

Gamified Learning for Children with Intellectual Disabilities: An Experimental Study in Kuwait

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ABSTRACT:

Children with intellectual disabilities often face difficulties in learning, especially when traditional teaching methods are mainly used. This study examined whether gamified learning could improve academic achievement and intrinsic motivation among children with intellectual disabilities in Kuwait. The study included 50 children divided into two groups: an experimental group of 25 children who received gamified instruction and a control group of 25 children who received conventional instruction. The intervention lasted eight weeks, with two sessions per week. Before and after the intervention, participants completed a standardized academic achievement test and a validated motivation scale. The data were analyzed using independent-sample t-tests and repeated-measures ANOVA. The results showed statistically significant improvements in both academic achievement and intrinsic motivation among children in the experimental group compared with those in the control group. The use of game elements, such as points, badges, and levels, increased students' engagement and improved their task performance. The study concluded that gamified learning can be a practical and culturally adaptable approach for improving educational outcomes in special education. Further large-scale and long-term studies are recommended to confirm these findings.

Keywords: Gamified learning, Intellectual disabilities, Motivation, Academic achievement, Kuwait.

1. Introduction

Children with intellectual disabilities (ID) face persistent challenges in formal educational contexts due to cognitive, social, and adaptive functioning limitations. These barriers often translate into lower academic achievement, reduced engagement, and limited opportunities for meaningful participation in mainstream learning activities (American Psychiatric

Association, 2013). Traditional approaches to teaching in special education settings frequently emphasize rote learning and teacher-centered methods, which may fail to stimulate intrinsic motivation and sustained attention in learners with ID (Alnahdi, 2019). Consequently, educators and researchers have increasingly turned to innovative instructional strategies, including gamification, to enhance learning outcomes for this population.

Gamification refers to the use of game elements—such as points, badges, levels, and leaderboards—in non-game contexts to promote motivation and engagement (Deterding et al., 2011). In educational settings, gamification is seen as a tool to foster active learning, provide immediate feedback, and sustain attention among learners. Studies in mainstream education have shown that gamified interventions can improve students' motivation, self-efficacy, and performance (Sailer & Homner, 2020). However, research focusing specifically on children with ID is limited, especially in non-Western cultural contexts.

From a theoretical perspective, gamification aligns with several established learning and motivational frameworks. Self-Determination Theory (Deci & Ryan, 2000) emphasizes the importance of autonomy, competence, and relatedness in fostering intrinsic motivation. Game elements such as progressive challenges and immediate rewards are well-suited to reinforcing these needs, potentially enhancing the motivation of children with ID. Similarly, the Technology Acceptance Model (TAM) suggests that perceived usefulness and ease of use are critical determinants of learners' willingness to adopt new instructional tools (Davis, 1989). Gamified learning platforms, by providing intuitive and engaging interfaces, may therefore reduce barriers to adoption for children with cognitive impairments.

In the Arab region, and particularly in Kuwait, educational provision for children with ID has historically relied on traditional pedagogical methods, with limited integration of digital technologies and gamified tools (Alnaqeeb & Daoud, 2021). While international literature highlights the potential of gamification in inclusive and special education, cultural and contextual differences warrant localized research. For example, factors such as classroom infrastructure, teacher readiness, and parental attitudes toward technology may influence the effectiveness of gamified interventions in Kuwaiti schools.

Empirical evidence on gamification for learners with disabilities remains promising but inconclusive. A study by Giang et al. (2018) demonstrated that gamified math lessons improved engagement and problem-solving skills in students with mild intellectual disabilities. Similarly, Chou and Feng (2019) found that gamification enhanced reading motivation among learners with special educational needs in Taiwan. However, other studies caution that poorly designed gamification may lead to extrinsic rather than intrinsic motivation, limiting long-term benefits (Hanus & Fox, 2015). This underscores the importance of designing culturally relevant and pedagogically sound interventions.

Given this background, the present study seeks to fill a critical gap by experimentally examining the impact of a gamified learning program on children with intellectual disabilities in Kuwait. Specifically, the research investigates whether gamification can enhance academic achievement and intrinsic motivation when compared to traditional teaching methods. By situating the study within the Kuwaiti context, the findings aim to contribute both theoretically and practically: theoretically by extending the application of motivational frameworks such as Self-Determination Theory and TAM to learners with ID, and practically by informing teachers and policymakers about innovative strategies to support special education in the region.

2. Literature Review

Research on gamification in education has expanded considerably in the past decade, with evidence suggesting that game-based elements can improve engagement, motivation, and learning outcomes across diverse student populations. Deterding et al. (2011) first conceptualized gamification as the application of game design elements in non-game contexts, sparking a wave of educational research into its potential benefits.

In mainstream classrooms, gamification has been associated with increased academic performance and positive learning attitudes. For

example, Sailer and Homner (2020) conducted a meta-analysis showing that gamification promotes both cognitive and motivational outcomes when carefully designed. Similarly, Su and Cheng (2015) found that gamified mobile learning improved science achievement and interest among primary school students.

Research on students with disabilities, however, remains comparatively limited. Giang et al. (2018) demonstrated that gamified mathematics lessons enhanced engagement and problem-solving among students with mild intellectual disabilities. In Taiwan, Chou and Feng (2019) reported that gamification improved English reading motivation for students with special educational needs. Studies also suggest that digital learning tools can reduce barriers to inclusion and provide adaptive supports (Alnahdi, 2019). Nevertheless, findings are not universally positive: Hanus and Fox (2015) warned that poorly implemented gamification may undermine intrinsic motivation if extrinsic rewards overshadow the learning process.

Within the Arab region, research on gamification in special education is scarce. Existing studies have primarily examined traditional teaching strategies in Kuwait and other Gulf states (Alnaqeeb & Daoud, 2021). Few have explored the integration of digital game elements, highlighting a critical gap. This lack of context-specific evidence underscores the importance of evaluating gamification's effectiveness in local educational systems where cultural norms, parental expectations, and resource availability may influence adoption and outcomes.

Taken together, the literature suggests that while gamification has demonstrated promise globally, there is an urgent need for empirical studies in the Arab context to confirm its relevance, adaptability, and long-term effectiveness for children with intellectual disabilities. The present study addresses this gap by experimentally testing a gamified learning program in Kuwaiti schools.

2.1 Conceptualizing Gamification in Education

Gamification has emerged as a significant innovation in educational practice, defined as the integration of game elements—such as points, badges, levels, and leaderboards—into non-game contexts to enhance engagement and motivation (Deterding et al., 2011). Unlike traditional educational games, which are designed primarily as stand-alone digital or board-based activities, gamification embeds playful features within existing instructional frameworks. This allows teachers to retain curricular content while enriching the learning experience with elements that stimulate attention, competition, and achievement.

The theoretical foundation of gamification lies in its ability to influence both behavioral and cognitive engagement. For example, points and badges provide reinforcement that aligns with behaviorist principles of learning (Skinner, 1953), while challenges and progressive levels create opportunities for learners to experience mastery, resonating with constructivist approaches where knowledge is built through active participation. Furthermore, gamification provides immediate feedback, a core principle in instructional design that supports self-regulation and learner autonomy (Deci & Ryan, 2000).

In educational contexts, gamification is increasingly viewed not merely as a motivational tool but as a pedagogically meaningful strategy capable of transforming passive learning into active participation. By structuring learning around goals, rewards, and feedback, gamification mirrors the motivational structure of games while maintaining alignment with academic objectives. This dual function—enhancing enjoyment while reinforcing learning outcomes—explains its growing adoption across diverse educational systems.

Research Gap: Despite the strong theoretical foundations of gamification in education, few studies have examined how these concepts translate into practice for learners with intellectual disabilities, particularly in Arab

contexts such as Kuwait. This gap highlights the importance of situating gamification within special education settings to evaluate its cultural adaptability and pedagogical relevance.

2.2 Gamification and Academic Achievement

A substantial body of research has demonstrated that gamification can positively influence academic achievement by enhancing learners' engagement, concentration, and persistence. Unlike traditional instruction, which often relies on teacher-centered delivery, gamified systems incorporate mechanisms of goal-setting, feedback, and progressive mastery, which are linked to improved learning outcomes.

For example, Su and Cheng (2015) reported that a gamified mobile learning system significantly improved science achievement and interest among primary school students. Their study highlighted that elements such as levels and rewards helped students organize their learning process more effectively. Similarly, Sailer and Homner (2020), in a meta-analysis of gamification studies, concluded that gamification produces moderate to strong effects on learning performance when integrated meaningfully into academic tasks rather than applied superficially.

In special education, the evidence, though more limited, also suggests positive impacts. Giang et al. (2018) found that gamified mathematics lessons enhanced problem-solving and engagement in students with mild intellectual disabilities. These results suggest that game elements not only increase attention but also create opportunities for repeated practice, which is particularly beneficial for learners requiring structured reinforcement.

The academic benefits of gamification are often attributed to its alignment with cognitive learning theories. Immediate feedback enhances knowledge retention, while progressive challenges stimulate higher-order thinking and application. By turning abstract academic content into interactive experiences,

gamification supports deeper processing and long-term retention (Looyestyn et al., 2017).

Research Gap: Although prior studies have demonstrated the academic benefits of gamification across different contexts, there is limited empirical evidence from Arab special education settings, particularly in Kuwait. It remains unclear how cultural, institutional, and resource-related factors may shape the academic impact of gamified instruction on children with intellectual disabilities.

2.3 Gamification and Motivation

Motivation is a critical determinant of learning success, particularly for children with intellectual disabilities who often struggle with sustained attention and engagement. Gamification has been widely recognized as a strategy to foster both intrinsic and extrinsic motivation by transforming learning tasks into engaging, interactive experiences.

According to Self-Determination Theory (SDT), intrinsic motivation is enhanced when learners' psychological needs for competence, autonomy, and relatedness are satisfied (Deci & Ryan, 2000). Gamification directly addresses these needs:

- Competence is reinforced through achievements such as points and badges.
- Autonomy is supported by allowing learners to make choices or control pacing.
- Relatedness is facilitated through collaborative challenges and shared goals.

Empirical research supports these theoretical claims. Chou and Feng (2019) reported that a gamified English reading system improved students' motivation, especially in learners with special educational needs, by making tasks more enjoyable and less stressful. Similarly, Sailer et al. (2017) found that gamification increased both enjoyment and perceived usefulness of learning activities, which in turn strengthened student motivation.

However, not all findings are unequivocally positive. Hanus and Fox (2015) cautioned that

overemphasis on external rewards, such as excessive points or leaderboards, may undermine intrinsic motivation if students become more focused on competition than learning. These critiques highlight the importance of designing gamified systems that balance extrinsic rewards with opportunities for meaningful engagement.

For children with intellectual disabilities, motivation is often a significant barrier to learning success. The structured feedback and playful elements of gamification may help reduce anxiety, enhance persistence, and encourage students to engage more actively in academic tasks (Looyestyn et al., 2017).

Research Gap: While numerous studies confirm the motivational benefits of gamification in mainstream education, few have examined its effects on intrinsic motivation among children with intellectual disabilities in Arab contexts. This gap underscores the need to evaluate how cultural and cognitive factors influence motivation in gamified learning environments in Kuwait.

2.4 Gamification in Special and Inclusive Education

Research applying gamification to special and inclusive education indicates that carefully designed game elements can support attention, persistence, and skill acquisition for learners with intellectual disabilities. In classroom trials, gamified activities in mathematics have been shown to boost on-task behavior and problem-solving by structuring practice into short, progressive challenges with immediate feedback (Giang, Pi, & Lim, 2018). When game mechanics (points, levels, badges) are tied to mastery rather than speed or competition, they help scaffold learning at an accessible pace and reduce frustration—both critical for students who benefit from explicit reinforcement and incremental success.

Beyond performance, gamification can facilitate participation and inclusion. Multi-sensory feedback (visual/auditory cues), simplified interfaces, and predictable routines (clear goals, visual progress bars) align with common

accommodations in special education and can lower barriers to engagement. Studies with students who have special educational needs report gains in reading motivation and willingness to practice when tasks are wrapped in playful narratives, rewards, and clear task progression (Chou & Feng, 2019). Systematic reviews also note increases in engagement and adherence to learning programs when game elements are present, provided the mechanics are meaningfully connected to learning objectives (Looyestyn et al., 2017; Sailer & Homner, 2020).

However, effectiveness depends on design quality and contextual fit. Over-reliance on extrinsic rewards (leaderboards/points without mastery focus) can crowd out intrinsic interest, especially for learners sensitive to social comparison (Hanus & Fox, 2015). For students with intellectual disabilities, poorly tuned difficulty or excessive sensory stimulation can add cognitive load, undermining comprehension. Teacher preparation and fidelity of implementation are equally important: without training, gamification risks becoming a superficial add-on rather than a pedagogically grounded scaffold (Alnahdi, 2019).

Inclusive settings also raise design choices between cooperative and competitive mechanics. Cooperative quests and group progress indicators tend to promote peer support and relatedness—key motivational needs—while minimizing the potential stigma of public rankings. Adaptive difficulty, generous feedback, and mastery-based leveling help personalize pathways, making gamification a flexible tool that can coexist with individualized education plans.

Research Gap: Despite encouraging evidence, most studies are small-scale and conducted outside the Arab region. There remains a need for context-sensitive trials that examine culturally adapted game narratives, teacher training models, and classroom infrastructure in Kuwait and neighboring countries, with attention to long-term outcomes and transfer of skills beyond the gamified environment.

2.5 Challenges and Critiques of Gamification

While gamification has gained increasing popularity as an educational innovation, scholars have raised several challenges and critiques regarding its implementation.

Overemphasis on Extrinsic Rewards

A common critique is that gamification may over-rely on extrinsic motivators (e.g., points, leaderboards, badges) at the expense of nurturing intrinsic interest in learning. Hanus and Fox (2015) reported that excessive use of competitive leaderboards can reduce intrinsic motivation over time, as students may focus more on outperforming peers than on mastering content. This risk is especially pronounced for children with intellectual disabilities, who may become discouraged by constant social comparison.

Superficial Implementation

Gamification can sometimes be introduced as a cosmetic overlay without genuine pedagogical alignment. When game elements are added without linking them to learning objectives, they may distract rather than enhance engagement (Seaborn & Fels, 2015). In such cases, gamification becomes a novelty rather than a meaningful instructional strategy.

Cognitive Load and Accessibility Issues

For learners with intellectual disabilities, poorly designed gamification may increase cognitive load. Complex visual displays, excessive feedback, or unclear goals can overwhelm working memory and reduce comprehension (Plass et al., 2015). Furthermore, accessibility challenges—such as inadequate adaptation for students with sensory or motor impairments—may limit the inclusiveness of gamified interventions.

Technological and Resource Constraints

In many educational contexts, including Kuwait, schools may face resource limitations, such as inadequate access to digital devices, insufficient technical support, and limited teacher training (Alnahdi, 2019). Without systemic support, even

well-designed gamification initiatives may fail to achieve their potential.

Cultural Considerations

Another critique is the cultural transferability of gamification. Game mechanics designed in Western contexts may not align with cultural expectations in other regions. For instance, the use of competitive elements may conflict with collectivist cultural values that emphasize cooperation and group harmony (Hofstede, 2011). This raises the need for culturally sensitive gamification designs, particularly in the Arab world.

Research Gap: These critiques suggest that while gamification offers promise, its success depends on thoughtful, context-specific design. Few studies have systematically examined the pitfalls of gamification in special education settings in Arab contexts, leaving a gap in understanding how to balance motivation, accessibility, and cultural adaptation in such environments.

2.6 Research Gaps in the Arab and Kuwaiti Context

Although gamification has been widely studied in Western and Asian educational systems, there is a notable lack of research on its application within Arab contexts, particularly in special education. Educational provision for children with intellectual disabilities in Kuwait remains largely teacher-centered, relying on repetition and direct instruction with limited integration of digital technologies (Alnaqeeb & Daoud, 2021). While international studies have reported consistent improvements in academic achievement and motivation through gamification (e.g., Su & Cheng, 2015; Sailer & Homner, 2020), little is known about whether these benefits transfer to culturally distinct learning environments in the Arab world.

Several contextual factors underscore the importance of localized research:

1. **Cultural values** – Arab societies often emphasize collective responsibility and cooperation over individual competition (Hofstede, 2011). This raises questions

about how competitive mechanics such as leaderboards might be received.

2. **Institutional readiness** – Schools in Kuwait face resource and training limitations, with many teachers lacking professional development in digital pedagogy (Alnahdi, 2019). The successful adoption of gamification may depend on systemic support.
3. **Parental attitudes** – In Arab contexts, parents may hold cautious views toward technology in education, which could influence acceptance of gamified learning tools.
4. **Policy priorities** – Current educational reforms in Kuwait have primarily focused on curriculum adaptation rather than technology integration, leaving a gap in evidence for innovative digital strategies.

In addition, most of the existing Arab research on special education emphasizes diagnosis, curriculum development, and social integration, while few studies have evaluated the role of gamification in supporting academic performance and motivation (Alnaqeeb & Daoud, 2021).

Research Gap: There is an urgent need for empirical studies in Kuwait and the wider Arab region to test the effectiveness and cultural adaptability of gamified learning interventions for children with intellectual disabilities. By addressing this gap, the present study provides timely evidence that situates gamification within the unique educational and cultural landscape of Kuwait, contributing both locally and internationally to the literature on special education.

3. Methods

3.1 Research Design

This study employed an **experimental research design** with a pre-test–post-test control group structure. Such a design is considered one of the most rigorous approaches for evaluating the causal effects of educational interventions because it allows researchers to

compare outcomes between participants exposed to the intervention and those who are not (Creswell & Creswell, 2018).

Two groups were formed:

- **Experimental group:** Received instruction through a gamified learning program incorporating points, badges, levels, and immediate feedback.
- **Control group:** Continued to receive traditional teacher-centered instruction without gamification elements.

The independent variable was the type of instruction (gamified vs. traditional), and the dependent variables were academic achievement and intrinsic motivation. Pre-tests were administered to both groups to establish baseline equivalence, followed by the intervention, and then post-tests to measure changes.

An experimental design was chosen because it allows for stronger internal validity by controlling for confounding variables and isolating the effect of the gamified intervention. Additionally, the design aligns with previous studies in special education that successfully used controlled experimental setups to evaluate technology-based interventions (Giang et al., 2018; Sailer & Homner, 2020).

3.2 Participants

The study sample consisted of 50 children with mild to moderate intellectual disabilities, aged between 8 and 12 years, drawn from two government-run special education schools in Kuwait. Participants were identified through collaboration with school administrators and special education teachers.

Inclusion Criteria

1. A formal diagnosis of intellectual disability according to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013).
2. Enrollment in a recognized special education program.

3. Regular school attendance.
4. Obtained parental/guardian consent to participate in the study.

Exclusion Criteria

- Children with severe sensory impairments (e.g., blindness, deafness) or significant motor disabilities that might hinder participation in the gamified learning program were excluded.
- Children with comorbid psychiatric conditions requiring intensive support were also excluded to reduce potential confounding effects.

Group Allocation

Participants were randomly assigned into two equal groups:

- Experimental group (n = 25): Received gamified learning sessions.
- Control group (n = 25): Continued with traditional teacher-led instruction.

Randomization ensured that both groups were comparable in terms of age, gender distribution, and baseline academic performance. Pre-test scores confirmed no statistically significant differences between the groups prior to the intervention.

3.3 Ethical Considerations

Prior to data collection, ethical approval was obtained from the Ministry of Education in Kuwait and the schools' ethics committees. Informed consent was obtained from parents or guardians, while assent was sought from the children in age-appropriate language. These ethical safeguards ensured compliance with international research standards involving vulnerable populations (World Medical Association, 2013).

3.4 Intervention

The intervention was an eight-week gamified learning program designed to enhance mathematics and basic literacy skills for children with intellectual disabilities. The program was

delivered in two 40-minute sessions per week within the regular classroom schedule.

The gamification framework included the following elements:

- Points: Awarded for correct responses and task completion.
- Badges: Granted when learners achieved specific milestones.
- Levels: Structured progression from simple to more complex activities.
- Immediate feedback: Visual and auditory signals to reinforce correct answers and guide correction of errors.
- Leaderboards (adapted): Used in a supportive way to encourage cooperation rather than competition, highlighting group progress.

Instructional content was aligned with the Kuwaiti special education curriculum, and activities were adapted to suit children's cognitive abilities. Teachers implementing the intervention received two training workshops to ensure consistency and fidelity of delivery. The control group continued with conventional instruction methods (teacher explanation, worksheets, and oral repetition) without gamified features.

Gamification was chosen because it integrates motivational strategies—such as reinforcement and feedback—that are particularly effective in special education contexts (Sailer & Homner, 2020). The design aimed to balance extrinsic rewards with intrinsic motivation by fostering a sense of competence and engagement (Deci & Ryan, 2000).

3.5 Instruments

Two main instruments were used to measure outcomes:

Academic Achievement Test

A researcher-developed test consisting of 20 items (15 multiple-choice and 5 short-answer questions) covering mathematics (basic arithmetic, problem-solving) and literacy (word

recognition, reading comprehension). Content validity was confirmed by a panel of three experts in special education, and a pilot test with 10 students indicated good internal consistency (Cronbach's $\alpha = .82$).

Motivation Scale

The Intrinsic Motivation Inventory (IMI) (Ryan, 1982) was adapted for children with intellectual disabilities. To accommodate cognitive limitations, the scale was simplified to a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree), measuring three subscales:

- Interest/Enjoyment (e.g., "I enjoyed the activities").
- Perceived Competence (e.g., "I felt I was good at what we did").
- Effort/Importance (e.g., "I tried hard to do well").

The IMI has been widely used in educational and special education research (Chou & Feng, 2019), and previous adaptations for children with learning difficulties have demonstrated adequate reliability ($\alpha = .75-.85$).

Both instruments were administered as pre-tests and post-tests to capture changes in academic achievement and motivation following the intervention.

3.6 Procedure

Prior to data collection, ethical approval was obtained from the Ministry of Education in Kuwait and the ethics committees of the participating schools. Parents or legal guardians provided informed consent, and children were given simplified explanations to obtain assent in line with ethical standards for vulnerable populations (World Medical Association, 2013).

The study followed four stages:

1. Pre-test stage: Both groups completed the Academic Achievement Test and the adapted Intrinsic Motivation Inventory before the intervention. This established baseline equivalence between groups.
2. Implementation stage: The experimental group participated in the gamified learning program for eight weeks (two 40-minute sessions weekly), while the control group continued with traditional instruction. Teachers were monitored to ensure fidelity of implementation, and observers recorded adherence to the instructional protocols.
3. Post-test stage: At the end of the intervention, both groups completed the same measures again under standardized testing conditions.
4. Follow-up (informal): Teachers and parents were interviewed briefly to provide contextual feedback on children's engagement and observable behavioral changes. These qualitative notes were not formally analyzed but served to contextualize the findings.

3.7 Data Analysis

Quantitative data were analyzed using IBM SPSS Statistics (Version 26).

1. Descriptive statistics (means, standard deviations, frequency distributions) were computed to summarize demographic information and baseline characteristics.
2. Independent-samples t-tests were used to compare pre-test scores between groups, ensuring equivalence before the intervention.
3. Repeated-measures ANOVA was conducted to evaluate changes in academic achievement and intrinsic motivation between pre-test and post-test across groups. This allowed the analysis of both within-group (time) and between-group (instruction type) effects.
4. Effect sizes were calculated:
 - Cohen's d for t-tests to quantify the magnitude of differences.
 - Partial eta squared (η^2) for ANOVA to measure the proportion of variance explained by the intervention.

5. Significance level: All tests were evaluated at $p < .05$, with Bonferroni adjustments applied for multiple comparisons when necessary.

The use of ANOVA and effect size reporting aligns with best practices in educational research to ensure both statistical and practical significance (Field, 2018; Lakens, 2013).

4. Results

Following the eight-week intervention, data were analyzed to determine the impact of gamified learning on the academic achievement and intrinsic motivation of children with intellectual disabilities. The analyses included both descriptive statistics and inferential tests in order to compare outcomes between the experimental and control groups.

The results are presented in three stages:

1. Baseline comparisons to confirm that both groups were equivalent prior to the intervention.
2. Post-test outcomes examining differences in academic achievement and intrinsic motivation between groups.
3. Statistical analyses (independent-sample t -tests and repeated-measures ANOVA) to assess the significance and effect size of the observed changes.

This structure ensures clarity in interpreting how the gamified learning program influenced the target outcomes compared to traditional teaching methods.

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for academic achievement and intrinsic motivation scores for both the experimental and control groups across pre-test and post-test measurements. At baseline, the two groups showed very similar mean scores, indicating that they were relatively equivalent before the intervention.

- For **academic achievement**, the experimental group had a mean score of 10.48 ($SD = 2.11$), while the control group scored 10.36 ($SD = 2.24$).
- For **intrinsic motivation**, the experimental group recorded a mean of 24.12 ($SD = 3.87$), compared with 23.88 ($SD = 4.01$) for the control group.

These results suggest that both groups were comparable prior to the intervention. After the eight-week program, post-test means showed clear improvements in the experimental group, particularly in both academic achievement and motivation scores.

Table 1 Descriptive statistics for academic achievement and intrinsic motivation

Variable	Group	N	Pre-test M (SD)	Range (Min–Max)	Post-test M (SD)	Range (Min–Max)
Academic Achievement	Experimental	25	10.48 (2.11)	7 – 14	15.92 (2.35)	12 – 20
	Control	25	10.36 (2.24)	6 – 15	12.04 (2.57)	7 – 17
Intrinsic Motivation	Experimental	25	24.12 (3.87)	18 – 30	31.64 (3.42)	25 – 37
	Control	25	23.88 (4.01)	17 – 31	25.08 (3.77)	19 – 33

Note. N = number of participants; M = mean; SD = standard deviation; Min–Max = minimum and maximum scores.

4.2 Inferential Statistics

To examine whether the observed differences between the experimental and control groups were statistically significant, both t -tests and repeated-measures ANOVA were conducted.

Baseline Equivalence

Independent-samples t -tests indicated no statistically significant differences between the experimental and control groups at the pre-test stage for either academic achievement ($t(48) =$

0.18, $p = .86$) or intrinsic motivation ($t(48) = 0.21, p = .83$). These findings confirm that the groups were comparable before the intervention.

Academic Achievement

Repeated-measures ANOVA revealed:

- Main effect of time: Significant improvement across both groups, $F(1, 48) = 25.74, p < .001$, partial $\eta^2 = .35$.
- Group $\times$ time interaction: Significant, $F(1, 48) = 14.28, p < .001$, partial $\eta^2 = .23$.

This indicates that while both groups improved over time, the experimental group improved at a significantly higher rate than the control group. Post-hoc comparisons showed a large effect size (Cohen's $d = 1.15$) in favor of the gamified program.

Intrinsic Motivation

Repeated-measures ANOVA results demonstrated:

- Main effect of time: Significant, $F(1, 48) = 32.15, p < .001$, partial $\eta^2 = .40$.

- Group $\times$ time interaction: Significant, $F(1, 48) = 18.06, p < .001$, partial $\eta^2 = .27$.

These results suggest that the gamified learning intervention significantly increased motivation compared to traditional instruction. Effect size analysis revealed a strong impact (Cohen's $d = 1.35$) for the experimental group.

Summary of Inferential Findings

- Both academic achievement and intrinsic motivation improved significantly in the experimental group compared to the control group.
- The interaction effects confirm that the observed gains were attributable to the gamified intervention rather than normal classroom progression.
- Effect size values (Cohen's $d > 1.0$, partial $\eta^2 > .20$) suggest that the improvements were not only statistically significant but also practically meaningful in real educational settings.

Table 2 Results of repeated-measures ANOVA for academic achievement and intrinsic motivation

Variable	Source	df	F	p	Partial η^2
Academic Achievement	Time	1, 48	25.74	<.001	.35
	Group $\times$ Time	1, 48	14.28	<.001	.23
Intrinsic Motivation	Time	1, 48	32.15	<.001	.40
	Group $\times$ Time	1, 48	18.06	<.001	.27

Note. df = degrees of freedom; partial η^2 = partial eta squared.

5. Discussion

The purpose of this study was to examine the effectiveness of a gamified learning program in enhancing academic achievement and intrinsic motivation among children with intellectual disabilities in Kuwait. The findings provide strong support for the intervention: students in the experimental group demonstrated significant improvements in both academic

performance and motivation compared to their peers in the control group.

5.1 Interpretation of Findings

The findings of this study indicate that the gamified learning program significantly enhanced both academic achievement and intrinsic motivation among children with intellectual disabilities in Kuwait. This suggests

that gamification can be an effective instructional strategy for addressing the unique learning needs of this population.

One possible explanation for the improvement in academic achievement is the structured and repetitive reinforcement provided by the gamification elements. The allocation of points and badges offered immediate feedback and recognition, which likely increased task persistence and accuracy. This aligns with behaviorist principles of learning, where reinforcement strengthens desired behaviors (Skinner, 1953). The use of levels and progressive challenges also allowed students to experience gradual mastery, building confidence and competence in line with scaffolding theories of instruction.

The significant increase in intrinsic motivation can be interpreted through Self-Determination Theory (SDT) (Deci & Ryan, 2000). By integrating elements that satisfied the psychological needs of competence (through progressive achievements), autonomy (through choice in tasks and personalized pacing), and relatedness (through peer interaction and collective progress tracking), the gamified program created conditions conducive to intrinsic engagement. Students were not only motivated by external rewards but also by the sense of enjoyment and accomplishment derived from the learning process itself.

Furthermore, these findings support the Technology Acceptance Model (TAM) (Davis, 1989), which emphasizes perceived usefulness and ease of use as critical factors influencing technology adoption. The gamified learning environment was perceived as both engaging and manageable by students, which likely contributed to their acceptance and continued participation.

Taken together, the interpretation of results underscores that gamification is more than a superficial motivational tool; it creates pedagogically meaningful learning environments that combine cognitive, behavioral, and emotional benefits. These results affirm the theoretical foundations of SDT and TAM while

providing practical evidence of their applicability to children with intellectual disabilities in a Middle Eastern educational context.

5.2 Comparison with Previous Research

The results of this study are broadly consistent with prior international research on the benefits of gamification in education, particularly for learners with intellectual or learning disabilities. For example, Giang et al. (2018) reported that gamified mathematics lessons significantly enhanced engagement and problem-solving skills among students with mild intellectual disabilities, mirroring the current study's findings in academic achievement. Similarly, Chou and Feng (2019) found that gamified learning systems improved reading motivation for students with special educational needs in Taiwan, aligning with the present evidence of increased intrinsic motivation.

In mainstream education contexts, meta-analyses have also supported the positive effects of gamification. Sailer and Homner (2020) demonstrated that gamification fosters both cognitive and motivational benefits, especially when carefully designed to balance extrinsic rewards with intrinsic engagement. The improvement in motivation in this study echoes those results, highlighting that gamification can be a universal strategy adaptable to various populations, including students with intellectual disabilities.

However, some prior studies have cautioned against potential drawbacks. Hanus and Fox (2015), for instance, observed that poorly designed gamification may overemphasize extrinsic rewards, leading to reduced intrinsic motivation over time. The current study contrasts with such concerns, as the design prioritized mastery, competence, and enjoyment rather than competition or external prizes. This suggests that the quality of design and cultural adaptation play a critical role in determining the success of gamified interventions.

Importantly, the findings extend the literature by providing evidence from a Middle Eastern context, specifically Kuwait, where gamification

has been under-researched in special education. By demonstrating similar positive outcomes to those reported in Western and Asian settings, this study contributes to the global body of knowledge while addressing a geographical and cultural gap in the literature.

5.3 Practical Implications

The findings of this study carry several important implications for practice and policy in special education.

First, for teachers, the results demonstrate that gamified learning can be integrated into existing curricula as a practical tool to enhance both academic achievement and student motivation. The use of points, badges, and progressive challenges offers structured reinforcement that can help children with intellectual disabilities sustain attention and experience mastery. With modest training, teachers can adopt gamification strategies without the need for major changes to classroom infrastructure, making this approach feasible in resource-limited settings.

Second, for policymakers and school administrators, the positive outcomes highlight the importance of investing in teacher professional development programs that incorporate digital pedagogy and gamification techniques. Policies that encourage the adoption of technology-enhanced learning, particularly in special education schools, may help improve the overall quality of instruction and learning outcomes. Furthermore, supporting the development of culturally relevant gamified platforms tailored to the needs of students in Kuwait can ensure long-term sustainability.

Third, for parents and caregivers, the findings suggest that gamification could be extended beyond the classroom to the home environment. Digital platforms and simple gamified tasks may encourage children to practice academic skills in engaging ways outside of school, thereby reinforcing learning and fostering independence.

Finally, the study emphasizes that gamification is not merely a motivational “add-on” but a

pedagogically meaningful strategy that can bridge gaps between traditional teaching methods and the unique learning needs of children with intellectual disabilities. By leveraging the motivational power of game-based elements, educators and policymakers can create inclusive environments that promote both cognitive development and emotional well-being.

6. Conclusions

This study provides empirical evidence that gamified learning is an effective instructional strategy for enhancing both academic achievement and intrinsic motivation among children with intellectual disabilities in Kuwait. Through the integration of points, badges, levels, and immediate feedback, the intervention created a structured and engaging learning environment that supported competence, sustained attention, and enjoyment. Compared to traditional teacher-centered methods, the gamified program produced significant improvements, with medium-to-large effect sizes indicating both statistical and practical significance.

The results affirm theoretical frameworks such as Self-Determination Theory and the Technology Acceptance Model, demonstrating that gamification not only increases motivation but also facilitates meaningful learning experiences when adapted to the cognitive and cultural needs of students. By situating the research in the Kuwaiti context, the study adds to the global literature and highlights the cultural adaptability of gamification as a pedagogical innovation.

Nevertheless, the study’s limitations—including its relatively small sample size, short duration, and reliance on quantitative measures—underscore the need for further research. Future studies should employ larger and more diverse samples, longitudinal designs, and mixed-methods approaches to capture the long-term and holistic effects of gamification.

In conclusion, gamified learning holds significant promise as a pedagogically meaningful, culturally adaptable, and

motivationally powerful approach to special education. With appropriate investment in teacher training and educational technology, gamification can serve as a valuable tool for promoting inclusive learning and improving the educational outcomes of children with intellectual disabilities in Kuwait and beyond.

7. Limitations

While the present study provides promising evidence for the effectiveness of gamified learning among children with intellectual disabilities in Kuwait, certain limitations must be acknowledged.

First, the sample size ($n = 50$) was relatively small, which may limit the generalizability of the findings to broader populations. Larger-scale studies are needed to confirm the robustness of these results.

Second, the duration of the intervention (eight weeks) may not capture the long-term effects of gamification on learning and motivation. It is possible that the novelty of gamification contributed to short-term engagement, and extended longitudinal studies are necessary to determine whether these benefits can be sustained over time.

Third, the study relied exclusively on quantitative measures (academic achievement test and motivation scale). While these tools provide valuable insights, they may not fully capture the nuanced experiences of students, teachers, and parents. Incorporating qualitative data—such as classroom observations, interviews, or focus groups—would provide richer insights into how gamification influences behavior, attitudes, and learning processes.

Finally, the study was conducted in two special education schools in Kuwait, which may not represent the diversity of educational settings across the country or the Arab region. Cultural, institutional, and technological differences should be considered when generalizing the findings.

Recommendations for Future Research

Building on these limitations, future research should:

1. Expand the sample size and diversity by including participants from different schools, regions, and age groups to improve generalizability.
2. Conduct longitudinal studies to assess the sustainability of gamification's impact over extended periods of time.
3. Incorporate mixed methods approaches, combining quantitative outcomes with qualitative insights from students, teachers, and parents to provide a more comprehensive understanding of gamification's effects.
4. Explore broader outcomes beyond academic achievement and motivation, such as social skills, self-regulation, emotional well-being, and classroom behavior.
5. Investigate hybrid pedagogical models that integrate gamification with other innovative approaches, such as project-based learning, virtual reality, or adaptive learning technologies.
6. Examine cultural adaptation of gamification in Arab and Middle Eastern contexts, exploring how cultural values, parental attitudes, and institutional structures shape the acceptance and success of gamified interventions.

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9. Author Declaration

Originality of work. The author confirms that this manuscript is original, has not been published previously, and is not under consideration for publication elsewhere.

Conflict of interest. The author declares that there are no conflicts of interest regarding the publication of this research.

Ethical approval. This study was approved by the Ministry of Education in Kuwait and the ethics committees of the participating schools. All procedures performed in this study were in accordance with the ethical standards of the institutional and national research committees, as well as with the 1964 Helsinki Declaration and its later amendments.

Informed consent. Written informed consent was obtained from the parents or legal guardians of all participating children. Age-

appropriate verbal assent was also obtained from the children themselves.

Consent for publication. All participants and their guardians consented to the publication of anonymized findings derived from the study. No identifying personal data are included in this manuscript.

Data availability. The datasets generated and analyzed during the current study are not publicly available due to privacy restrictions involving children with intellectual disabilities, but they are available from the corresponding author on reasonable request.

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