THE EFFECTIVENESS OF FOREIGN LANGUAGE LEARNING SUPPORTED BY THE SUPERMEMO.NET PLATFORM (BASED ON THE *HIER UND DA 1* COURSE)
(Excerpt)

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Introduction

This paper presents the results of research into the use of the supermemo.net platform as a support for the learning of German.

The subjects for the research were students at 58 post-secondary schools in Poland. The experimental group consisted of 673 starter-level students of German who began using the *Hier und da 1* textbook and received access to an online course tailored to it on the supermemo.net platform. The scope of their actual use of the online course was verified based on their learning data stored on the platform. Simultaneously, a control group was selected and tested. This group was composed of 632 starter-level students of German who also began learning using the *Hier und da 1* textbook but had no access to the online course.

The effects of supporting the traditional form of learning with the e-learning course were analysed by means of two tests that checked how well the material from the *Hier und da 1* textbook was mastered by the students. The first test was carried out 2 months after the experimental group students had been given access to the platform; the other took place at the end of the 2-semester project. The results of the final test showed that students who had used the online course at least once a week scored on average 39% higher than those in the control group and 32% higher than the average score in both the control and experimental groups together. Furthermore, students who used the supermemo.net platform significantly improved their results in the second test compared to the first.

Individualisation of learning on the supermemo.net platform

The process of learning individualisation on the supermemo.net platform is linked to the repetition algorithm that is based on the answers provided by the learner (student). In this way, the system sets an individual model of repetition. Furthermore, it is possible to apply various solutions for presenting information, and consolidating and verifying knowledge (Łodyga, 2010).

The key aspect of learning individualisation on the supermemo.net platform, characteristic for this platform, is the application of the SuperMemo method in the courses.

SuperMemo is a computer-supported method of learning designed on the basis of many years of research into long-term memory and factors responsible for the effective memorisation of new information. The main principle of the method is to provide the learner with optimum intervals between each repetition of the material. The SuperMemo program constantly analyses the level of forgetting and remembering of the material, thus allowing the repetition schedule to be adjusted to the individual needs of each learner. Thanks to a mathematically-advanced algorithm, a separate repetition schedule is created for each item of information included in the SuperMemo course. As a result, learners waste no time on repeating the information that they remember well, and instead focus on practicing the material that causes problems (http://www.supermemo.pl/opis_metody) (04.06.2011).

The repetition schedule is created on the basis of an approximation of forgetting curves for groups of information remembered by the learner, selected with respect to their difficulty level and the

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amount of repetition of them in the past. With every repetition the forgetting curve is shifted and smoothed, which is reflected in the consolidation of the information remembered. The algorithm schedules repetition for a given item of information on the day when the estimated probability of the user recalling it from memory falls to an established level. In the chart below that level was set at 90%, as is the case on supermemo.net.
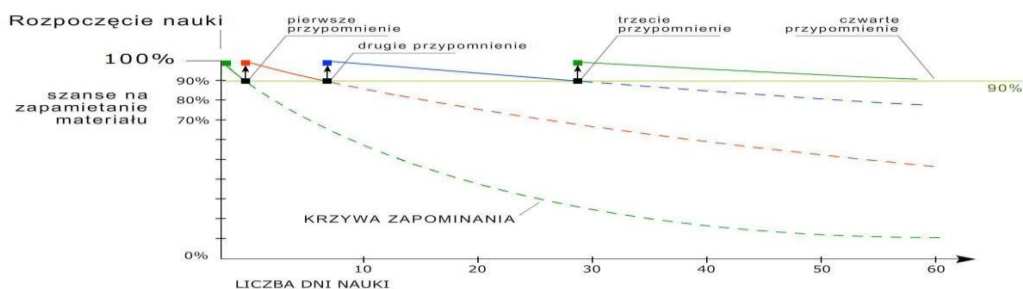
Picture 1. Forgetting curve.
Source: http://www.supermemo.pl/opis_metody *(14.08.2011)*

The most important features of the SuperMemo method include:
- Regular repetition to ensure a high probability that each piece of information is remembered
- Selection of the material based on its correct classification and division into items of information in the course (small units of material that each represent one piece of information or competence)
- Moderation when the learner assesses their own learner's speed and capabilities before he or she starts to learn (**http://www.supermemo.com**) (05.08.2010)
- Focus on the content that is more difficult to remember and less repetition of the material that has already been mastered as a result of algorithmic optimization.

Thanks to the application of the SuperMemo method, an individual study plan is created for each learner. This plan is based on their current progress in learning; thanks to the repetition algorithm, a repetition schedule is created for the material that has been learnt before.

The *Hier und da 1* course on the supermemo.net platform

The *Hier und da 1* online course was based on the *Hier und da 1* textbook for post-secondary school starter-level learners of German. The course was published on the supermemo.net platform.

The online course contained the following elements:
- Presentation pages where the textbook material was presented and discussed
- Exercise pages consisting of SuperMemo exercises (i.e. exercises that were included in the SuperMemo repetition schedule) and one-time exercises (i.e. exercises that were not included in the schedule).
- Audio files including the correct pronunciation of German phrases and expressions.

SuperMemo exercises allow learners to check their knowledge, view the correct answer and assess themselves (by choosing one of the options: I know, I don't know, Almost). Depending on the option chosen, a given exercise is included in the repetition schedule in a given number of days.

Research

Method

The research was conducted during the 2008-2009 school year. The subjects were students at 58 post-secondary schools in Poland who were starter-level learners of German. These were divided into the experimental group (673 students), who began to learn German using the *Hier und da 1* textbook and simultaneously were given access to the online course, and the control group (632 students), who began to learn German from the same textbook and participated in the same two tests, but had no access to the supermemo.net platform with the online version of the course.

The research was carried out by School Publishers PWN in Warsaw and SuperMemo World sp. z o.o. in Poznań.

The aim of the study was to investigate whether 1st-year post-secondary school students learning German from the *Hier und da 1* textbook and using the online course scored higher in vocabulary tests than students learning from the same textbook with no access to the online course.

 Students were tested twice during the 2008-2009 school year for their knowledge of vocabulary from the *Hier und da 1*. The data from the two tests was then analysed. The tests were carried out in the two groups simultaneously. The students in the experimental group (from 26 schools) were aware of the platform and its didactic aim and had access to it; however its use was not obligatory and some students did not use it. Those in the control group (from 32 different schools) were unaware of the online course and had no access to it.

The analysis of the experimental group subjects with respect to their activity on the supermemo.net platform was based on two factors: the percentage of the material learnt and the regularity of repetition.

The percentage of the course material learnt provides information on whether a student used the online course, to what extent he or she viewed the content of its presentation pages and whether he or she did the respective exercises at least once. The level of involvement of the students was quite diversified: 2% of the experimental group students completed the entire course, 24% completed at least half of the material, and 44% completed at least one quarter (Chart 1).
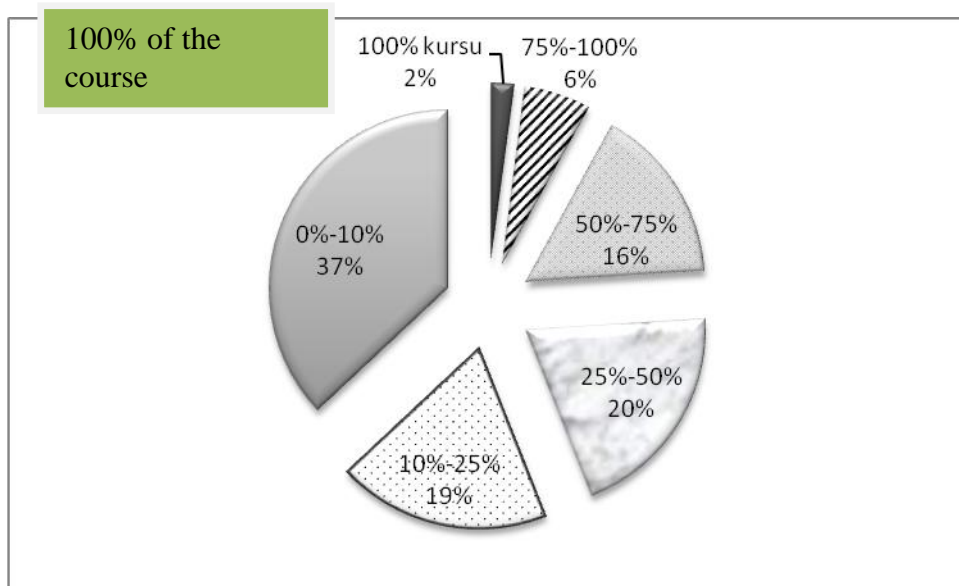

Chart 1. Experimental group students according to the online course material that they completed (in per cent).

The regular repetition coefficient indicates whether a course participant did the exercises based on the repetition algorithm in a regular way, i.e. whether or not he or she had any pending material to be covered. This parameter can be interpreted as the regularity rate with regard to learning from the course according to the schedule set by the SuperMemo method. The criterion was considered to be fulfilled in any given day when the student did all the repetition that had been set by the system for

that day. For example, if the student did all the required repetition every other day, their regularity rate would be 50%.
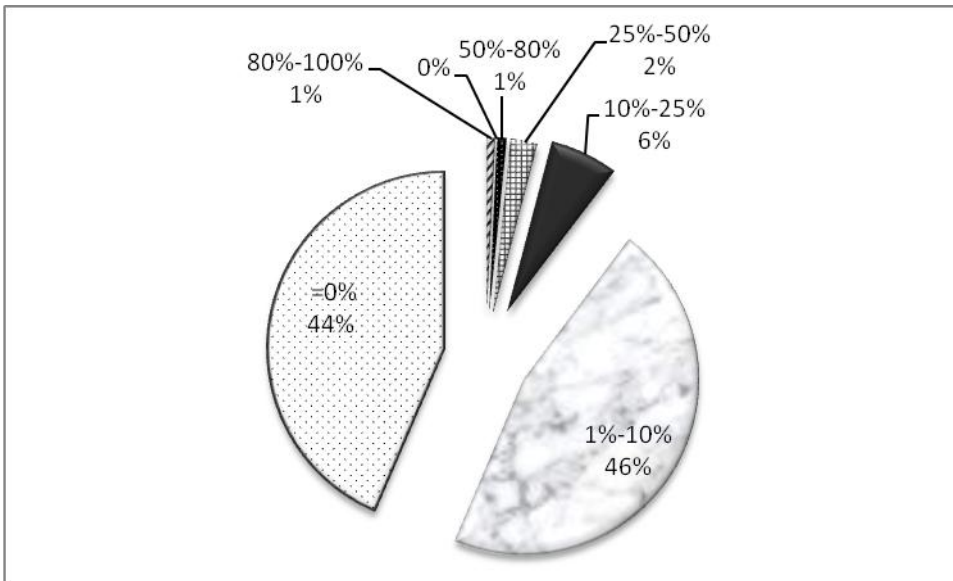

Chart 2. Experimental group students according to their regularity rates (in per cent).

Test 1 was carried out in December 2008; there were 673 participants from the experimental group and 632 students in the control group. The results achieved on Test 1 do not provide a full insight into the effect of using the online course on students' results because at this point they had only been using the online course for approximately 2 months.

Test 2 was carried out in May and June[2] 2009. This time there were 488 students in the experimental group and 499 students in the control group. The results achieved in Test 2 can this time be considered as a reliable indicator as to whether there is any connection between use of the online course and the level of vocabulary mastered. When they took Test 2, the experimental group students had been using the online course on the supermemo.net platform for at least 7-8 months (depending on exactly when they started and when they took Test 2).

Results

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[2]   Test 2 was carried out when the teacher finished Chapter 4 of the *Hier und da* textbook, which is why schools were allowed to proceed with the test on different dates (depending on how fast the material was introduced by the teacher).

Chart values: 55.20 (5x/tydzień), 55.84 (2x/tydzień), 54.85 (1x/tydzień), 53.44 (3x/miesiąc), 52.88 (2x/miesiąc), 52.21 (1x/miesiąc), 50.06 (1x/2m)

Note box:
/tydzień = /week
/miesiąc = /month
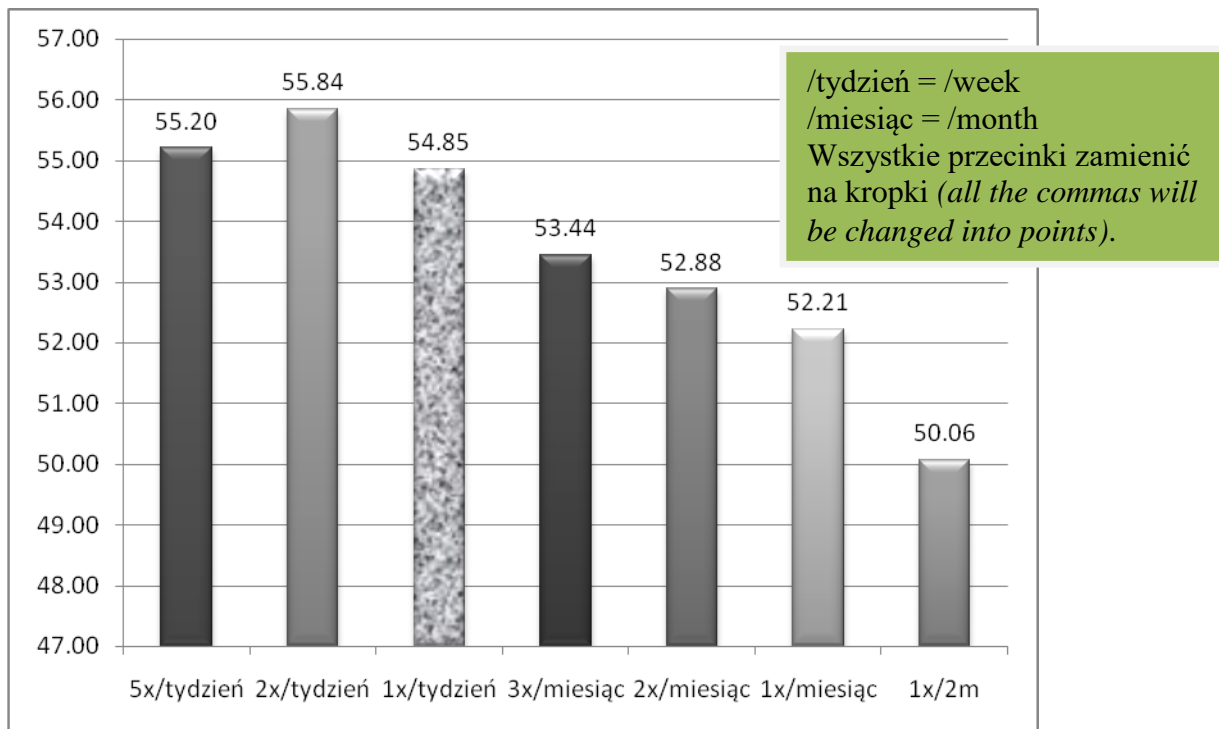Wszystkie przecinki zamienić na kropki *(all the commas will be changed into points)*.

Chart 3. Number of points scored by the students who had completed at least 50% of the course material according to the minimum frequency of repetition.

Taking into consideration the results of the students who had used the online course at least once a week, it was found that their average score (54.85) was 32% higher than the average score of the experimental group as a whole (41.49) and 39% higher than the average score of the control group (39.40). The irregularity of the chart, i.e. a decrease in the average score on Test 2 for the group that did the repetition at least 5 times a week is probably related to the very small size of the group (only 5 people), which is likely to have caused a disturbance in the statistical result.

In order to analyse the dynamics of the results from both tests, a comparison of percentile scores, (i.e. scores based on the relative position of students in the group) was carried out. As a result, the scores assigned to each student based on their positions in the experimental group as a whole on Test 1 (at the beginning of the experiment) were compared with the scores assigned to them on the basis of their position in the experimental group as a whole on Test 2 (at the end of the experiment). For example, a student may have scored 70% on Test 1, because their score was 70% higher than the score of their peers in the rest of the experimental group. If the same student then had a score 80% higher than their peers in Test 2, the change in their score was +10%, which means an improvement of their position compared with the group. (…)

As a result of the above analysis, a clear correlation was found between the level of activity of students on the platform and the positive dynamics of their percentile scores between the first and the second tests. (…) In particular, students who completed at least 50% of the material and did all of the repetition scheduled for them by SuperMemo at least once a week improved their positions by 5.92% compared with the rest of the group. This shows that students using the course on the supermemo.net platform scored higher on the tests than the others in absolute terms. Furthermore, their score positions improved compared to the rest of the group.
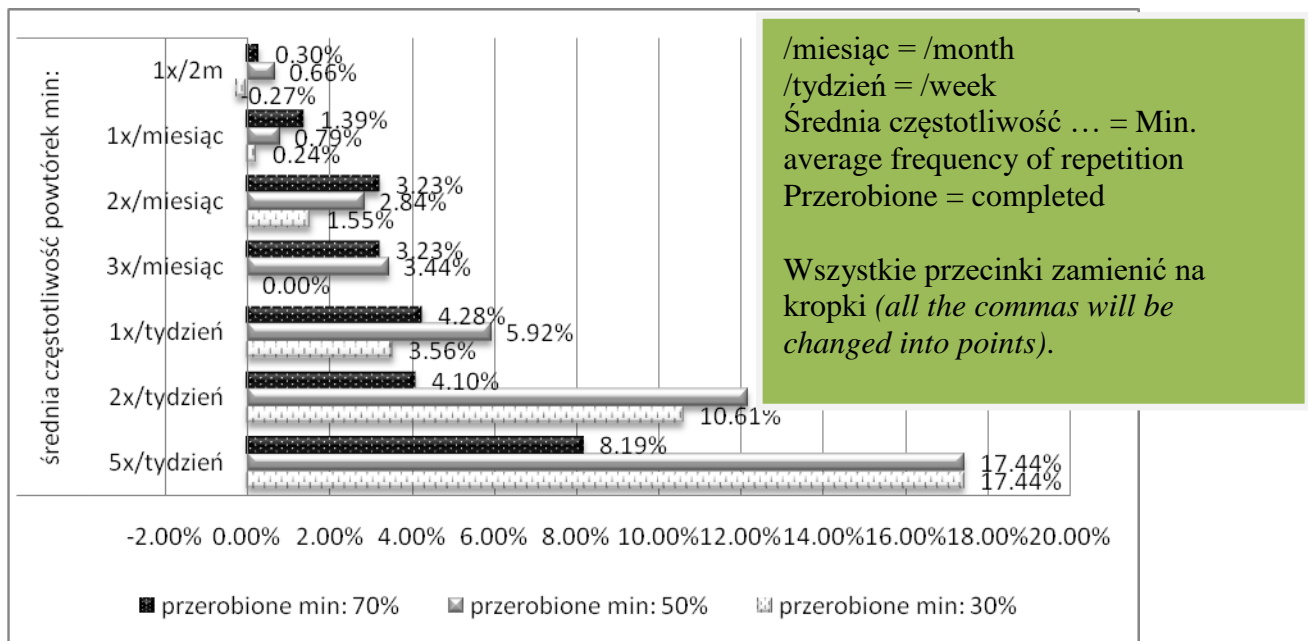
Chart with vertical axis labeled "średnia częstotliwość powtórek min:" and the following data:

- 1x/2m: 0.30%, 0.66%, 0.27%
- 1x/miesiąc: 1.39%, 0.79%, 0.24%
- 2x/miesiąc: 3.23%, 2.84%, 1.55%
- 3x/miesiąc: 3.23%, 3.44%, 0.00%
- 1x/tydzień: 4.28%, 5.92%, 3.56%
- 2x/tydzień: 4.10%, 10.61%
- 5x/tydzień: 8.19%, 17.44%, 17.44%

Horizontal axis: -2.00% 0.00% 2.00% 4.00% 6.00% 8.00% 10.00% 12.00% 14.00% 16.00% 18.00% 20.00%

Legend: ■ przerobione min: 70%   ▧ przerobione min: 50%   ▨ przerobione min: 30%

Callout box:
/miesiąc = /month
/tydzień = /week
Średnia częstotliwość … = Min. average frequency of repetition
Przerobione = completed

Wszystkie przecinki zamienić na kropki *(all the commas will be changed into points)*.

Chart 4. Changes in experimental group scores (in per cent) between the first and second tests.

Benefits of learning using the supermemo.net platform

The method of supporting the traditional learning of a foreign language with an online SuperMemo course proved beneficial for both teachers and students:

- The course on the supermemo.net platform made learning more diversified and attractive
- The recordings in the course provided constant access to phonetic models (…)
- The personalised repetition system accelerated the process of learning new vocabulary and the practical application of grammar, which allowed students to prepare for the tests more effectively
- The online course allowed students to learn at any time and with the use of any computer with Internet access, i.e. both at school and at home
- The community aspect of the supermemo.net platform increased motivation for learning by facilitating contact and the exchange of ideas and observations between students
- Teachers were provided with an attractive tool for supporting the learning process, including during German classes which took place in computer rooms
- By using the learning data provided by the platform, teachers were able to monitor the progress of their students, as well as their regularity of study and their levels of involvement in the project.

References:

1. Łodyga, O. (2010). *Indywidualizacja e-nauczania na przykładzie metody SuperMemo.* [w:] *Rola informatyki w naukach ekonomicznych i społecznych. Innowacje i implikacje interdyscyplinarne*. 2/2010, Redaktor Z. E. Zieliński, WSH im. B. Markowskiego, Kielce 2010.

Internet references:

1. http://www.supermemo.com (05.08.2010)
2. http://www.supermemo.pl/opis_metody (04.06.2011)