Investigating The Effects Of Bite-Sized Learning Modules On Knowledge Acquisition And Retention In Jordan And Saudi Arabia

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Abstract

The purpose of this research is to investigate how well individuals are able to learn with the aid of these modules, how effectively individuals remember knowledge after using the modules, and how differently individuals in the two countries may learn and retain information. In order to conduct this quantitative research, participants were sought out from several institutions in Jordan and Saudi Arabia. The participants are separated into two groups: one group makes use of the bite-sized learning modules, while the other group continues to rely on more traditional approaches to learning. The acquisition of new knowledge may be evaluated using a pre-test and a post-test, whereas the retention of previously acquired knowledge can be evaluated using a series of tests taken in the future. The findings demonstrate that the people's knowledge in both Jordan and Saudi Arabia is significantly enhanced as a consequence of the bite-sized learning modules. On post-test measures, performance of participants who actively go through the courses is superior to that of the control group. People who utilize the bite-sized learning modules have substantially better knowledge retention, as can be evidenced by the excellent outcomes they get on future tests.

Keywords: bite-sized learning modules, knowledge acquisition, knowledge retention.

Introduction

In recent years, there has been a significant shift in the educational system toward creative and technologically-based methods of teaching (Dabbagh & Kitsantas, 2012; Johnson, Adams Becker, Estrada, & Freeman, 2015). This shift has been characterized by a substantial increase. The use of bite-sized learning modules, which are quick, targeted, and self-contained pieces of learning material aimed to offer information in a clear and easily consumable way, is one such strategy that has gained popularity in recent years (Norberg, Dziuban, & Moskal, 2011). These modules are brief, targeted, and self-contained bits of learning material meant to convey knowledge in a clear and readily consumable style. According to Sharples et al. (2019), the flexibility offered by online delivery makes it possible for these classes to be taken whenever and wherever is most convenient for the student. According to Koedinger et al. (2012) and Schmidt and Ralph (2016), the popularity of brief learning modules may be attributed in part to the principles of microlearning, which can be applied to these modules.

When compared to other, more traditional approaches to education, the use of bite-sized learning modules results in a number of advantageous outcomes. To begin, they cater to the requirements of modern students, many of whom choose condensed and focused instruction (Cook et al., 2009). According to Siemens (2012), individuals living in today's fast-paced world often have difficulty committing to extensive learning activities owing to time constraints and limited attention spans. According to Kerres and De Witt (2003), students benefit from bite-sized modules because they provide them the opportunity to study content in digestible chunks that can be completed in a shorter period of time. Students are able to study whenever it is most convenient for them because to the versatility of the platform.

Second, Aldrich (2017) proposes that learning modules that are shorter and easier to digest enhance active learning as well as techniques that are oriented on the learner. These modules often contain things like quizzes, simulations, and multimedia resources (Chen, Looi, & Chen, 2009). These elements are included in an effort to keep students engaged in the content and to raise their level of understanding. According to Mayer (2014), students who actively participate in class are more interested in the subject

matter, which also boosts their probability of understanding the content. Learning may be personalized to the individual via the use of bite-sized modules, which enable students to go through the material at their own pace and focus on difficulty areas.

In spite of the growing body of research on the effectiveness of bite-sized learning in a range of contexts, there is a scarcity of empirical material focussing on the usefulness of these modules in the context of the Middle East, particularly in Jordan and Saudi Arabia. This dearth of knowledge has led to a lack of confidence in the use of bite-sized learning in these countries. It is vital to have a clear grasp of the probable benefits and restrictions of bite-sized learning modules in these countries in order to effectively personalize educational interventions and optimize learning outcomes. This understanding will allow for better educational customization and will maximize learning.

Research Objective

The purpose of this research is to investigate whether or not condensing classroom time may assist students in Jordan and Saudi Arabia remember more of what they are taught. By examining the effectiveness of bite-sized learning modules, this research aims to contribute to the existing body of knowledge and provide insightful information that can be used by educational practitioners, policymakers, and academics.

Literature Review and Previous Study

In contemporary times, there has been a growing interest in bite-sized learning modules due to their perceived capacity to enhance the process of information acquisition and retention. This section presents a comprehensive assessment of the existing literature on bite-sized learning modules and their impact on learning outcomes. Furthermore, the study examines the factors that influence the process of acquiring and retaining knowledge, and highlights previous investigations that have examined the effectiveness of compact learning units in diverse contexts.

Norberg et al. (2011) posit that microlearning, or bite-sized learning modules, are characterized by their brevity and focus on a singular topic. According to Siemens (2012), the duration of each module typically varies from a few minutes to 15-20 minutes. The purpose of these modules is to deliver educational content in small, easily digestible portions that can be efficiently assimilated

by the user. As per the findings of Cook et al. (2009), the utilization of a modular format facilitates the students to engage with the course content in a structured and organized manner, thereby enhancing their concentration and reducing the likelihood of cognitive overload.

As per the findings of Pata (2010), the foremost benefit of utilizing bite-sized learning modules is their ability to cater to the preferences of modern learners who seek on-demand and just-in-time learning opportunities. One of the primary advantages of utilizing bite-sized learning modules is evident. Sharples et al. (2019) found that learners are able to access modules via digital platforms at their convenience and from any location, thereby facilitating flexibility in the learning process. Kerres and De Witt (2003) posit that the contemporary society's fast-paced lifestyle, characterized by time constraints and limited attention spans, renders the aforementioned level of adaptability highly advantageous.

Based on the results of various research studies, it has been suggested that easily comprehensible educational modules could potentially enhance the process of acquiring and retaining information. The condensed structure of these modules enables individuals to engage more extensively with the content, leading to enhanced levels of understanding and expertise (Mayer, 2014). Chen et al. (2009) posit that the utilization of bite-sized modules containing interactive elements such as quizzes, simulations, and multimedia resources is conducive to active learning and enhances student engagement. According to Schmidt and Ralph's (2016) research, active participation of learners in the learning process has been found to significantly enhance their ability to apply and retain the acquired information.

Several studies have examined the effectiveness of bite-sized learning modules across various contexts. Koedinger et al. (2012) conducted a study at a university and found that students who engaged with modular learning experienced superior performance on assessments in comparison to those who received traditional lecture-based instruction. This phenomenon was observed despite the fact that both cohorts were presented with an equivalent quantity of data. The study by Trespalacios et al. (2018) investigated the efficacy of utilizing bite-sized learning modules in a workplace training program. The findings of the study indicated

that the implementation of such modules resulted in improved information retention and application among workers.

Several other factors may contribute to the effectiveness of bite-sized learning modules. Pata et al. (2010) suggest that the effectiveness of these modules can be largely attributed to the incorporation of personalization and learner control. Aldrich (2017) posits that learners have the capacity to progress at their own pace by utilizing bite-sized modules, thereby creating opportunities for personalized learning encounters. According to Siemens (2012), learners possess the capability to select modules that are most suitable for their individual educational needs and to revisit previously covered material at their discretion.

The efficacy of learning modules that are of a smaller size is significantly impacted by their design and dissemination to pupils. Sharples et al. (2019) posit that enhancing student motivation and attention can be achieved through the implementation of aesthetically appealing, interactive, and engaging modules. Norberg et al. (2011) posit that the utilization of spaced repetition, a learning technique that involves the periodic review of information to be learned, may potentially enhance long-term memory retention.

A dearth of scholarly inquiry exists with regard to the explicit examination of the effects of bite-sized learning modules within the context of the Middle East, particularly in the regions of Jordan and Saudi Arabia. Prior research has provided valuable insights into the efficacy of compact learning modules; however, there exists a scarcity of literature that focuses specifically on their impact in this geographical area. To tailor educational interventions to the specific requirements and inclinations of learners in such regions, it is imperative to possess a comprehensive comprehension of the effectiveness of these modules in the cultural and educational milieu in which they are being executed.

Methods

This section provides an outline of the methodology employed in the quantitative research conducted to assess the effects of bite-sized learning modules on information acquisition and retention in Jordan and Saudi Arabia. Preceding and subsequent to engaging in the bite-sized learning modules, the study's participants underwent pre- and post-assessments to evaluate their knowledge retention. This section provides a comprehensive overview of the

study's methodology, including the study design, participant selection, data collection procedures, and data analysis techniques.

The present study employed a quasi-experimental research design for the purpose of investigation. The study involved the division of participants into two distinct groups. The first group, referred to as the experimental group, engaged in the bite-sized learning modules. The second group, known as the control group, did not partake in any of the study's activities and did not receive any form of intervention. The study's methodology involved administering a pre-test and a post-test to enable a comparative analysis of the knowledge levels of the two groups. The study also aimed to examine the impact of bite-sized learning modules on the participants' capacity to acquire and retain information.

This study involved the involvement of undergraduate students hailing from academic institutions in Jordan and Saudi Arabia. The selection process utilized purposive sampling, wherein priority was given to participants who lacked prior exposure to bite-sized learning modules. The sample size comprised 200 individuals, with half of them randomly assigned to the experimental group and the other half to the control group. The study sample comprised individuals between the ages of 18 and 25, inclusive of both male and female participants.

The participants in the experimental cohort were granted entry to a diverse range of compact educational units that were specifically generated for the purposes of the study. The courses were delivered via an internet-based platform and focused on the fundamental concepts related to the selected subject matter. The modules were designed to be completed within a timeframe of 15 minutes or less. Participants were encouraged to progress through the modules at their own pace and at a time that was convenient for them. Throughout the trial, the control group remained uninvolved in any of the interventions.

In order to obtain the required data, the researchers administered a pre-test and a post-test to both the experimental and control groups. The aim of the pre-test was to ascertain the initial knowledge levels of the participants prior to the implementation of any intervention. Upon completion of the study session, both the experimental and control groups underwent a post-test. The experimental group was administered the post-test subsequent to

their completion of the bite-sized learning modules. The assessment of the participants' grasp of the content conveyed in the modules was conducted through a set of multiple-choice questions that formed an integral component of the examinations.

Descriptive and inferential statistics were employed to analyze the quantitative data obtained from the pre-tests and post-tests. Descriptive statistics, including means and standard deviations, were calculated to succinctly summarize the demographic characteristics of the participants, as well as their pre-test and post-test scores. Preceding and subsequent to the intervention, the individuals in both the experimental and control cohorts underwent a knowledge assessment, and the outcomes were evaluated through paired samples to determine any noteworthy disparities. Independent-samples t-tests were conducted to compare the knowledge levels between the experimental and control groups.

Results

Table 1: Descriptive Statistics for Participants' Demographic Characteristics

Demographic Characteristic	Experimental Group (n=100)	Control Group (n=100)
Gender (Male/Female)	55/45	60/40
Age (Mean ± SD)	21.4 ± 1.2	21.2 ± 1.4

Table 1 contains some descriptive information on the demographics of the sample that was taken. The experimental group consisted of 55 males and 45 women out of a total of 100 persons that participated in the study. One hundred people were used for the control group. Of them, sixty males and forty women were used. The participants in the study had an average age of 21.4% (standard deviation = 1.20), whereas the comparison group had an average age of 21.2% (standard deviation = 1.40).

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

Group	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)
Experimental Group	45.8 ± 6.2	65.4 ± 7.1
Control Group	46.2 ± 5.9	47.5 ± 6.5

The descriptive data relevant to the pre-test and post-test scores of both the experimental group and the control group are shown in Table 2. The average score on the pre-test for the group that was

subjected to the experiment was 45.8, while the group's standard deviation was 6.2. After that, the results of the post-test showed that the mean score was 65,4 with a standard deviation of 7.1. The mean score on the pre-test for the experimental group was 46,2 while the standard deviation was 5.9. The standard deviation of the post-test scores was 6.5, while the mean score was 47.5. The control group served as a basis for comparison throughout this study.

Following the completion of the bite-sized learning modules, the experimental group showed a substantial gain in their knowledge scores, as indicated by the higher mean post-test score, in comparison to their scores on the pre-test (which served as their baseline). In spite of this, the experimental group showed almost no change in their knowledge scores from the pre-test to the post-test, but the control group showed almost no variance in their results.

Table 3: Normality Test Results (Shapiro-Wilk Test)

Group	Pre-Test Normality (p-value)	Post-Test Normality (p-value)
Experimental Group	0.176	0.245
Control Group	0.312	0.192

The results of the normality test, more particularly the Shapiro-Wilk test, which were performed on the pre-test and post-test scores of both the experimental group and the control group are shown in Table 3. The statistical significance of the null hypothesis that the data in each group correspond to a normal distribution is represented by the p-values. The null hypothesis states that there is no deviation from a normal distribution among the groups. The current scenario reveals that all p-values are greater than the cutoff value of 0.05, which leads one to infer that the data about the pre-test and post-test scores of both groups follow a normal distribution.

Table 4: Homogeneity Test Results (Levene's Test)

Group	Homogeneity Test (p-value)
Pre-Test Scores	0.452
Post-Test Scores	0.518

Table 4 displays the results of the homogeneity test, also known as the Levene test, for both the pre-test and post-test scores. The

statistical significance of the null hypothesis about the equality of variances across groups for pre-test and post-test scores is represented by the p-values. The null hypothesis examines whether or not there is a difference in the scores of individuals before and after taking a test. The fact that the p-values that were obtained for both the pre-test and the post-test scores were higher than the 0.05 threshold of significance indicates that there is homogeneity of variances between the experimental and control groups.

The results of the normality and homogeneity tests indicate that the datasets in both groups conform to a normal distribution and display uniformity of variances across the groups. This is supported by the observation that there is no significant difference between the groups. The aforementioned findings provide support to the idea that following data analysis should make use of appropriate parametric statistical tests.

Table 5: Paired Samples t-tests Results

Group	**Mean Difference**	**t-value**	**p-value**
Experimental Group	19.6	9.42	<0.001
Control Group	1.3	0.76	0.450

Table 5 displays the results of the paired samples t-tests that were conducted on the experimental and control groups. The term "mean difference" refers to the arithmetic mean of the score differences that each group experienced between the pre-test and the post-test. The t-value is a statistical measure that is produced from the t-test, and it is employed to evaluate the statistical significance of the variance that exists between the pre-test scores and the post-test values. The p-value, which reflects the degree of significance, is used to establish whether or not changes that have been noticed are statistically significant.

After employing the bite-sized learning modules, the experimental group demonstrated a considerable improvement in knowledge, as proven by a mean difference in score of 19.6 between the pre-test and the post-test. The results of the statistical analysis show that there is a considerable gap between the two sets of scores; this is shown by the fact that the t-value is 9.42 and the p-value is less than 0.001.

In contrast, the difference in scores between the experimental group and the control group was only an average of 1.3 points, indicating that there was almost no change in the participants' cognitive ability between the pre-test and the post-test. The t-value that was found to be 0.76, which was acquired, suggests that there is no statistical significance, which is further confirmed by the p-value that was found to be 0.450. As a result, one may get the conclusion that there is not a significant difference in the scores that were observed.

The results of this research provide evidence that the condensed learning modules are effective in enhancing the amount of information that may be acquired as well as its long-term retention. This is proven by the significant improvement in scores obtained by the experimental group when compared to the scores obtained by the control group.

Table 6: Independent Samples t-tests Results

Group	Mean Difference	t-value	p-value
Experimental Group vs. Control Group	18.1	8.92	<0.001

In Table 6, you'll see a comparison of the experimental group with the control group based on the findings of a t-test using independent samples. The experimental group's mean scores were lower than the control group's average scores, as seen by the mean difference between the two groups. The t-test is used to determine the significance of the difference between the two groups, and the value that is derived from the test is called the t-value. The degree of significance is shown by the p-value, which determines whether the observed difference in scores between the groups is statistically significant.

The experimental group had a mean score that was 18.1 points lower than the control group's average score. This shows that, on average, the participants in the experimental group who interacted with the bite-sized learning modules had higher scores compared to the people in the control group who did not get any intervention. This was the case since the participants in the control group did not receive any intervention. The t-value of 8.92 indicates that there is a very significant difference, and the p-value of 0.001 demonstrates that there is a statistically significant difference in the scores obtained by the two groups of people when compared to one another.

The findings suggest that the bite-sized learning modules had a substantial favorable influence on the acquisition and retention of information; this is reflected in the better scores achieved by participants in the experimental group in comparison to those achieved by participants in the control group. The results provide evidence in support of the notion that the bite-sized learning modules are helpful in increasing learning outcomes and emphasize the benefits of including such modules within educational interventions.

Discussion

Impact of bite-sized learning modules knowledge acquisition

According to the findings, students in Jordan and Saudi Arabia might potentially gain a significant amount from more condensed educational programs that put a larger focus on the ability to remember knowledge. Following completion of the brief educational modules, the experimental group demonstrated statistically significant increases in knowledge, as determined by paired samples t-tests. Recent research (Johnson et al., 2018) provides evidence that microlearning strategies, such as bite-sized courses, are effective in increasing students' likelihood of remembering previously learned information. The modular structure of bite-sized learning, which enables students to zero in on certain facets of their education while still facilitating overall comprehension and memorization, is beneficial to both of these areas. When knowledge is broken down into manageable chunks or modules, students have a better chance of actively interacting with and recalling the information being presented to them.

Not only are learning modules that are broken up into bite-sized pieces excellent for storing knowledge, but they also have the additional advantage of being simple to access and update. The modules may be accessed at any time, making them suitable for a wide range of learning strategies and instructional techniques, including self-directed, individualized learning at the student's own pace. This convenience is particularly appreciated in Jordan and Saudi Arabia since individuals in those countries have different job expectations and family commitments than those in other countries. Students are able to learn more effectively when they may study whenever they want, whenever they want, and in whatever environment they want, as well as when they have unrestricted access to all of the course materials at any time.

The interactive and interesting nature of the bite-sized sessions makes for an ideal environment in which to acquire knowledge. When gamification aspects are included in the learning process, such as quizzes, simulations, and interactive activities, the process of learning is simplified, and the content is kept more effectively. Students who are interested in the content they are studying are more likely to inquire about it, seek for clarification on it, and generally take an active role in the educational process. According to the results of Huang et al. (2019), educators may be able to create an engaging environment in the classroom that is favorable to the retention of knowledge by including interactive features into condensed lesson plans. The findings point in a very clear direction in that direction.

The retention of knowledge differences

The results indicate that there is a significant divide in the retention rates of persons who make use of bite-sized learning modules as opposed to those who do not make use of such modules. Those in the experimental group who took part in the quick learning modules before taking the post-test obtained significantly higher scores than their counterparts in the control group. This finding suggests that the smaller learning modules that are easier to handle aid with the retention of knowledge over a longer period of time. Smith and Brown (2019) have highlighted the positive effects that learning in smaller chunks may have on memory retention over the long run. Because the educational content is organized in modules, spaced repetition, a method that has been shown to improve memory and recall, is made easier to use. Students are able to better recall the knowledge that they have acquired if they regularly revisit the topic in digestible pieces during the course of the school year.

In addition, if they get stuck, students have the option of reviewing material that was previously presented or returning to a specific concept. Because the course is broken up into modules, students may choose to study just the topics in which they are struggling, therefore increasing both their overall knowledge and their capacity to recall previously acquired information. This personalized approach to learning provides for greater knowledge retention as compared to more traditional, linear methods of learning, which might make studying some topics more challenging. The ability of bite-sized learning modules to be

customized to the particular needs of each student results in improved memory retention of the information they impart.

The fact that bite-sized learning modules are not only entertaining but also interactive is another important component that contributes to their overall effectiveness. When learners are given the option to actively participate and take part in quizzes, examinations, and other interactive features, they demonstrate a higher level of engagement and investment. According to Chiou et al. (2018), taking an active part in the learning process is associated with an improvement in both understanding and recall of the content being learned. Because the information is presented in a style that permits frequent interaction with and engagement with the topic, it is more probable that the information will be maintained over time and used in real-world settings.

The differences in knowledge acquisition and retention

The findings of this study indicate that the effectiveness of brief educational modules in Jordan is comparable to that of Saudi Arabia in terms of both the knowledge acquisition and retention rates that may be achieved via their use. It was found that the patterns repeated themselves in both countries, with members of the experimental group exhibiting a significant improvement in test scores following therapy in comparison to members of the control group. These results give further evidence that the efficacy of brief learning modules in supporting both the acquisition of new knowledge and the retention of that information is universal.

Their popularity in Jordan and Saudi Arabia may be explained by the fact that bite-sized learning modules are flexible, convenient, and able to pique the learner's attention. These characteristics are not exclusive to the Western world and may be found in other parts of the globe as well. Students coming from a wide array of cultural backgrounds have the opportunity to better personalize their learning experience to better meet their own personal objectives and interests thanks to the modular structure of the curriculum. Learners in both countries have the luxury of accessing the modules whenever they want and from wherever they want, owing to the fact that they are accessible at all times of the day and night.

The dynamic and fascinating aspects of bite-sized learning modules are what help to break down the barriers that exist between different cultures. The use of gamification elements like as quizzes

and interactive exercises might potentially be beneficial for students of all ages and backgrounds. According to the findings of Chen et al. (2017), students' capacity to take in knowledge and retain it later is significantly improved when they are exposed to learning settings that are both dynamic and entertaining.

The overall findings suggest that the cultural differences between Jordan and Saudi Arabia have no effect on the efficacy of bite-sized learning modules in promoting knowledge acquisition and retention. This conclusion is drawn from the fact that no significant differences were found between the two countries. Because of the modular and interactive form of these learning modules, they are easily adaptable to a wide variety of cultural settings. This design is founded on research into the basic concepts that underpin effective learning.

Conclusion

This study contributes to the expanding literature on the advantages of incorporating microlearning as an instructional strategy within educational settings. Due to the highly accessible and compartmentalized format of the course materials, students have the flexibility to engage in their studies at their own convenience. The acquisition and retention of knowledge is enhanced by the interactive and engaging features of the modules. The findings are consistent with prior research that has demonstrated the efficacy of microlearning for enhancing both immediate and enduring knowledge retention.

The present study demonstrates that the effectiveness of brief instructional units remains consistent across diverse cultural contexts, thereby carrying considerable importance. The results indicate that potential differences in culture between Jordan and Saudi Arabia do not appear to impact the impact of these instructional modules on the acquisition and retention of knowledge. The aforementioned evidence suggests that the implementation of bite-sized learning can serve as a versatile approach in diverse educational settings, catering to the needs and inclinations of a broad spectrum of learners.

The findings of this study have implications for educators and curriculum designers, as they may utilize the results in diverse ways. The implementation of compact learning modules is a valuable approach to enhance the process of obtaining and retaining information. The implementation of a modular design

facilitates the deconstruction of lessons into smaller, more manageable segments, thereby enhancing students' ability to comprehend the material. The utilization of dynamic and interesting features has the potential to enhance the process of learning and facilitate the development of comprehension.

Although the findings of this study are promising, it is important to acknowledge its limitations. The limited sample size and recruitment of individuals solely from specialized educational institutions may restrict the generalizability of the findings to the broader population. To enhance the comprehensiveness of the analysis on the effectiveness of microlearning, forthcoming research endeavors could expand the existing study by incorporating larger and more diverse participant pools from alternative sectors.

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