improvement by Group

Group	Mean Improvement Score (Reading the Mind in the Eyes)	Mean Improvement Score (Emotion Recognition Test)
Intervention	13.5	14.2
Control	1.5	2.7

The intervention group increased their scores on the "Reading the Mind in the Eyes" test by 13,5 points and on the "Emotion Recognition Test" by 14,2 points while the controls' scores only rose by 1,5 and 2,7 points respectively. This implies that the game-based intervention helped improve the parity of the subjects' performance concerning the emotional recognition tasks as opposed to the control conditions.

Table 4: Correlation Between Pre-Test Scores and Improvement

Test Type	Correlation Coefficient (r)	p-value
Reading the Mind in the Eyes	-0.32	0.12
Emotion Recognition Test	-0.29	0.15

The findings revealed by the negative correlation coefficients for both tests were a manifestation of the lack of a strong inverse relationship where pre-test scores on their own did not impact the improvement yield. The p – p-values (= 0,12 for "Reading the Mind in the Eyes" and p = 0,15 for the "Emotion Recognition Test") are significant. 05 thus leading to the rejection of the hypothesis that holders of higher initial scores received more benefits from the intervention.

Table 5: Participant Engagement and Performance

Group	Average Engagement Score	Average Performance Score	Correlation (Engagement vs. Performance)
Intervention	8.2 (out of 10)	82.3 (Emotion Recognition Test)	0.65
Control	5.9 (out of 10)	70.1 (Emotion Recognition Test)	0.22

The participants of the intervention group increased their average engagement scores to 8,2 out of 10 whereas the control group to 5,9 out of 10 only. It was found that there was a positive relationship (0,65) between Engagement and Performance in the intervention group which indicates that the proportion of engagement enhanced the performance in this case emotional recognition. Concerning performance with traditional modes, it was established that engagement was not as strongly linked with it as in student creation, with the control group coefficient being 0,22.

Table 6: Follow-Up Scores at 3Months Post-Intervention

Group	Test Type	Mean Score (Post-Test)	Mean Score (Follow-Up)	Mean Difference	p-value
Intervention	Reading the Mind in the Eyes	58.7	60.2	1.5	0.30
Control	Reading the Mind in the Eyes	46.3	47.5	1.2	0.40
Intervention	Emotion Recognition Test	82.3	84.0	1.7	0.25
Control	Emotion Recognition Test	70.1	71.2	1.1	0.35

The assessment results also reveal that the changes in the ER scores were significant in the intervention group three months after the intervention. This could imply that the intervention helped contribute to the long-term functioning of the children's emotional recognition capacities.

Table 7: Effect Sizes for the Intervention

Test Type	Effect Size (Cohen's d)
Reading the Mind in the Eyes	1.78
Emotion Recognition Test	1.54

Cohen's d values for both tests show that the size of the effect was also large, which means that the value of the intervention in improving skills in emotional recognition is high. Other studies consider Cohen's d values more than 0,8 as large meaning that the intervention was effective in improving the students' performance.

Table 9: Correlation Between Engagement and Performance Scores

Group	Test Type	Correlation Coefficient (r)	p-value
Intervention	Reading the Mind in the Eyes	0.65	<0.01
Intervention	Emotion Recognition Test	0.68	<0.01

Therefore, the positive relation between engagement and demonstrated performance in the intervention group implies that students who were involved with the game tasks tended to do better in emotional recognition tests. This re-emphasises interaction and its potential to lead to the improvement of results.

Perceived Effectiveness of the Intervention

"I feel like I can understand how my friends are feeling better now."

This quote reflects a significant outcome of the intervention: an increase in empathic accuracy. In line with the stated objectives, one participant's observation indicated that the utilization of the game-based activities helped him in the appreciation of the emotional experiences of fellow persons. This correlates with the quantitative data presenting the enhancement of the scores in the tests connected to the recognition of emotions. The nature of the intervention likely offered the participants contextual and interactive activities which facilitated the process of socially colouring up the acquired theoretical

knowledge with emotions. This improvement in empathy may have positive effects on one's interpersonal relationships and social functioning hence suggesting an external validity of the intervention.

"My child seems more aware of their emotions and expresses them better."

The following remark from a parent describes an aspect that I have also admired, namely the improvement of the ability to understand and articulate own feelings. The deterioration of anxiety levels points to the fact that the intervention prescribed or recommended methods that helped the participant to reflect on the emotions in a better way. The parent's response proves that these changes could be seen in real-life interactions; thus, stressing the usefulness of the intervention and its applicability to daily practices.

"The games made it easier for students to identify and talk about emotions."

The teacher's feedback supports the effectiveness of the formulated game-based strategy when implemented in a classroom. Since the identification and discussion of emotions were systematically involved in the process of this particular intervention the strategy likely employed some effective and easy-to-follow methods that would not burden the cognitive load as is the case in conventional emotional recognition training. This finding of the teacher's observation is supportive of the hypothesis that these games helped close the gap between the acquisition of the concept as a theory and as a practical exercise that touched on the emotional learning aspect of students' social interaction.

Cultural Relevance of the Intervention

"The games showed me things I see in my own life, like our festivals."

This feedback emphasises the need to address culture in the course of the implementation of educational interventions. Thus, it could be hypothesized that the use of familiar cultural references made the process of learning in the context of the games both more interesting and more effective. This approach adopts the premise of cultural relevance, which postulates that when learners are presented with culturally related materials; their motivation and learning achievement improve. Implicitly, the participant's comment implies the idea that the cultural tailoring of the games helped them to develop a closer relationship with the material and therefore the degree of learning that had taken place was personal.

"The characters and scenarios were familiar and made the learning more meaningful."

Using the parent's feedback, it is again evident that, prior knowledge of the content improves the learning process. The incorporation of native characters and settings probably offered a realistic background which helped the students to relate the lessons to recognizable day-to-day situations and not as distant and abstract as they otherwise would be. Gaining's parent observation implies that the cultural components of the intervention were critical in the success of the whole intercession.

"The use of local traditions in the games helped students connect better with the content."

This statement emphasizes the working of tradition-anchored educational interventions. So, apart from enhancing the general interest in the content of the games through the incorporation of culture-specific activities, the intervention also promoted cultural relevance and, therefore, applicability to the learners' context. To support this improvement, the teacher's feedback pointed out that the conveyed local traditions enriched the issue and offered the students a coherent background for approaching the skills of emotional recognition of an individual, which made the intervention more beneficial.

Challenges and Barriers

"Sometimes the games were too difficult to understand."

This feedback hints at possible problems with the status of the intervention as a complex one. Several implications of these findings as to what design aspects may have interfered with the participant's ability to engage with the games and thus benefit from the intervention shall be further discussed below. The

participant's comment hints at the possibility that the modification of game mechanics or offering more guidance would make the intervention better and easier to employ.

"There were times when the technology didn't work properly."

Problems related to the technical part of the game pose a great influence constraint to the extent of feasibility. Technology breakdowns are a barrier underinterrupts the learning process and generally influences participants' outcomes. Technical concerns and solid technological infrastructure should be solved for the intervention to remain effective and for the learning process to have no complications.

"Some students needed more support to get the most out of the games."

The need for extra help shows that there is variability in students' capacity to learn as well as respond to the intervention as planned. This indicates that although the intervention was helpful on many occasions, the effect was not the same for all the participants who were in the study. Individual learning differences and students' needs were considered to be the basis of differentiated instruction and support. From the feedback obtained from the teacher, the added-up strategies for delivering the intervention can improve the teacher's interaction and response to more students, particularly the ones who are slow to learn.

Impact on Daily Life

"I find it easier to talk about how I feel with my family now."

The above quote illustrates the generalization of skills imparted through the intervention to the real life of the participant. The improvement of communication skills in the feelings area implies new good changes in the family members' relations. Based on the participant's account, the intervention indeed must have had some effect on the way the person coped with the affective aspects of learning beyond the formal instructions of the program.

"We noticed that our child was more open about their emotions after the games."

The parent's observation is consistent with the presumed effect of the intervention by demonstrating that their child is more emotionally available after the intervention. This implies that the skills delivered by the games produced the capability to enhance the interchange of feelings thus delivering an improved emotional verbal communication within the building blocks construction family set-up. The feedback supports the realism of the intervention in promoting increases in the specific forms of emotional communication.

"Students seemed to use what they learned during interactions with their peers."

This observation by the teacher reveals that peer relations were also positive; therefore, it can be concluded that the gained emotional recognition skills were effectively put into practice at a social level. This relates to the other outcome of the intervention regarding students' social behaviours and relationships by supplementing the belief on how behavioural treatments in educational settings positively shape the students' individual and interpersonal conduct. Employment of the learned skills in peers' interactions further substantiates the intervention's ability to transfer knowledge from the classroom environment to real life.

Discussion

Effectiveness of the Intervention

The data presented revealed improvements in participants' performance concerning recognition of emotions, which was rated using standardized tests for the measurement of affective recognition. These facts correlate with other research, which highlights the effectiveness of the objects used in the presentation of emotional competencies. For example, Santos et al. (2021) pointed out that to build emotional intelligence, the learners have to employ the usable knowledge at the workplace, through interactive sessions that help them acquire the relevant kind of skills. Likewise, Cejudo et al. (2020) discovered that programs involving activities leading to social interactions are efficient in improving,

social and emotional learning consequently pointing to the game-based intervention and its interactive engagement as being crucial.

This meant that the intervention of keeping the learning process in the form of a game made the process engaging and realistic. Therefore, in designing the games that were played in the experiment, one focused on using activities related to facets such as the use of real-life situations and other related forms of interactions that exercise emotional recognition under real-life-like conditions (**Matthews et al., 2012**). The kind of learning that the identified virtual experience is based upon is embraced by educational research which argues that simulation and role-play learning paradigms invariably enhance one's emotional skills because the individual is exposed to the client's real-life situations in a controlled environment. The outlined games enabled the participants to engage in different emotional roles that built and strengthened their awareness capabilities of emotions in real-life situations in a fun way.

Qualitative feedback supported the study's quantitative findings as well. Qualitative results showed a significant increase in the participants' ability to express and perceive emotions, as was reflected in the higher scores on the test of emotions. For instance, parents' feedback confirmed that children in their care demonstrated enhanced skills and improved capability for self-regulatory expression of their feelings, proving that the given intervention did contribute to development of the emotional self-regulation skills. To some extent, this aligns with conclusions drawn in the EI studies that indicate that training interventions can facilitate improvement in people's overall affect knowledge and regulation (**Hubscher-Davidson & Lehr, 2021**).

Furthermore, the tutors stated that through the game-like activities, the topic of emotion was discussed, thus narrowing the gap between concept and practice. This is in concordance with other literature on the use of interactive learning strategies in schools and associated institutions. For example, **Tapingkae et al. (2020)** explain that meaningful contexts like using games in the classroom have the potential to improve students' opportunities to use what has been taught in real life. Combining elements of the intervention that aimed at encouraging participants' discussion and reflectivity allowed the participants to work on the application of the skills in a highly significant frame. The integration of the quantitative and the qualitative data supports the findings indicating that the mentioned intervention improves the performers' emotional competencies. The quantitative outcomes underscored differences in the extent of responders' successes regarding emotional apperception and qualitative consumer feedback gave the understanding of how the improvements enhanced participants' lives. This approach incorporated in the assessment of the intervention provides substantiation of success in terms of results together with the reality of implementing emotional skills.

Cultural Relevance

Culture as a factor was found to be another critical component of the intervention in the present study due to the results that showed how augmentation of educational material with culturally relevant content can improve results. It is noteworthy that participants reported a high level of appreciation for the use of local traditions and familiar scenarios in the game-based intervention. By so doing, it made it easier for the participants to identify with what they read and activate by enhancing the learning process. Cultural congruence implies that educational material that mirrors the learners' culture may improve motivation and learning was observed in this study (**Yang & Wyatt, 2021**). Therefore, by incorporating culturally relevant references into the games, the intervention was able to contextualize the content in a way that would have been easily relatable to participants' reality.

The inclusion of the local traditions and scenarios is well supported by the situated learning theories since these theories acknowledge the need to put the learning scenarios in real-life contexts (**Scavarelli et al., 2021**). According to situated learning theory that asserts that, learners' capacity to engage in meaningful interactions with the content of learning, improves when the content is anchored to the learners' experience and cultural context (**Chen et al., 2022**). In this study, the game-based intervention was designed such that it has stimuli that are closely related to Saudi students' everyday lives, thus leading to identification with the emotions targeted in the intervention. This not only helped in making

the content more interesting but also for the fact that it kept the learnt skills as close to reality as practically possible.

The participants' feedback on the culturally appropriate content also supports the strategy used before. People explained that the presence of local cultural practices and familiar social scenarios in the learning process helped enhance the student's interest and understanding. This finding is in concordance with the studies done in culturally relevant pedagogy where the author stated that students have increased motivation and positive results if the content taught reflects the culture and beliefs of the learners (Tanase, 2020). Through the consideration of cultural angles in the intervention, the study was able to increase the possibilities of a more positive response from the participants, as well as higher learning possibilities.

Also, the adherence to the cultural aspect can be explained by the guidelines of the inclusion concept in education, which implies the need to modify academic processes following the requirements and needs of learners of different cultural backgrounds. Thus, the game-based intervention was not only culturally sensitive but also culturally proactive, thus using the fact of students' cultural variability as a strength rather than a challenge. Culturally responsive practices are known to enhance the efficiency of the instructional process and the learning achievements of students with diverse backgrounds (Rafiola et al., 2020).

The use of elements familiar to the participants' culture also helped in developing the Emotional Recognition skills in a context that was both realistic and applicable. For instance, using social intercourse and cultural practices, the contestants were placed in a position to relate the skills learnt with experience in life. This element of contextual relevancy improved the applicability of the acquired skills in the participants' everyday practices.

Challenges and Barriers

However, several issues arising from the studies were noted as follows; The participants also experienced some challenges with the levels of interaction in some elements of the games they engaged in, which might have affected their learning process. This feedback emphasises the work on interventions, which loads should be reasonable so the learner can use relevant information most effectively (Xu et al., 2021). The authors also indicate that the presence of too many variables can inhibit learning, which may imply that making some of the aspects of the intervention less intricate, could enhance the possibilities of the technique.

Technical issues also proved to be among the challenges Although a sombre reminder of the reality on the ground, this conclusion was unsurprising given the nature of basic education. Technology problems, which are tasted to have great potential of affecting any participant's experience, were evident and seen to have disrupted the participation of the participants. This finding supports the need to guarantee strong technological backup and viable solutions to all the probable technical issues that affect a positive learning environment (Ferri et al., 2020). These problems have to be solved if professionals want the intervention to be as effective as it is stipulated, and if they want its application results to be at least moderately stable, then they have to rely on the technology this type of intervention prescribes.

Another issue highlighted was in the area of Individualized support as a requirement based on participants' needs. Some students needed more support to get the most out of the intervention pointing out the call for differentiated instruction to support the students' learning (Gheysens et al., 2022). Individualization can also add value to the delivery of the particular intervention and its implementation to all the concerned parties since they may differ in ability and interest. In light of this, in the subsequent attempts at implementing this intervention, there is a need to include features for the identification of the special needs of each Learner.

Impact on Daily Life

Appreciably, the effects of the intervention on the participants' day-to-day existence were significant, showing how deliberate educational undertakings can engender dramatic enhancements in the areas of well-being and interpersonal interaction as they are experienced by ordinary people. The qualitative aspect of the study further showed that the skills learned from the intervention were not only confined to the game activities, which was evidenced by positive changes in participants' behaviour in their homes and among their peers. The application of such skills in the course of the everyday intervention effectively demonstrates that the programme has a useful efficacy in the development of approaches to the treatment of ER and SI and enhancing everyday social interactions.

It could be observed that participants expressed a level of comfort in the process of expressing their feelings to family members, hence revealing that the implemented intervention was successful in enhancing emotional expression and communication skills. This is supported by research on educational intervention and specifically how education helps in boosting emotional health and even social relations. **Kågesten&van Reeuwijk**(2021) established that programs developed to enhance social and emotional courtesies can bring about substantial changes in interpersonal interactions as well as emotional well-being. In this aspect, the intervention worked as the promotion of instruments that help the participants to describe their feelings, and due to that, the families' communication improved, which led to positive changes in support and relationships.

Guardians noted was a sense from their children that they were more emotionally expressive which pointed to another revelation into the effectiveness of the intervention given that the changes were realistic. This observation concurs with **Mondi et al. (2021)** and includes findings regarding Social and Emotional Learning regarding outstanding programs suggesting that enhanced interventions foster enhanced emotional interaction and other social aspects. The enhanced results derived from the parents concerning the aspect of emotional openness may be an indication that the intervention endowed the participants with crucial skills that were reflected in the ways they expressed and related emotionally in their daily lives.

The capacity to transfer the learnt skills into an actual-life environment confirms the successful identification of a gap between theory and practice, by tackling the gap through the intervention. Applying the intervention effects, this approach falls into the practical generalization of the transfer of educational interventions because the aftermath of the intervention denotes positive results but also the potential for creating significant changes within the real-world classroom setting (**Huang et al., 2022**). Therefore, as a measure showing the outcome of applying the skills of emotional recognition in practical communications of participants, the effectiveness of the intervention in terms of making changes in participants' emotional and social behaviour, that are useful, meaningful and last long, was proved.

Also, the results relating to peer-interaction increases suggest that the intervention has implications for the social domain of ER skills. As to daily functioning, participants mentioned better relationships with peers, meaning the skills to identify and regulate emotions contributed to improvement in communication and interactions with other people. There is also research on the social aspect of emotional competencies and actually, it is noticed that more leverage in the aspect of emotional recognition will result in better social interactions and relationships (Goleman, 1995; Salovey & Mayer, 1990). The improvement in peer relationships further supports the intervention's initial goal of promoting improvement in social skills not limited to family-related ones.

Recommendations

From the emerging conclusions, it is suggested that future works of game-based interference pay more attention to the overcomplicated game components and secure technological backgrounds. Some of the game mechanics were problematic for the participants, which raised a caution that design should be simple and cohesive, thus assisting with the players' focus. Moreover, solving technical problems by guaranteeing the necessary infrastructure and support is needed to avoid such problems to influence the efficiency of the intervention. Managing these elements will enhance the learning experience, and thus, bring out the full potential of this program.

Another recommendation in this particular area is the inclusion of personalized support. The participant's level of ability and willingness to engage at the events stressed the importance of considering learning differences to effectively create and implement instructional plans. Thus, the educators are to adjust the approach to maximally increase the intervention's feasibility and effectiveness. This approach will help the teacher make non-intrusive adjustments in an attempt to accommodate all the students, thus helping all students and achieving students' learning goals. Therefore, more studies in this area should focus on developing different game-based interventions by including other cultural frameworks to increase the appeal and realism. Also, understanding the basic functions of such interventions with regards to the emotional recognition and social skills domain, as well as the longitudinal effects of the latter on overall functioning, will be informative for the development and enhancement of the former. Thus, it is critical to continue providing the results of this research as a contribution to the improvement of efficient educational practices and the student's emotional and social development in ASD.

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