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# IMPROVING STUDENTS' LANGUAGE PERFORMANCE THROUGH CONSISTENT USE OF E-LEARNING: AN EMPIRICAL STUDY IN JAPANESE, KOREAN, HINDI AND SANSKRIT

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## Abstract

This paper describes the backing theories, methodology, and results of a two-semester long case study of the application of technology in teaching four Asian languages (Japanese, Korean, Hindi, and Sanskrit) to Croatian students. We have developed e-learning materials to follow the curriculum in Croatia and deployed them in Asian language classrooms. Students who agreed to participate in the study were tested before using the materials and after each semester, and their progress was surveyed. In the case of Japanese students (N=53), we have thoroughly monitored their usage and compared the progress of students who have diligently studied vocabulary and grammar using our materials on Memrise, and those who have neglected their studies. This was measured through their scores on the Memrise, which shows the user's activity. Also, their progress was measured using standardized tests that were designed in such a manner to resemble Japanese Language Proficiency Test. We have found that frequent users progressed averagely 20,3% after each semester, while non-frequent users have progressed only 11,6%, proving this method to be related to stable and constant use of e-materials.

**Keywords:** e-learning; second language teaching; Japanese; Korean; Hindi; Sanskrit; Memrise; Anki; Quizlet

## Povzetek

Članek obravnava dva semestra trajajočo študijo primera o uporabi tehnologije pri poučevanju štirih azijskih jezikov hrvaškim študentom; japonščine, korejščine, hindijščine in sanskirta. Razvili smo elektronsko učno gradivo in ga dali v uporabo študijskim programom z omenjenimi štirimi azijskimi jeziki. Študentje, ki so bili pripravljeni sodelovati, so izvedli preizkus znanja jezika pred uporabo elektronskega učnega materiala ter po vsakem končanem semestru. Analiziran je bil njihov napredek. V primeru študentov japonščine – teh je bilo 53 –, smo se osredotočili na njihovo uporabo elektronskega učnega gradiva in primerjali študente, ki so pri učenju besedišča in slovnice redno uporabljali e-gradivo na spletni strani Memrise, s tistimi, ki niso uporabljali e-gradiva. Uporabili smo število dostopov na spletno stran, kar nakazuje na aktivnost učenja študentov. Njihov napredek smo



merili s testi, ki so bili oblikovani na osnovi standardnih testov japonsčine JLPT. Ugotovili smo, da so se študentje, ki so redno uporabljali e-gradivo, na testih izkazali bolje, saj so v primerjavi z rezultati na prejšnjih testih napredovali za 20,3%, medtem ko so tisti študentje, ki niso uporabljali e-gradiva, napredovali le za 11,6%. S tem smo dokazali koristnost redne in dolgoročne uporabe elektronskih učnih materialov.

**Ključne besede:** e-učenje; poučevanje drugega jezika; japonsčina; korejščina; hindi; sanskrit; Memrise; Anki; Quizlet

## 1 Introduction

This paper presents the results of a year-long project, with the goal of producing systematic and sustainable materials for e-learning of Asian languages in Croatian language. We have covered four languages within the project: Japanese, Korean, Hindi and Sanskrit. The materials for each language were created by a language teacher and a team of collaborators, using the most common textbooks used in Croatia for the reference. Our primary goal was to create e-learning and m-learning materials which can be most beneficial to learners and for that reason the materials should follow the classroom curriculum as much as possible. A secondary goal of the project was the research of the correlation between e-learning using spaced repetition algorithms and learners' improvement of vocabulary, grammar, and writing in written language performance only, i.e. test speaking and listening skills were not included. This is due to the format of the materials and short-term length of the project, but it is certainly planned in the future should this method prove to be successful.

The first phase of the project consisted of conducting the comprehensive survey with the learners of Japanese, Korean, Hindi and Sanskrit throughout Croatia, and learning about difficulties in their studies, specific needs in the study materials, and their attitudes towards e-learning. The second phase was creating materials according to the survey results, on the e-learning and m-learning platforms Memrise, Quizlet and Anki, and their employment in the language classrooms as much as possible. Throughout the project, we have conducted language testing every three months, in order to assess the improvement in students' performance. The final phase included reviewing the results and using this input to improve the materials for the new generation of learners. In this article we will present some current studies in the similar fields, the methodology of our research (creation of materials and testing), our results and their commentary.

## 2 Languages and technology

### 2.1 Terminology issues: CALL, e-learning, m-learning and languages

In the *MemAzija* project, we dealt with using technology in language learning. It should be recognized that there is a lot of terminology relating to this field, some of which intersect. Computers and language learning have been a topic of research even before the broad spread of Internet and ever-present smart-phones. This project falls into the broad field of computer-assisted language learning, or CALL (Hanson-Smith, 2002). According to Warschauer and Healey (1998), CALL is present from the 1960s, but the presence of Internet and its myriad of opportunities 'can truly revolutionize it.'

Thus, this project fits into the field of e-learning, but also online learning as we are using the Internet as a medium. It is important to mention that mobile learning, or m-learning, is an important part of the project because all materials can be, and are, accessed through mobile devices such as smart-phones and tablets. Terms e-learning and m-learning are not limited to language studies. In fact, they are often not systematically applied to the field of language learning. According to Simkova, Tomaskova and Nemcova (2012), e-learning is limiting learners because it does not enable them to study at any place, while m-learning enables them not only to study anywhere but also to receive information and news faster. In language study, the continuous input is of a great importance, so m-learning is an ideal option for languages that are not often encountered in Croatia, such as our goal languages. We are aiming to use the technology for learners' benefit, in the long term and providing systematically organized content which follows the curriculum.

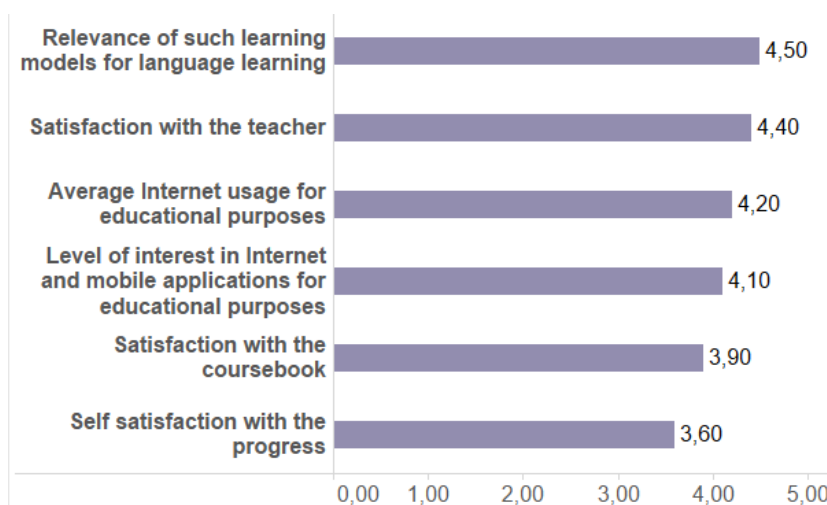
There are many benefits found in CALL and mobile/electronic language learning fields such as improving the results (Golonka et al., 2014) and also attitudes of students toward certain subjects (Yushau, 2006). However, we have discovered that in the case of Asian languages, long-term studies with a larger corpora of participants are very hard to find. One such study is about using Skritter software for Chinese character practice to improve proficiency (McLaren & Bettinson, 2016). With the lack of such studies for Asian languages, we hope that our research will contribute to the field in the area of technology usage in Asian language learning, especially considering promising results of our smaller-scale research, which we present in the next section.

### 2.2 Previous research

There is a plethora of research which deals with students' attitudes towards CALL (Ayres, 2002; Kuo, 2008; Rahimi & Yadollahi, 2011; Mashhadizadeh & Rezvani, 2015), without actually having tested materials in practice. In cases where some tests have been performed, they were either short-lived (e.g. one session with results of pre- and post- testing, as in De la Rouviere, 2013), or with a very small number of students (Tam & Huang, 2012). While these articles provide some insight into relationship between technology and language teaching and learning, we were interested in longer and more

systematic exposure to e-learning, especially that which is conducted as complementary to classroom curriculum.

Studies generally suggest favorable views on using technology in language classroom (Tam & Huang, 2012), as we have also found in our survey in the first phase of the project. Out of 203 surveyed students of Asian languages, most have given a favorable grade to the prospect of using technology in their studies, but they also reported mostly on not being previously exposed to it in the classrooms of Japanese, Korean, Hindi or Sanskrit. A small number of students used some e-learning websites on their own, while only 23.6% have had a chance to encounter e-learning and technology in language learning in the classroom. Graph 1 (adapted from Janjić et al., 2016) shows Croatian students' attitudes toward e-learning in Asian languages. This research was conducted on all age groups of learners of Asian languages, most of them being university students.<sup>1</sup>



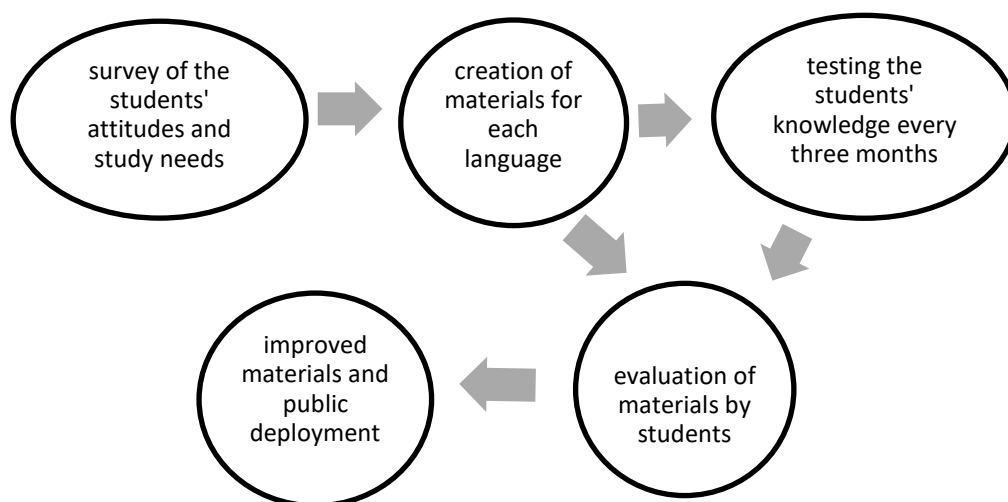
**Graph 1:** Attitudes of Croatian students of Asian languages towards e-learning

Even though literature review encourages us to start developing technology-based materials for studying, we should be wary of overstating their usefulness. Wiebe and Kabata (2010) warn us that instructors tend to assess the usefulness of their computer-based materials higher than students. This does not necessarily signify they are not as useful as we have thought, but that we need to develop materials tailored to specific learners' needs. This can not be done without proper research and testing. This project aims to develop the first draft of materials, measure their usefulness in this state, but also to collect feedback in order to improve them for the next generation of learners.

<sup>1</sup> Detailed demographics and survey results are presented in Janjić, Librenjak and Kocijan (2016).

### 3 Methodology

In order to systematically conduct research with e-learning and m-learning materials amongst students, we needed to establish a relatively strict methodology. Figure 1 shows the draft of the method for this research.



**Figure 1:** Schematic view of the methodology for this project

#### 3.1 Student survey

Before creation of materials, the survey among 203 Croatian students of Asian languages (Japanese, Korean, Hindi and Sanskrit) was conducted, and specific information gathered (Janjić et al., 2016). We have found most difficult areas for each language because each was treated differently due to various differences: the script (e.g. Japanese uses most difficult writing system, as rated in the survey), the grammar (Indo-European versus non-Indo-European languages), pragmatic level (use of Sanskrit in a conversation is not very probable), etc. We also collected information about the most common textbooks used in Croatia, and reasons behind studying these languages. This information was used in order to determine how to create the best possible materials for the first phase, but having in mind that they would have to be further improved after receiving students' feedback.

#### 3.2 Creation of e-materials on Memrise, Anki and Quizlet platforms

After the survey, we concluded that for the creation of e-materials we should use platforms that are available both as desktop and mobile version but are also easy to use from the teachers' and students' perspectives. For us, this meant that the platform has simple procedures for course creation as well as for course materials usage. Two of the chosen platforms (Memrise and Anki) use spaced repetition algorithm to improve students' memory, while the third one (Quizlet) uses games and text to speech

synthesis to improve students' listening skills and add more fun to learning. We have also divided the used platforms by language in order to respond to language specific problematic areas which were reported in the survey. The choice of a platform per language, as well as most common learning issues, are shown in Table 1.

Language	Most common learning issues	Platform(s) chosen	Reason
Japanese	script (kanji)	Anki	spaced repetition: the best choice for a large number of separate items to memorize
	speech production, grammar, vocabulary	Memrise	adaptable to various skills (grammar and vocabulary), best interface
Korean	speech understanding, writing and composition, grammar	Quizlet	automatic TTS (text to speech synthesis) ensures a lot of listening games to practice sentence formation
Hindi	speech production and understanding, memorizing vocabulary	Memrise	best choice for memorizing words in an attractive setting Quizlet provides no spaced repetition algorithm
Sanskrit	writing and composition, grammar, pronunciation	Memrise	adaptable to various language skills, popular with students

**Table 1:** Choices of platforms for creation of materials per language

It is important to note that these materials do not cover all necessary language skills. We have focused on improving vocabulary and script acquisition, and to some extent grammar. Platforms specialized for memorization, such as those used in our project, have their limitations. Thus, for specific grammar exercises some other e-learning materials should be used. A mobile and desktop applications for practicing grammar are being produced by authors for additional assistance in learning.

In this project, we have covered levels from A1 to B1, since there are not that many students who have so far reached level B1 in any of the languages. For the convenience of understanding and comparison it is important to keep in mind that names of these levels correspond to CEFR name levels. A1 designates a student beginner and material that should be covered by such student to reach level A2 which marks a learner who is a beginner with limited working proficiency. B1 level marks a student experienced with longer exposure to language learning, wider vocabulary than A1 and A2 level students, and is at beginning stages of intermediate level of his /her skills. We have extended the same classification over students of Sanskrit as well, which is like Latin considered a dead language even though it is claimed as the mother tongue by a small community

in India.<sup>2</sup> In this research we saw it fit to extend the division of levels to Sanskrit for one more reason: the research is focused on the study of students' acquisition of grammatical topics and vocabulary, and in that case whether a language is dead or not does not influence the distinction of beginner levels from intermediate levels, or in our case A levels and B levels. All the materials are published publicly under Creative Commons license (Attribution-NonCommercial-ShareAlike) and are available on the project website (<http://memazija.ffzg.unizg.hr/>), as well as on respective websites of each platform. They are not meant to be used only by the learners who actively participate in the project, but are free to be used by anyone who wants to learn either of the four languages in Croatian. Since the materials are easily adaptable and translatable, the raw materials are available upon request and could be localized for usage in another language.

### 3.3 Pre-usage and post-usage testing of students' knowledge

In order to assess the usefulness of materials, standardized tests were performed every three months. A number of learners who agreed to participate in the project for two semesters were monitored in their usage of materials through their user-names, and tested every three months for the improvement in their knowledge. In the case of Japanese, their test results were also compared to their individual usage of materials.

Students were asked to complete the test before we distributed the materials (pre-usage testing). After the first three months of using the materials, they were asked to complete another test of the equal format, but with a different set of questions. Another three months later, second post-usage testing was performed. All three tests were designed following the format of standardized tests for Japanese and Korean, and aligned with curriculum. However, for Hindi and Sanskrit such standardized tests were not available and therefore the tests followed topics covered by Croatian curriculum.<sup>3</sup> All tests included sections on vocabulary (with script), grammar and reading. As in the standardized tests published by the Ministries of Education of Japan or Korea, questions were multiple choice. The tests for Hindi and Sanskrit followed the same format. For the purpose of this project, the skills of writing, listening and speaking were not tested. Although they are certainly important language skills, they were not a part of this research project.

In the case of Japanese, we have used JLPT (Japanese Language Proficiency Test) format, dividing them into three levels: A1 approximately corresponding to N5, A2 approximately corresponding to N4 and B1 as a level approximately between N3 and

<sup>2</sup> See statistical data on mother tongues in India:

[http://www.censusindia.gov.in/Census\\_Data\\_2001/Census\\_Data\\_Online/Language/Statement1.aspx](http://www.censusindia.gov.in/Census_Data_2001/Census_Data_Online/Language/Statement1.aspx).

<sup>3</sup> Since standardized tests are an internationally objective way of measuring knowledge, we opted to use them for comparison of results whenever possible, while the materials themselves follow the curriculum.



N2.<sup>4</sup> Each test consisted of following sections: kanji reading and recognition, vocabulary, particles, grammar in context, dialogues, reading passages.

Korean tests were constructed on the basis of TOPIK (Test of Proficiency in Korean), published before the 2014 reform. Students who were taking A1 and A2 Korean class, were given a test similar to TOPIK I, and students who are taking B1 class took the test of the format similar to TOPIK II. The students were tested on vocabulary, particles, grammar, completing the paragraphs, ordering text and reading comprehension.

Hindi and Sanskrit tests were constructed following information from teachers on grammatical topics covered by students of each year and the textbooks used for study. Thus, the first year students of Hindi were given tests that correspond to A1 level, students of second year tests of A2 level and students of third year or higher tests that correspond to B1 level. They were tested on vocabulary, grammar, ordering text and reading comprehension.

In the case of Sanskrit, the main issue was that it is being taught primarily in a different way from other languages included in the study. As a language which is considered dead, and is thus comparable to Latin and ancient Greek, the dominant teaching method is concentrated on enabling students in the first year to independently recognize different grammatical units (verbal tenses, cases, sandhis, etc.). In collaboration with the teacher, these units were classified as levels which could correspond to A1, A2, etc. Vocabulary, deemed necessary for students to absorb, was extracted from texts students mostly encounter during their studies and was based on the frequency of lexemes' appearance. The students were tested on vocabulary, grammar and reading comprehension.

All tests are computer based and automatically graded, and could be used in any language since the questions are all in the target language, with the exception of cues and instructions. A student writes their user-name for the platform they are using when writing the test, and their result is stored in our database. In other words, we have not only monitored their grades on the standardized testing, but also its correlation to the frequency of their usage (i.e. scores which are awarded with the activity on Memrise). For the purpose of this study, we were able to perform this only for the students of Japanese, so the results pertaining to this comparison are not generalized for all four languages.

### **3.4 Evaluation of materials by students and further distribution**

Finally, the materials needed to be graded by their users in order to improve them further. During the two semesters of their use, we accepted all reports of errors, bugs, and imperfections that could have been solved while not disrupting the availability of materials to users. Upon the completion of continuous two semester usage, students

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<sup>4</sup> It should be noted that JLPT does not officially correspond to CEFR.

will also be asked to complete a comprehensive survey which will collect their attitudes towards this type of study, their grade of the materials in the whole as well as for each specific field and type. We also hope to be able to collect the suggestions to construct the lessons and tasks better, and re-issue faulty materials where necessary.

After we employ the needed improvements, we will be ready for the distribution and promotion of our materials to all types of users in Croatia including universities, language schools and private students. Although they have been publicly available since 2015, after additional improvement, a new wave of promotion throughout Croatia will be implemented. They will be promoted through workshops, school visits and the Internet.

## 4 Results and discussion

The materials were distributed to students throughout Croatia, and 65 of learners also agreed to participate in the two-semester monitoring of their progress while using the materials. All users were given a chance to participate in the testing in order to compare their results before and after using the materials. In the case of Japanese, their results were also compared with the frequency of using vocabulary and grammar exercises on Memrise. Other languages have not had a sufficient number of users to provide us with a detailed statistical account of the correlation between their Memrise scores and test scores, but we have recorded their test scores nevertheless.

### 4.1 An overview of offered courses and their users

Learners have had a number of courses to partake in. All of them follow most schools' curricula in the target language, so this should have been an additional motivational factor. It is important to note that instructors also play a significant role in motivating their students to use materials. According to Schmidt and Watanabe (2001), the role of a teacher as a motivator in language learning is significant in both generating, as well as in maintaining students' motivation. It was not possible to completely control and stimulate usage throughout two semesters in the various places of learning, so it was expected that course completion rate would not be 100%, i.e. that a number of students would stop using materials at some point. We expected that at lower levels, especially A1, would have most users since there are more students in e.g. the first year of Japanese or Hindi course than there are students in a second or third year. Table 2 shows courses created in the *MemAzija* project, as well as their current number of units, their main source and the current number of users.

Language and content		No. of units	Main source	Users	Audio + meme
Japanese	Vocabulary A1	768 words	Genki 1	85	yes
	Grammar and sentences A1	134 sentences		63	yes
	Vocabulary A2	751 word	Genki 2	28	yes
	Grammar and sentences A2	180 sentences		23	partially
	Vocabulary B1	772 words	Integrated approach to intermediate Japanese	11	not yet
	Grammar and sentences B1	266 sentences		10	not yet
	Vocabulary B2	85 words (currently in making)	Tobira: A gateway to advanced Japanese	N/A	not yet
Korean	Hangeul course	235 excercises	Active Korean 1	31	yes
	Vocabulary A1.1	402 words	Active Korean 1	25	yes yes
	Grammar and sentences A1.1	97 sentences			
	Vocabulary A1.2	413 words	Active Korean 2	8	yes
	Vocabulary A2.1	465 words	Active Korean 3	5	yes
	Vocabulary A2.2	387 words	Active Korean 4	4	yes
Hindi	Vocabulary A1	720 words	Complete Hindi: A Teach Yourself Guide	21	partially
	Grammar and sentences A1	501 sentence	Complete Hindi: A Teach Yourself Guide	22	yes
	Vocabulary A2	1148 words	Complete Hindi: A Teach Yourself Guide	4	partially
	Vocabulary A2.2 (synonymes, antonymes, expressions)	83 pairs	Complete Hindi: A Teach Yourself Guide	2	partially
	Grammar and sentences A2	453 sentences	Complete Hindi: A Teach Yourself Guide	3	yes
	Vocabulary B1	683 words	Living Language Hindi	2	partially
	Grammar and sentences B1	494 sentences	Living Language Hindi	2	not yet

Language and content		No. of units	Main source	Users	Audio + meme
Sanskrit	Vocabulary A1	297 words	Elements of Sanskrit Grammar, most frequent words from Mahabharata and Ramayana	21	partially
	Grammar and sentences A1.1	377 sentences	Elements of Sanskrit Grammar	20	not yet
	Grammar and sentences A1.2	219 sentences	Elements of Sanskrit Grammar	3	not yet
	Grammar and sentences A2.1	186 sentences	Elements of Sanskrit Grammar	2	not yet
	Grammar and sentences A2.2	73 sentences	Elements of Sanskrit Grammar	1	not yet
	Vocabulary A2	531 word	Elements of Sanskrit Grammar, most frequent words from Mahabharata and Ramayana	4	partially
	Vocabulary B1	522 words	most frequent words from epics, puranas and classical literature	4	partially
	Grammar and sentences B1	20 sentences (in making)	Elements of Sanskrit Grammar	N/A	not yet

**Table 2:** List of all MemAzija courses, their units, sources and users

Along with those courses, specifically for the acquisition of scripts (hiragana, katakana and kanji for Japanese, hangeul for Korean), Anki flashcard decks were constructed. As one can see, a number of users are significantly higher at lower levels, which is in accordance with the number of students in lower and higher school years, as well as the testing attendance throughout the academic year, which is discussed in the following paragraphs.

## 4.2 General testing results for all languages

Tests were conducted in three intervals: first test (pre-usage) in the beginning of the academic year 2015/2016, second test after the first semester (around February 2016) and the third test after the summer semester (June 2016). We invited all learners who agreed to partake in the study, but we were not always able to ensure their complete attendance, since it was voluntary, and the largest part of the participants are studying these languages as a hobby or a facultative subject, and not their major.

Still, we were able to collect enough information to compare their progress in each of the intervals. As Asian languages and their teaching methodology is a severely underdeveloped field in Croatia, at the point of writing this article there were not enough students to form control groups. Thus, the figures shown in Table 3 only serve as the record which should be compared with the future research. They cannot testify about the influence of e-learning on the general performance, as it is impossible to ascertain to which extent did e-learning and m-learning help in their improvement. The following chapter will discuss the case of Japanese, where we were able to perform more detailed analysis of the students' progress.

Table 3 summarizes the testing results per language per levels for each three testing intervals, as well as the number of attending students. Average scores are displayed in percentages of correct answers. Percentages in brackets mark improvement in correlation to the prior testing. As already mentioned, number of Hindi and Sanskrit students does not allow any statistically valid conclusions. The first year Hindi students (marked with \* in Table 3) show higher mean score in pre-usage test than other Hindi students, whereas with Sanskrit it is opposite. One could speculate that it shows that first year students are more interested in living language, whereas at later stage their understanding of a language like Sanskrit becomes more consolidated, hence their pre-usage results are better. In general in all four languages, the positive surge in results after pre-usage test could point out to psychological effect test had on students, i.e. their motivation in having better results. Similarly, the second test mean score could point out to the decreased level of motivation or, on the other hand, to students experiencing more challenges in their further study and overview of topics.

Language	Pre-usage testing (Sep. 2015)		First testing (Feb. 2016)		Second testing (Jun. 2016)		Average score improvement
	Mean score	No. of students	Mean score	No. of students	Mean score	No. of students	
Japanese	29%	48	50% (+21%)	30	61% (+11%)	17	17,89%
Korean	63%	12	<i>n/a (not enough students stayed in the course)<sup>5</sup></i>				
Hindi	20,42% (30%)* <sup>6</sup>	14 (+9)*	42,1% (+21,68 %)	6	53,28% (11,18 %)	4	16,43%
Sanskrit	44,27% (32%)*	11 (+16)*	51,11 % (6.84 %)	6	60,66% (9,55%)	5	8,19%

**Table :** Testing results for MemAzija users and their general improvement

<sup>5</sup> If the number of the Korean language students who stay in the classes after one semester reaches a statistically significant number, the research will be repeated. In this research, it regrettably had to be omitted because only 3 students stayed in the class.

<sup>6</sup> First year students (marked with \*), tested as a reference for non-first year students learning Hindi and Sanskrit. First year students did not come forward to participate in first and second testing.

### 4.3 Correlation between Memrise usage and improvement in language performance: a case of Japanese

Additionally, we have specifically measured the activity of students of Japanese, since they were most active and most numerous. This is done in order to determine the connection between the usage of e-learning materials and language performance more precisely since the number of Asian language students in Croatia is not high enough to perform specific statistical analyses.

For this part of the research, 53 participants took part during the two semesters of research and study. Out of 53, 21 did not use Memrise frequently (category „analog“), 22 have used it regularly (category „digital“), and 10 have used it but not as diligently (category „mixed“). This was measured through Memrise activity scores: „analog“ was <500.000, „mixed“ was between 500.000 and 1.000.000, and „digital“ counted the users who have scored more than 1.000.000 points on materials issued by MemAzija on the Memrise. All participants were invited to regular testings, and their results were compared according to the category. It should be noted that the „mixed“ category also signified that a participant has also used Memrise a lot, but has taken a break at some point, so they are not as consistent in both semesters. Nevertheless, since they have certainly used the materials a lot, they are grouped together with the category „digital“ for the overall results, in opposition to the category „analog“.

Table 4 displays the results and average attendance rate for all groups. We can recognize two patterns: those who are not using Memrise a lot are not participating in the tests that much either; and those who are using Memrise more display better results in tests, having progressed 5,76% more after first, and 10,20% more after second testing, compared to the first group, i.e. showing mean progress of 11,6% for non-regular users and around 20% for users of Memrise.

Category	N	Average scores			Average change in scores		
		Pre-usage	After 1 semester	After 2 semesters	After 1 semester	After 2 semesters	Mean
<b>Analog</b> (non-frequent Memrise users)	21	28,7%	40,9%	51,9%	18,9%	4,3%	11,6%
Attended test:		18/21	6/21	4/21			
<b>Mixed</b> (used Memrise but with breaks)	10	29,2%	53,2%	61,0%	17,4%	22,9%	20,1%
Attended test:		10/10	7/10	2/10			

Category	N	Average scores			Average change in scores		
		Pre-usage	After 1 semester	After 2 semesters	After 1 semester	After 2 semesters	Mean
Digital (used Memrise consistently)	22	27,6%	52,0%	63,1%	27,8%	12,9%	20,3%
Attended test:		20/22	17/22	11/22			
Overall	53	28,1%	50,39%	60,21%	<b>+23,79%</b>	<b>+11,99%</b>	<b>+17,89%</b>
Attended test:		48/53	30/53	17/53			

**Table 4:** Testing results and average progress compared to various activity categories on Memrise

These scores point us to the existence of correlation between consistent and systematic learning using Memrise and improvement in standardized test scores. It is interesting to note that Memrise does not significantly lose its effect on a learner even if it is not used extremely consistently, as the users in the „mixed" category have had similar overall progress to those who have had a bigger score, i.e. have used Memrise more. However, we can conclude that using Memrise to study likely improves learner's performance on a Japanese standardized test over time. Unless we could perform complete surveillance over students' habits, it is impossible to completely discern all the factors contributing to their improvement. Although we could speculate that, for example, digital group students are more prone to technology, however, it is not possible to determine the influence of such factors in this research. For a possible topic of future research, we propose using the system consistently on a larger number of students to prove its usefulness more statistically significant. Lastly, vocabulary e-learning is certainly not sufficient for overall language proficiency, but we are inclined to conclude that it is an important addition and should be welcomed in language classrooms.

## 5 Conclusion

The conclusion that can be drawn from presented data can be summed up as following: students are interested in adding new learning materials to the already existing one. They have positive attitudes towards the use of technology. However, the data suggests that the consistency of students' usage of new materials mediated via technology is not ensured by the mere existence of such materials. Whether this should lead us to conclusion that e-learning is beneficial in case of any language learning is beyond the scope of this paper. It is, however, a question, that is interesting and surely important for science to answer. Hence, the general conclusion can be that further research in students' motivation, teachers' input and reflection on various aspects of created materials in language classrooms is very much in need, if not already overdue.

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