The Effectiveness of Spaced Learning for Teachers and Students : A Review

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Abstract

The aim of learning and teaching a concept is to retain or store the knowledge that has been learned. The failure and ineffectiveness of the didactic approach to get the desired results has led to the innovation of many effective teaching techniques. One of the successful methods that has emerged in achieving it is spaced learning. In this method, cognition is exploited in the manner it works best to enhance long-term memory creation. The approach, also known as distributed practice, is designed to teach a new skill or concept to learners by dividing the modules in parts and repeating them at intervals to minimize the forgetting curve and optimize retrieval of information from memory. The lack of mental exhaustion aids in assimilation of knowledge and its reclamation. The effectiveness of this technique is not just limited to students, teachers too get better results for their efforts. As facilitators, instructors are constantly aware of the progress learners make, and by conducting frequent smaller assessments, the need to conduct marathon examination sessions is obviated. Also, the educator-learner rapport gets built on a positive foundation through constant communication.

Keywords: spaced learning, distributed practice, cognition, retention, forgetting curve, learners, teachers

الملخص

إن الهدف من تعلم وتدريس مفهوم ما هو الاحتفاظ بالمعرفة التي تم تعلمها أو تخزينها. وقد أدى فشل وعدم فعالية النهج التعليمي في الحصول على النتائج المرجوة إلى ابتكار العديد من تقنيات التدريس الفعالة. ومن بين الأساليب الناجحة التي ظهرت في تحقيق ذلك التعلم المتباعد. وفي هذه الطريقة، يتم استغلال الإدراك بالطريقة التي تعمل بها على أفضل وجه لتعزيز إنشاء الذاكرة طويلة المدى. تم تصميم النهج، المعروف أيضًا باسم الممارسة الموزعة، لتعليم مهارة أو مفهوم جديد للمتعلمين من خلال تقسيم الوحدات إلى أجزاء وتكرارها على فترات لتقليل منحنى النسيان وتحسين استرجاع المعلومات من الذاكرة. يساعد الافتقار إلى الإرهاق العقلي في استيعاب المعرفة واستعادتها. لا تقتصر فعالية هذه التقنية على الطلاب فحسب، بل يحصل المعلمون أيضًا على نتائج أفضل لجهودهم. بصفتهم ميسرين، يدرك المعلمون باستمرار التقدم الذي يحرزه المتعلمون، ومن خلال إجراء تقييمات أصغر حجمًا بشكل متكرر، يتم تجنب الحاجة إلى إجراء جلسات امتحانات ماراثونية. كما يتم بناء علاقة إيجابية بين المعلم والمتعلم من خلال التواصل المستمر.

الكلمات المفتاحية: التعلم التباعدي، الإدراك، الاحتفاظ.

I. Introduction

The primary aim of didactics is to impart knowledge, learning and skill through methods that are easy and effective for the students where teachers play the part of catalysts. By implementing techniques that are best suited for

learners of varied learning abilities, the fundamental challenge for the teachers is to make students retain what they are taught. Spaced learning is considered to be one of the most effective technique among many. The method, discovered by, Ebbinghaus is defined as a technique which requires a sufficient number of repetitions for memorization of gained knowledge (Ebbinghaus, 1885). It is an approach to minimize the forgetting curve. Ebbinghaus observed that learners have a "learning curve" and a "forgetting curve". The learning curve is the period taken to learn something, while the forgetting curve is the point when the learning starts to escape recollection. To stall the unlearning, spaced learning aids in greater variability across learning repetitions and provides more avenues for potent retrieval (Estes, 1959). Ascribable to contextual drift in the long run (Glenberg, 1979), longer inter-repetition intervals (IRIs) would cause greater contextual change, and therefore, more variable encoding, ensuing better memory performance. Consistent with this hypothesis, introducing variations across massed repetitions has been found to improve memory performance (Paivio et al.).

The effectiveness and benefits of spaced learning for long-term retention is proved by multiple theories (Toppino & Gerbier, 2014). One significant theory posits that repeating a subject matter assuredly enables the learner of its prior occurrence, which induces retrieving the previous presentation of the subject matter, a method that increases memory (e.g., Wahlheim, Maddox, & Jacoby, 2014). Massed repetition disposes of the retrieval process as it eliminates the need to retrieve from memory because the same subject matter was set forth a moment ago. Another theory accentuates the study/learning context (i.e., the encompassment of an event, from the external environment to an individual's mental state). One more theory is that of deficient processing of massed repetitions. When a current subject matter is identical to the one that was recently set forth, the redundancy reduces attention (Magliero, 1983). The different theories are not collectively exclusive, and there is a great possibility that many mechanisms act together to produce the memory advantage created by spaced practice.

The effectiveness of spaced learning for educators lies in the learners retaining the subject matter that has been taught to them. With learners of varied learning abilities, the task of a teacher to make learners remember what they learn is made easier through spaced learning. Teachers know the significance of repetitions, but they can only help if they are spaced over time. Revisiting old topics, taking surprise quizzes on a subject matter and to higher engagement levels for the students, thus making the teaching process easier and faster. Furthermore "Homework assignments targeting both old and new material, cumulative and/or weekly formative assessments, short review sessions, and implementation of a spiral curriculum all have an intrinsic spacing component under full teacher control. Also, merging retrieval and spacing creates optimal learning situations; retrieval practice followed by feedback is highly effective because this feedback serves as a spaced exposure." (Surma & Kirschner, n.d.). Another positive characteristic of spaced learning is that it linked to interleaving. The time gap between studying and re-studying a subject, makes room for other concepts to be taught, which aids learners to connect links between different subjects or concepts.

II. Aims of the study

- To fathom the effectiveness of spaced learning for teachers and students.

- To understand the extent of learning and teaching enhancement with spaced learning.
- To encourage educators to utilize spaced learning for learners for an exponential experience.

III. Hypotheses of the Study

• The teachers and secondary school students of Baghdad may experience a high level of improvement in their performances.

• The levels of the learners and educators will be enhanced regarding the following sub samples:

(a) Improved learning outcomes

(b) Better teaching experiences

(c) Reduced mental exhaustion

IV. Sample and Methodology

The sample consists of 180 secondary school students from 18 schools in Baghdad and 30 secondary school teachers. The methodologies utilized are qualitative and quantitative, based on their integration. The details of the sample selected for the study are shown in Appendix-I and Appendix-II.

V. Study Tools

• Techniques of triangulation among observation grids and interviews.

• Active Learning Methodology (ALM) questionnaires.

VI. Methodology for data collection

Eighteen schools were approached and they permitted to carry out the survey. The researcher chose grade VII to IX students of the secondary level for the present research. The researcher picked 180 students and 30 teachers. Data collection sheets regarding the effectiveness of spaced learning for teachers and students were handed out to the selected sample of students and teachers. The respondents were instructed on the manner the sheets were supposed to be filled with their responses.

Data Analysis

- Based on interpretative principles that consider the multidimensionality of survey objects and make the analysis of research results emerge from them.
- A working hypotheses that can lead to data which are generalizable and, in some way, objectively structurable according to standard measurement criteria. (Semeraro, 2014, p. 100).

VII. Research Limitations

The research is strictly limited to finding out the effectiveness of spaced learning for teachers and students of secondary schools in the city of Baghdad.

VIII. Data Interpretation and Analysis

After the respondents had responded, the data of the two groups (students & teachers) was divided and analysed into percentages.

Table 1.

The table shows the number of respondents that have a favourable opinion of spaced learning in all aspects.

Student size	Strongly Agree	Agree	Not decided	Disagree	Strongly disagree
180	178*	—	2	—	—

*98.88%

Table 2

The table shows the number of respondents that have a favourable opinion of spaced learning in all aspects.

Teacher size	Strongly Agree	Agree	Not decided	Disagree	Strongly disagree
30	29	1	—	—	—

*100% (All respondents are in agreement).

Table 3.

The table shows the number of student respondents that have unanimously and strongly agreed on the most important aspect of spaced learning.

Aspect	Strongly Agree	Agree	Not decided	Disagree	Strongly disagree
Memory					
Retention	180	—	—	—	—
Easy learning	180	—	—	—	—
Mental ease	180	—	—	—	—
Higher interest	180	—	—	—	—

Table 4.

The table shows the number of teacher respondents that have unanimously and strongly agreed on the most important aspect of spaced learning.

Aspect	Strongly Agree	Agree	Not decided	Disagree	Strongly
Better student					
engagement	30	—	—	—	—
Effective	30	—	—	—	—
Timesaving	30	—	—	—	—
Lower stress	30	—	—	—	—

The above data emphatically underlines the effectiveness of spaced learning for teachers and students. For learners, it reveals the improvement of cognition and memory retention besides other advantages. Teachers experienced better student engagement and lower stress levels as the prime benefits of this method along with timesaving and

effectiveness. The aim of a teaching methodology is to make learning easier, engaging and make the content or subject matter understandable. However, if the memories of the learners don't retain the information for a long duration, the teaching methodology is likely to be questioned. The data brings to the fore the solutions to those problems through the experiences of the respondents. Moreover, the overwhelming positive response for spaced learning is a resounding approval for it. The highlight of this data is the increased engagement levels for both teachers and the students that helps to create a bonhomie between them, which in turn, makes learning interesting in a cheerful environment. The factors of motivation and increased concentration for learning and teaching emerged as vital ingredients that glued teachers, students and the subject matter for a wholesome experience of education.

IX. Findings

- The sample group of the secondary school students is immensely benefitted with the effectiveness of spaced learning in all parameters, especially, in comprehending a wider scope of information and to retain it.

- The learning time was reduced significantly.

- Spaced learning reduced the mental exhaustion of students and offered a higher engagement level with their difficult subjects.

- Teachers experienced lesser stress levels and optimum enthusiasm while teaching.

- The constant need to explain complex content complex was eliminated to a great extent.

- The teacher-student interactions became more positive and fruitful.

X. Conclusion

To retain knowledge that has been learnt is the aim of education. The challenge for the students, and greater still, for teachers, is to make it happen. Through spaced learning, a very effective solution is found which directly works with the cognition of students. Thorough scientific researches have proved it time and again that complex content and subjects can be made easy through temporal intervals in learning through memory retention. Spaced learning engages the teachers and students in equal measure and enthuses the instructors with its overall positive outcomes which results in better engagement with learners. Also, spaced learning is a timesaving methodology that dispels the need of unnecessary revisions with the aim of learning again. Finally, the results prove it beyond an iota of doubt that spaced learning is a practical approach that reaps rewards for teachers and students.

XI. Recommendations

The current research can be considered as a valued contribution towards the study on the effectiveness of spaced learning for teachers and students in the city of Baghdad, Iraq. However, the results should be treated with caution as the respondents represent a specific age group in a single city. Further research in the exact and long term benefits of spaced learning across age groups should be examined, which could help in getting better insights into the overall ease of teaching and learning.

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Appendix I.

Name of the Teacher:……

Name of the School ……

The following statements are related to the effectiveness of spaced learning for teachers and students. The responses should be true and accurate. Tick (✓) the degree of your agreement or disagreement with the statements provided in the columns.

Sl. No.	Statement	Strongly agree	Agree	Not decided	Disagree	Strongly disagree
1.	Teaching a difficult subject has become easier with spaced learning.					
2.	I try to utilize the spaced learning methodology to the optimum.					
3.	I find spaced learning timesaving and effective.					
4.	I experience lower stress levels in the classroom.					
5.	I find myself enthused with spaced learning methodology.					
6.	Student engagement with me has increased with this approach.					
7.	Students of all learning abilities are benefited.					
8.	Students grasp the subject quickly.					
9.	The need to revise a subject has been eliminated.					
10.	Spaced learning has changed my attitude towards teaching.					
11.	My performance as a teacher is reflected in the mark sheets of the students.					

12.	Students enjoy the spaced learning technique.					
13.	My workload has eased considerably.					

Appendix II.

Name of the Student:……

Name of the School ……

The following statements are related to the effectiveness of spaced learning for teachers and students. The responses should be true and accurate. Tick (✓) the degree of your agreement or disagreement with the statements provided in the columns.

Sl. No.	Statement	Strongly agree	Agree	Not decided	Disagree	Strongly disagree
1.	Learning a difficult subject, has become easier with spaced learning.					
2.	I am able to retain my learning for longer durations.					
3.	I find spaced learning exciting and motivating.					
4.	I find difficult subjects easy to learn.					
5.	I believe that my approach to education has become more positive.					
6.	I am able to retrieve information easily.					
7.	I grasp the subject quickly.					
8.	My concentration levels have improved.					
9.	Teachers have become more engaged with us.					
10.	I don't feel the need to revise a content once learned through spaced learning.					
11.	I get better scores in my exams.					
12.	I get better insights on my subjects.					
13.	I am able to connect my learning with practical use.					