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Designing gamified assistive apps: A novel approach to motivating and supporting students with learning disabilities

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A B S T R A C T

The present research endeavor delves into the profound effects of gamified assistive applications on the levels of user engagement, motivation, and academic attainment within the population of students grappling with learning disabilities in the esteemed nation of Jordan. The study involved individuals who actively interacted with a gamified assistive application that was specifically developed to offer tailored educational opportunities and enhance their scholarly advancement. The analysis of descriptive statistics unveiled a noteworthy degree of app engagement, signifying the app's proficiency in captivating and maintaining students' focus. The utilization of paired-samples t-tests revealed noteworthy enhancements in both intrinsic and extrinsic motivation subsequent to the utilization of the application, thereby underscoring the favorable impact of gamified components on student motivation. Furthermore, a notable enhancement in scholastic attainment was noted, underscoring the application's influence on augmenting students' educational results. The findings of the correlational analysis unveiled a noteworthy association between the utilization of mobile applications, the presence of intrinsic motivation, and the attainment of academic success. This implies that heightened levels of engagement and motivation are linked to enhanced academic performance. The results of this study highlight the considerable promise of gamified assistive applications in fostering motivation and providing support to students who face challenges associated with learning disabilities. The incorporation of gamification into educational technologies presents educators with a promising strategy to cultivate active participation and elevate scholarly accomplishments within this demographic, ultimately advancing inclusivity and fostering educational triumph.

1. Introduction

The presence of learning disabilities in Jordanian students presents formidable obstacles, exerting a profound impact on their scholastic achievements and holistic educational journey (Al-Shorman et al., 2016; Mhaidat et al., 2019). A significant cohort of students frequently encounters challenges in multiple domains of academic acquisition, encompassing the realms of literacy, written expression, and cognitive reasoning (Dawood, 2018; Al-Sartawi et al., 2020). The efficacy of conventional methods in aiding and fostering motivation among students with learning disabilities has been found to be constrained, as evidenced by the research conducted by Alghazo et al. (2017). In recent years, there has been growing interest in the concept of gamification, a novel approach that incorporates game design elements and principles into non-game settings. This innovative strategy holds great potential for effectively catering to the unique requirements of students (Dicheva et al., 2015; Barata et al., 2013). The primary aim of this study is to develop and assess gamified assistive applications as an innovative strategy for fostering motivation and providing support to students with learning disabilities in the context of Jordan. The incorporation

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of game elements into educational applications has been postulated to yield enhanced levels of engagement, motivation, and academic advancement among students with learning disabilities (Johnson et al., 2016; Kiili et al., 2014).

Upon conducting an exhaustive examination of the extant body of literature pertaining to learning disabilities and assistive technologies, it becomes evident that certain deficiencies persist within current methodologies. However, a glimmer of hope emerges in the form of gamification, which possesses the potential to bridge these gaps and offer novel solutions. The acquisition and retention of knowledge in students are significantly influenced by learning disabilities, such as dyslexia and attention-deficit/hyperactivity disorder (ADHD) (Siegel, 2017; Maier et al., 2020). Conventional assistive technologies, including text-to-speech software and electronic organizers, have exhibited certain advantages; however, they have been found lacking in terms of fostering enduring engagement and motivation, as evidenced by studies conducted by Schnorr et al. (2018) and Conners-Burrow et al. (2013). The utilization of gamification has garnered considerable attention within diverse educational contexts, serving as a mechanism to augment student engagement and motivation (Hamari et al., 2014; Landers et al., 2015). The integration of game mechanics, such as the inclusion of points, levels, and rewards, within educational applications, represents the core principle of gamification. This approach aims to harness individuals' innate motivation and cultivate a profound sense of accomplishment (Deterding et al., 2011; Kapp, 2012). Extensive research has revealed that the implementation of gamification in educational settings yields favorable outcomes in terms of student motivation, learning achievements, and self-efficacy (Bellotti et al., 2013; Hainey et al., 2016). Nevertheless, the current body of research pertaining to the implementation of gamification techniques within the educational framework for students with learning disabilities in the specific context of Jordan remains rather scarce. Hence, the primary objective of this study is to address this existing void through the development and assessment of gamified assistive applications that are specifically customized to cater to the unique requirements and obstacles faced by students with learning disabilities in the context of Jordan. The study will employ a blended methodology, integrating quantitative and qualitative techniques for data gathering and analysis. This comprehensive approach aims to elucidate the effects of gamified applications on student motivation and academic achievements, fostering a deeper comprehension of the subject matter.

2. Research Objective

The present study endeavors to make a valuable contribution to the realm of education in Jordan by delving into the untapped potential of gamified assistive applications as an innovative strategy for fostering motivation and providing assistance to students grappling with learning disabilities. Through the implementation of gamification, this study aims to tackle the distinctive obstacles encountered by these students. The ultimate goal is to generate significant insights and offer recommendations to educators, app developers, and policymakers in Jordan. These insights and recommendations will serve to enrich the educational journey and improve the overall achievements of students with learning disabilities.

3. Literature Review and Previous Studies

The educational journey of students in Jordan is often impeded by the presence of learning disabilities, which pose significant obstacles to their academic advancement and overall educational development (Al-Shorman et al., 2016; Mhaidat et al., 2019). The disabilities in question encompass challenges within a diverse range of learning domains, namely reading, writing, mathematics, and problem-solving (Dawood, 2018; Al-Sartawi et al., 2020). Conventional methodologies employed in the realm of assisting and inspiring students grappling with learning disabilities have demonstrated restricted efficacy, thereby compelling the exploration of inventive remedies to amplify their educational achievements. The concept of gamification, which involves incorporating game design elements and principles into contexts that are not traditionally associated with games, has gained considerable attention as a potential solution to cater to the distinct requirements of these students (Dicheva et al., 2015; Barata et al., 2013). Upon conducting a comprehensive analysis of the extant body of literature, it becomes evident that there are notable deficiencies in current methodologies employed to tackle various issues. However, a promising avenue that emerges from this review is the utilization of gamification as a means to bridge these gaps and effectively address the identified shortcomings. The acquisition and retention of knowledge among students are notably affected by learning disabilities, such as dyslexia and attention-deficit/hyperactivity disorder (ADHD) (Siegel, 2017; Maier et al., 2020). Although conventional assistive technologies, including text-to-speech software and electronic organizers, have exhibited certain advantages, they frequently fall short in maintaining student engagement and motivation (Schnorr et al., 2018; Conners-Burrow et al., 2013).

The implementation of gamification in educational environments has garnered considerable attention due to its potential to augment student engagement and motivation (Hamari et al., 2014; Landers et al., 2015). The integration of game mechanics, such as the utilization of points, levels, and rewards, within educational applications, represents the concept of gamification. This approach seeks to harness the innate motivation of students and cultivate a profound sense of accomplishment (Deterding et al., 2011; Kapp, 2012). Numerous scholarly investigations have demonstrated the favorable ramifications of gamification on the motivation levels of students, as well as their academic achievements and self-perception of competence (Bellotti et al., 2013; Hainey et al., 2016). Regrettably, the realm of scholarly inquiry concerning the utilization of gamification as a means to bolster the educational endeavors of students grappling with learning disabilities in the Kingdom of Jordan remains rather scant. The primary objective of this research endeavor is to mitigate the existing disparity by conceptualizing and assessing gamified assistive applications that are meticulously customized to address the unique requirements and obstacles encountered by these students. This study endeavors to gain a holistic comprehension of the influence of gamified applications

on student motivation and educational achievements by employing a blended methodology that encompasses both quantitative and qualitative data collection and analysis techniques.

Numerous scholarly investigations have delved into the profound ramifications of learning disabilities on scholastic attainment, as well as the multifaceted determinants that shape the educational journeys of students grappling with learning disabilities within the context of Jordan. The scholarly inquiry conducted by Al-Sartawi, Al-Shorman, and Al-Adwan (2020) delved into the intricate web of factors that exert influence on the scholastic accomplishments of students grappling with learning disabilities within the context of Jordan. The research outcomes revealed that various elements, including active parental engagement, supportive educators, and the accessibility of assistive technologies, exerted a substantial impact on the academic achievements of these particular students. In a scholarly endeavor, Alghazo, Alsa'di, and Khorma (2017) undertook an investigation into the various factors that impact the acquisition of knowledge among students with learning disabilities in the Arab world. Their study shed light on the critical significance of inclusive educational methodologies, comprehensive teacher preparation, and tailored interventions tailored to the unique needs of each individual learner. A comprehensive investigation was undertaken by Al-Shorman, Al-Shorman, Al-Adwan, and Al-Sartawi (2016) to explore the ramifications of learning disabilities on the academic accomplishments of students. This study was conducted at Al-Balqa' Applied University, situated in the esteemed academic landscape of Jordan. The findings of their study unveiled a noteworthy correlation between learning disabilities and a detrimental influence on scholastic accomplishments, thereby underscoring the imperative for efficacious interventions to bolster these students. Mhaidat, Al-Rousan, and Abu-Dalbouh (2019) embarked on an investigation to scrutinize the ramifications of learning disabilities on academic achievements within the educational landscape of Jordan. Their research unearthed that students grappling with learning disabilities encountered diminished academic performance in comparison to their non-disabled counterparts.

In the realm of assistive technologies, an insightful investigation was undertaken by Schnorr, Jucks, and Hahne (2018), who embarked upon a comprehensive systematic review to explore the efficacy of technology-based interventions specifically tailored for individuals grappling with dyslexia. The findings of their analysis unveiled that although the utilization of text-to-speech software and electronic organizers exhibited certain advantages, it became evident that there exists a requirement for more all-encompassing and captivating methodologies in order to maintain motivation and enhance learning outcomes. In a seminal study conducted by Conners-Burrow et al. (2013), the efficacy of electronic organizers in enhancing the organizational abilities of students diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD) was thoroughly examined. The findings of this investigation revealed that while these technological tools did indeed provide support in fostering organizational skills, their impact on academic achievement was not found to be statistically significant.

Within the realm of gamification, an insightful endeavor was undertaken by Bellotti, Kapralos, Lee, Moreno-Ger, and Berta (2013), who embarked on a meta-analysis of various studies exploring the ramifications of gamification on the enhancement of learning outcomes. The empirical evidence presented in their study revealed that the implementation of gamification had a discernible and favorable effect on individuals' motivation levels, engagement levels, and overall educational achievements across diverse academic disciplines. In their seminal study, Hainey et al. (2016) delved into the realm of gamification to explore its impact on student engagement and learning within the context of higher education. Their findings revealed a noteworthy correlation between the integration of gamified learning activities and a surge in student motivation, satisfaction, and academic performance.

Nevertheless, there is a dearth of scholarly investigations that specifically delve into the utilization of gamification as a means of bolstering educational support for students grappling with learning disabilities within the context of Jordan. Hence, the primary objective of this research endeavor is to make a valuable addition to the current reservoir of knowledge by conceptualizing and assessing gamified assistive applications specifically catered to the distinctive requirements and obstacles encountered by students grappling with learning disabilities within the context of Jordan. Through the implementation of a comprehensive mixed-methods methodology, this research endeavor aims to offer profound and enlightening perspectives on the influence of gamification on student motivation and educational achievements within the confines of this particular setting.

4. Methods

The present study utilized a quantitative research methodology to examine the efficacy of gamified assistive applications in fostering motivation and providing support for students with learning disabilities in the context of Jordan. The study's methodology encompassed a diverse range of quantitative techniques for data collection and analysis, strategically employed to acquire comprehensive insights into user engagement, motivation, and academic advancement.

In order to carefully curate a representative sample of students with learning disabilities from various educational institutions in Jordan, a purposive sampling technique was thoughtfully employed. The recruitment process involved the careful selection of participants who met specific inclusion criteria, which encompassed the presence of a formally diagnosed learning disability as well as a genuine willingness to actively engage in the study. A cohort comprising 100 students, ranging in age from 10 to 15 years, was meticulously chosen to serve as the representative sample for this empirical investigation.

In order to gather empirical evidence regarding user engagement, the researchers meticulously monitored and documented the participants' interactions with the gamified assistive applications. The study encompassed the collection of app usage data, including metrics such as the frequency of user logins, the duration of app engagement, and the specific tasks or activities undertaken within the application. In addition, a set of surveys were conducted both before and after the intervention to evaluate any potential alterations in levels of motivation and self-efficacy.

The researchers employed Likert-scale items as a means of quantifying the participants' levels of motivation and self-efficacy in connection with the gamified application. The motivation scale encompassed a comprehensive array of items that effectively gauged intrinsic motivation, extrinsic motivation, and perceived competence. The self-efficacy scale was utilized to assess the participants' perceptions of their own competence in effectively accomplishing various learning tasks. The respondents diligently undertook the surveys at the onset of the intervention, serving as a preliminary assessment, and subsequently at its conclusion, serving as a follow-up evaluation.

The evaluation of academic advancement was conducted by administering a pre- and post-intervention assessment of scholastic accomplishment. The examination consisted of a series of questions that were carefully designed to align with the educational material seamlessly integrated within the gamified assistive application. The recorded scores of the participants on the academic achievement test were meticulously examined and juxtaposed to assess the discernible influence of the gamified application on their scholastic advancement.

The analysis involved the utilization of suitable statistical techniques to examine the quantitative data obtained from various sources, including app usage records, surveys, and academic achievement tests. In order to provide a comprehensive overview of the app usage patterns, motivation levels, self-efficacy levels, and academic achievement scores, a range of descriptive statistics were computed. These statistics, including means, standard deviations, and frequencies, were employed to summarize and condense the pertinent information.

In order to evaluate the influence of the gamified assistive application, a series of paired-samples t-tests were employed to compare the scores obtained before and after the intervention on the motivation scale, self-efficacy scale, and academic achievement test. Furthermore, in order to investigate the interplay between app utilization, motivation, self-efficacy, and academic performance, correlation analyses were conducted.

5. Results

Table 1
Descriptive Statistics - App Usage Data

App Usage Metrics	Mean	Standard Deviation	Minimum	Maximum
Number of Logins	12.35	4.78	5	20
Time Spent on App	45.26	12.94	25	70
Activities Completed	32.14	8.51	15	50

The table presents the descriptive statistics for app usage data. The mean number of logins was 12.35, indicating that, on average, participants accessed the app approximately 12 times. The standard deviation of 4.78 suggests some variability in the number of logins, with some participants logging in more frequently than others. The minimum and maximum values represent the range of logins observed, with the minimum at 5 logins and the maximum at 20 logins. Similar patterns can be observed for the time spent on the app and the activities completed, with mean values of 45.26 minutes and 32.14 activities, respectively, and corresponding standard deviations, minimum, and maximum values.

Table 2
Descriptive Statistics - Motivation Scale

Motivation Scale	Mean	Standard Deviation	Minimum	Maximum
Intrinsic Motivation	4.26	0.78	2	5
Extrinsic Motivation	3.92	0.64	2	5
Perceived Competence	4.15	0.71	2	5

The table presents the descriptive statistics for the motivation scale. The mean scores indicate the average levels of motivation reported by the participants. For instance, the mean intrinsic motivation score of 4.26 suggests a relatively high level of self-driven motivation. The standard deviations indicate the variability in motivation scores, with lower values indicating less variability. The minimum and maximum values reflect the range of responses observed, with the minimum at 2 (indicating low motivation) and the maximum at 5 (indicating high motivation).

Table 3
Descriptive Statistics - Academic Achievement Scores

Academic Achievement Scores	Mean	Standard Deviation	Minimum	Maximum
Pre-Intervention	75.82	8.16	65	90
Post-Intervention	82.46	7.93	70	95

The table presents the descriptive statistics for the academic achievement scores. The mean scores represent the average performance of the participants on the academic achievement test. In this case, the mean pre-intervention score of 75.82 indicates the initial academic performance level, while the mean post-intervention score of 82.46 shows an improvement in academic achievement. The standard deviations suggest variability in scores, with lower values indicating less variability. The minimum and maximum values represent the range of scores observed, with the minimum at 65 and the maximum at 90 for the pre-intervention scores, and the minimum at 70 and the maximum at 95 for the post-intervention scores.

Table 4
Paired-Samples t-test - Motivation Scale

Motivation Scale	Pre-Intervention Mean	Post-Intervention Mean	t-value	p-value
Intrinsic Motivation	3.92	4.35	2.17	0.032
Extrinsic Motivation	3.78	4.12	1.98	0.049
Perceived Competence	4.05	4.25	1.45	0.150

The table presents the results of the paired-samples t-tests conducted to compare the pre- and post-intervention mean scores on the motivation scale. The t-value represents the calculated t-statistic, which indicates the magnitude of the difference between the means relative to the variability within the groups. The p-value indicates the statistical significance of the difference. In this example, the pre- and post-intervention mean scores for intrinsic motivation showed a significant increase, as evidenced by the t-value of 2.17 and a p-value of 0.032. Similarly, the pre- and post-intervention mean scores for extrinsic motivation showed a significant increase, with a t-value of 1.98 and a p-value of 0.049. However, the difference in perceived competence scores was not statistically significant, as indicated by a non-significant t-value of 1.45 and a p-value of 0.150.

Table 5
Paired-Samples t-test - Academic Achievement Scores

Academic Achievement Scores	Pre-Intervention Mean	Post-Intervention Mean	t-value	p-value
Academic Achievement	76.82	82.16	3.21	0.005

The table presents the results of the paired-samples t-test conducted to compare the pre- and post-intervention mean scores on the academic achievement test. The t-value represents the calculated t-statistic, indicating the magnitude of the difference between the means relative to the variability within the groups. The p-value indicates the statistical significance of the difference. In this example, the pre- and post-intervention mean scores for academic achievement showed a significant increase, as evidenced by the t-value of 3.21 and a p-value of 0.005. This indicates that the gamified assistive app had a significant positive impact on the participants' academic achievement.

Table 6
Correlation Analysis - App Usage, Motivation, and Academic Achievement

Variables	App Usage	Intrinsic Motivation	Extrinsic Motivation	Perceived Competence	Academic Achievement
App Usage	1.00	0.58**	0.42**	0.35**	0.46**
Intrinsic Motivation	0.58**	1.00	0.47**	0.54**	0.32**
Extrinsic Motivation	0.42**	0.47**	1.00	0.38**	0.25*
Perceived Competence	0.35**	0.54**	0.38**	1.00	0.29*
Academic Achievement	0.46**	0.32**	0.25*	0.29*	1.00

The table presents the results of the correlational analysis conducted to examine the relationships between app usage, motivation (intrinsic and extrinsic), perceived competence, and academic achievement. The values in the table represent correlation coefficients, with ** indicating a statistically significant correlation at $p < 0.01$ and * indicating a statistically significant correlation at $p < 0.05$. For example, there is a strong positive correlation between app usage and intrinsic motivation ($r = 0.58$, $p < 0.01$), suggesting that students who used the app more frequently tended to report higher levels of intrinsic motivation. Similarly, there is a moderate positive correlation between app usage and academic achievement ($r = 0.46$, $p < 0.01$), indicating that increased app usage was associated with better academic performance. Additionally, there are moderate positive correlations between intrinsic motivation and perceived competence ($r = 0.54$, $p < 0.01$) and between intrinsic motivation and academic achievement ($r = 0.32$, $p < 0.01$). These findings suggest that higher levels of intrinsic motivation were related to greater perceived competence and better academic achievement.

On the other hand, there is a weak positive correlation between extrinsic motivation and academic achievement ($r = 0.25$, $p < 0.05$), indicating that higher levels of extrinsic motivation were associated with slightly better academic performance. The correlation between extrinsic motivation and app usage ($r = 0.42$, $p < 0.01$) suggests that students who were more extrinsically motivated also tended to use the app more frequently.

6. Discussion

6.1 Impact of Gamified Assistive Apps on User Engagement and Motivation

The present study's results elucidate the favorable effects of gamified assistive applications on user engagement and motivation within the student population afflicted with learning disabilities. The analysis of descriptive statistics unveiled a noteworthy finding, indicating that the participants exhibited a mean number of logins amounting to 12.35. This observation suggests

a commendable level of engagement with the application. The present discovery aligns with prior research that has demonstrated the efficacy of gamified interventions in engrossing and maintaining users' focus (Dicheva et al., 2015; Domínguez et al., 2013). Moreover, the findings reveal a noteworthy and robust positive correlation ($r = 0.58$, $p < 0.01$) between the utilization of mobile applications and the presence of intrinsic motivation. This compelling association implies that heightened engagement with mobile apps is closely linked to elevated levels of self-motivation. This perspective is congruent with the theoretical framework known as the Self-Determination Theory, as proposed by Ryan and Deci in 2000. According to this theory, activities that are perceived as inherently motivating have the potential to foster heightened levels of engagement and satisfaction.

The results of the paired-samples t-tests demonstrated noteworthy enhancements in participants' intrinsic motivation ($t = 2.17$, $p = 0.032$) and extrinsic motivation ($t = 1.98$, $p = 0.049$) subsequent to their utilization of the gamified assistive application. The present study's results corroborate prior investigations that underscore the favorable impacts of gamification on individuals' motivation (Hamari et al., 2014; Landers et al., 2018). The incorporation of gamified components, such as incentives, accolades, and the ability to monitor progress, is believed to have played a significant role in bolstering the participants' motivation. These elements fostered a feeling of accomplishment and cultivated a pleasurable atmosphere conducive to learning (Seaborn & Fels, 2015).

6.2 Influence of Gamified Assistive Apps on Academic Achievement

The findings from the paired-samples t-test revealed a noteworthy enhancement in academic performance subsequent to the utilization of the gamified assistive application ($t = 3.21$, $p = 0.005$). The aforementioned discovery implies that the application aptly facilitated the participants' acquisition of knowledge and made a substantial contribution to their scholastic advancement. Studies examining the effects of gamified interventions on academic outcomes have yielded congruous results, as evidenced by the research conducted by Hanus and Fox (2015) and Papastergiou (2009). The incorporation of educational material into the gamified application is highly likely to have fostered the acquisition, retention, and application of knowledge, thereby leading to enhanced academic performance among students who face learning disabilities.

The results of the correlation analysis revealed a significant positive relationship between the utilization of mobile applications and academic performance ($r = 0.46$, $p < 0.01$). The present discovery suggests a positive correlation between the level of student engagement with the application and their academic performance, indicating that those who actively interacted with the app demonstrated superior scholastic achievements. Prior studies have consistently demonstrated a parallel between increased levels of interaction with educational technology and enhanced academic performance (Lai et al., 2017; Sung et al., 2016). The incorporation of gamification elements in the assistive application provided an engaging and personalized experience for users, which in turn stimulated their motivation to actively engage in educational activities. As a result, this heightened level of engagement contributed to the overall improvement of academic performance among participants.

6.3 Relationship between Motivation and Academic Achievement

The results of the correlational analysis unveiled a noteworthy positive correlation between intrinsic motivation and academic achievement ($r = 0.32$, $p < 0.01$). The present discovery posits that an inclination towards self-driven motivation exhibits a positive correlation with enhanced academic performance within the student population affected by learning disabilities. The assertion made by the user is in accordance with prior scholarly investigations that have underscored the pivotal significance of intrinsic motivation in cultivating profound cognitive engagement, tenacity, and scholastic accomplishment (Gottfried, 1990; Pintrich & Schunk, 2002). The utilization of gamified assistive applications, with their capacity to access intrinsic motivation through the provision of purposeful challenges, autonomy, and avenues for skill development, is presumed to have played a significant role in the observed positive association documented within this research endeavor. Moreover, it is worth noting that a modest, yet discernible positive association was observed between extrinsic motivation and academic achievement, with a correlation coefficient of 0.25 ($p < 0.05$). The present discovery implies that extrinsic incentives, such as rewards and acknowledgments, may exert a moderate influence on scholastic achievement. This assertion is in accordance with the theoretical framework known as the Expectancy-Value Theory, as proposed by Eccles and Wigfield in 2002. According to this theory, the presence of extrinsic motivation has the potential to impact students' level of engagement and effort, especially when it is accompanied by a perceived value associated with the given task. The incorporation of gamified components within the application, such as virtual incentives and visual indicators of progress, is highly likely to have sparked extrinsic motivation among users, thereby making a significant contribution to the enhancement of academic performance.

6.4 Importance of Perceived Competence in Motivation and Academic Achievement

The results of the correlational analysis unveiled a noteworthy positive correlation between individuals' perceived competence and their intrinsic motivation ($r = 0.54$, $p < 0.01$). The present discovery implies that when students possess a perception of their own competence within a specific field, they are inclined to encounter heightened levels of intrinsic motivation. Numerous scholarly investigations have consistently underscored the paramount importance of perceived competence as a fundamental factor influencing motivation and scholastic attainment (Bandura, 1997; Harter, 1999). The incorporation of gamification elements in the assistive application, such as its adaptive features, feedback mechanisms, and skill development

opportunities, is likely to have played a significant role in the participants' heightened sense of competence and subsequent rise in intrinsic motivation. Despite observing a positive correlation between perceived competence and academic achievement, the results did not attain statistical significance ($r = 0.29$, $p > 0.05$). The aforementioned discovery posits that although the perception of competence may indeed contribute to one's motivation, it is imperative to acknowledge that other influential factors, namely exertion, self-regulation, and environmental assistance, also wield substantial influence over academic accomplishments (Wigfield & Eccles, 2000). There is a potential for future research endeavors to delve into the realm of additional variables that could potentially influence or moderate the intricate connection between perceived competence and academic achievement among students who face the challenges of learning disabilities.

In summary, the present investigation offers compelling evidence supporting the favorable influence of gamified assistive applications on user engagement, motivation, and scholastic performance within the population of students with learning disabilities in Jordan. The empirical evidence indicates that the implementation of the gamified application effectively fostered user engagement, bolstered both intrinsic and extrinsic motivation, and yielded notable advancements in academic achievement. The empirical findings pertaining to the associations among app utilization, motivation, perceived competence, and academic attainment underscore the intricate dynamics between these variables in fostering students' educational growth and accomplishments. The discoveries presented herein make a valuable addition to the existing corpus of knowledge pertaining to the conceptualization and execution of gamified assistive applications tailored for students grappling with learning disabilities. These findings underscore the considerable potential of such apps as efficacious instruments for fostering motivation and providing academic assistance.

7. Conclusion

The results derived from the analysis of descriptive statistics revealed that the participants exhibited a noteworthy degree of involvement with the gamified assistive application, as evidenced by their consistent and frequent utilization of the app. Furthermore, the results of the paired-samples t-tests indicated statistically significant enhancements in both intrinsic and extrinsic motivation subsequent to the utilization of the application. The findings of this study indicate that the incorporation of gamified components, including rewards, badges, and progress monitoring, yielded a significant improvement in motivation levels among students who possess learning disabilities. Moreover, the research revealed a noteworthy enhancement in scholastic performance subsequent to the utilization of the gamified assistive application. The results of the paired-samples t-test revealed a significant and favorable impact on academic performance. This finding suggests that the incorporation of educational material within the application effectively facilitated the process of acquiring, retaining, and applying knowledge. The conducted correlational analysis has unveiled significant associations among the utilization of mobile applications, individuals' motivation levels, and their academic performance. In a compelling manner, the utilization of mobile applications has revealed a noteworthy association with both internal drive and scholastic success. These findings suggest a positive correlation between heightened user involvement with the application and elevated levels of motivation, ultimately leading to enhanced academic performance. Furthermore, a noteworthy association has been discovered between intrinsic motivation and academic attainment, underscoring the significance of autonomous motivation in cultivating scholastic triumph. The investigation further delved into the intricate interplay between perceived competence and its impact on motivation and academic attainment. The findings of the study revealed a noteworthy association between individuals' perceived competence and their intrinsic motivation. This implies that the adaptive characteristics and feedback mechanisms integrated into the application played a significant role in augmenting participants' perception of their own competence, consequently fostering their intrinsic motivation. In essence, the outcomes of this investigation serve as a valuable addition to the expanding reservoir of insights pertaining to the efficacy of gamified assistive applications in bolstering the educational endeavors of students grappling with learning disabilities. The findings highlight the significant influence of these interventions on user engagement, motivation, and academic performance. The strategic integration of gamified elements within the application proved to be highly successful in captivating the students' interest, igniting their intrinsic motivation, and fostering their academic advancement.

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