RaY

Research at the University of York St John

For more information please contact RaY at ray@yorksj.ac.uk

Computer assisted learning of Japanese verbs
- Analysis of errors in usage by Croatian students

Sara Librenjak, Marijana Janjić and Kristina Kocijan
Faculty of Humanities and Social Sciences, University of Zagreb, Croatia
sara.librenjak@gmail.com, marijanajanjic@yahoo.com, krkocijan@ffzg.hr

Abstract

This article deals with a specific topic in e-learning – acquisition of language grammar with the help of application designed to follow language class curriculum, and the analysis of errors collected by the application. Specifically, we are interested in Japanese language and Croatian learners. For the purpose of this research, we have analyzed all the Japanese verbs and grammatical forms for A1 and A2 levels, and systematically added them to a simple application, which was distributed to students for a six months trial usage. Based on the user inputs, we have analyzed the most common lexical and grammatical errors. This article provides detailed information about the most commonly mistaken Japanese verbs and grammatical forms, and explains the most likely reasons behind these errors. The purpose of this research is to promote e-learning and CALL in Japanese education, and help teachers and learners of Japanese language in Croatia and wider. Since most data is not language dependent, results of this research can be used by any Japanese language instructor or student.

Keywords: educational software, Japanese language teaching, CALL, Japanese verbs conjugation
Main Conference Topic: E-learning

Introduction

Japanese language is becoming more and more popular major of choice in Europe, and Croatian universities enroll around thirty new students every year at the University of Zagreb and University of Pula each. Even though it is still a relatively small field, its usefulness in business, tourism and translation is getting more widely recognized across Europe, and in Croatia as well.

Working in the field of Japanese language education, one can recognize various problems students may encounter in their study. We have specialized in defining and handling those problems in our project MemAzija, funded by European Union social funds. So far we have tackled the issue of Japanese script (Librenjak, Vučković and Dovedan Han; 2012) and vocabulary acquisition in our previous publications. As we established in our survey with 105 Croatian learners (Janjić, Librenjak and Kocijan; 2016), Japanese grammar is considered problematic for many beginners.

Japanese is an agglutinative language with no case and number, at least not to the extent that is present in Slavic languages such as Croatian. It does not have many exceptions and many tenses. Thus, in the beginning, it could seem that Japanese verb conjugation is extremely simple and needs no special exercises. However, this seemingly simple system becomes complicated for many learners. This is due to the fact that verbs express things which are not verbal, rather lexicalized, in Indo-European languages, e.g. the tense which expresses doing things in advance to be safe in the future. A learner often gets confused with Japanese verbs in two distinct manners: confusing the tense itself, or confusing the derivational rules. Since Japanese tends to be very elliptical in its constructions (i.e. omitting

anything not crucial to the meaning) correct verbal phrase often carries most of the meaning. When speaking, reading, writing or listening, one must be quick and accurate in determining the correct tense and form.

In order to devise the best method to teach students to produce verb forms quickly and accurately, we have resorted to computer-assisted learning method. We wanted to give them systematic and accurate, yet simple software which could be used for drilling all the grammatical forms they have learned during the class time.

Second purpose of this software was to consensually collect data from the users, forming a large database of correct and incorrect answers. From this database we can learn a lot about which verbs and which verb tenses and forms Croatian students find most difficult, and thus should be explained and practiced more in the class. We can suggest that this data would be indicative for other Slavic language learners as well, and some even for most Indo-European language learners, but to be certain of that fact, language-specific research should be performed.

First part of this article will present the current status of e-learning and Japanese language in Croatia. Secondly, we will describe the method of developing the software we used for this research. The software can be adapted to learning any language with flexion. Thirdly, we discuss its implementation in the classroom and advise the best practices to implement it alongside with the classes. Lastly, we present the typology of errors, providing the information about most common difficulties in specific tenses, as well as the lists of most commonly mistaken verbs, tenses and forms. We believe this data is useful for both students and teachers of Japanese language internationally, and the software portion could be adapted to various research projects if necessary.

E-learning and Japanese language in Croatia

In Croatia, Japanese language is taught in dozen language schools and at two universities. The number of students is equal to other non-dominant languages at universities, which is relatively large number for a small country. Although there is a lot of e-learning resources for Japanese language, almost all of it is taught in English or Japanese. For beginners in Croatia, we developed the Croatian language materials which follow the curriculum and most common textbooks. It was proven in various case studies (Altiner, 2011) that flashcard based programs help vocabulary retention in students, so we have used them as a basis for the materials which deal with vocabulary.

Along with the vocabulary and sentence exercises, there was a need for a e-learning component which enables student not only to memorize lexical items, but also to practice verb derivation. In this research, we will describe the latter.

So far, one can use Japan Foundation materials for instruction in English-Japanese language pair, with future possibility of other major world languages to be paired with Japanese. In the case of Croatian e-learning materials, during the MemAzija project we have provided lexical materials on the Memrise website and character learning and memorizing assistance with Anki spaced repetition software.

Unfortunately, for the verb and adjective derivation, there was no satisfactory pre-made software, and it had to be made by researchers. This will be further described in the next chapter.

Development of software for computer assisted learning of Japanese verbs

In order to develop the software for computer assisted learning of Japanese verbs, we needed to divide the work in several phases. As similar programs were already developed for other Asian languages, e.g. Chinese (Tam and Huang, 2012), we expected good reception

from the students. First phase is the analysis of Japanese verbs and adjectives, comparison to coursework and division by types in order to implement it better. Second step is the planning and computational implementation in Java programming language. Third phase is execution and testing. After the testing was complete, and the application positively evaluated by beta-tester students, it was ready for the classroom implementation. Figure 1 shows the model for the development of this software.
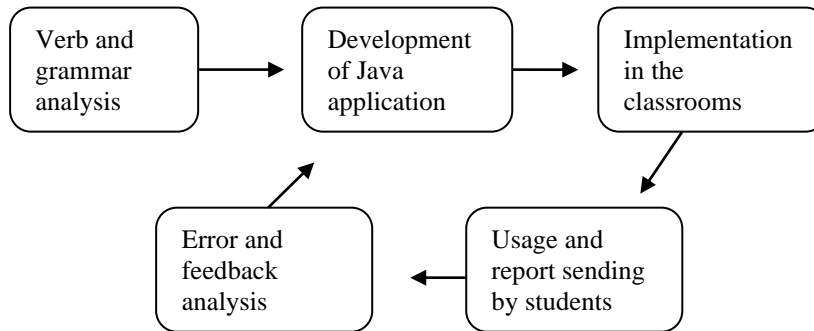
*Figure 1: Japanese verb practicing software development cycle*

In the first phase, we consulted the Genki I and II textbooks which are used in the universities in Croatia, and in many other countries as well, being considered one of the best Japanese textbooks. We divided the verb and adjective grammar into lessons and described the models for their formation in order for them to be digitally emulated. Since most students of Japanese in Croatia follow Genki textbook, it was decided that sorting the data using this approach would benefit most students. Since Japanese adjectives conjugate in a similar manner to verbs, we decided to include adjective grammar forms as well. Table 1 shows the grammar forms included in the software, and theoretical basis for their formation.

Table 1: Grammar forms for verbs and adjectives included in the application

Level	Grammar meaning	Base	Suffix	Lesson in Genki
1	Polite forms	Stem	-masu, masen, -mashita	3,4
2	Te-form	dictionary form	-te, -ite, nde,..	6
3	Permission, forbidding	te-form	-te kudasai, -te mo ii, -te wa ikemasen	6
4	Going to do an action	Stem	-ni iku, kuru, kaeru	7
5	Continuous form	te-form	-te iru, -te inai, -te ita..	7
6	Short forms	dictionary form	various forms	8, 9
7	Thinking and saying	short form	-to omou, omotta, -to iu, itta…	8
8	Likeing to do	short form	-no ga suki, kirai	10
9	Intention	short form	-tsumori, -tsumori ja nai	11
10	Wanting	Stem	-tai, -takunai, -takatta	11
11	Experience	short past	-ta koto ga aru/nai	11
12	Doing more activities	short past	-tari tari shimasu	12
13	Overdoing	Stem	-sugiru, sugimasu	8, 12
14	Please do / do not	negative stem,	-naide kudasai, -ta houga ii	12

Level	Grammar meaning	Base	Suffix	Lesson in Genki
		short past		
15	Must	negative stem	-nakereba ikeani, -nakya ikenai	13
16	Potential	dictionary form	-eru, -rareru, -emasu, -raremasu	13
17	Try, do in advance, to by accindent	te-form	-te miru, -te oku, -te shimau	13, 15, 18
18	Maybe do	short form	-kamoshirenai, -kamoshiremasen	14
19	Conditional	short form, short past	-tara, -nara	14, 17
20	Intention II	o-stem	-ou to omou	15
21	Doing and receiving favors	te-form	-te ageru, -te kureru, -te morau	16
22	Not having to	negative stem	-nakute mo ii	17
23	Regretting (not) having done	e-stem	-ba yokatta	18
24	Doing at the same time, way of doing	Stem	- nagara, -kata	18,23
25	Easy/difficult to do	Stem	-yasui, -nikui	20
26	Passive	dictionary form	-rareru, -areru	21
27	Causative	dictionary form	-sareru, -aseru	22
28	Causative-passive	dictionary form	-saserareru, -aserareu	23

Alongside with the grammar exercises, we included the verbs which are taught on A1 and A2 levels of Japanese course (CEFRJ), so the user can choose on which set of verbs the exercise is performed. Any combination of verbs and forms would be possible. Figure 2 shows some examples of choosing amongst different options using the graphical user interface.
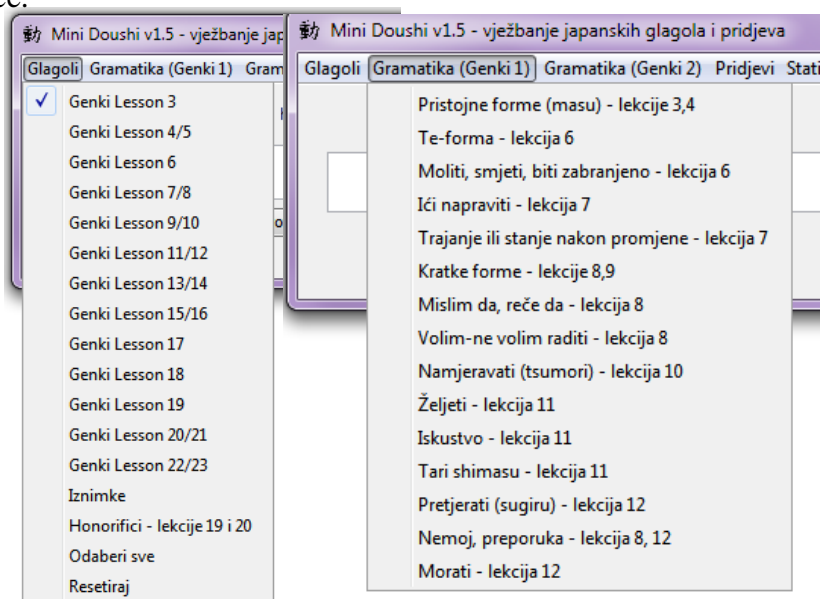
Figure 2: Possible options for verbs and grammar exercises

In the second phase, the actual software development took place. We have used the Java programming language, so the application could be used on Windows, MacOS and Unix platforms without difficulties. Application is named Mini Doushi (jap. "mini verb"). It was developed as a standalone application usable without the need for installation, logging in or internet connection. The only exception to this is the reporting function, which sends the user session data to our server upon user's request. Figure 3 shows the interface of the application.

The problem: grammar and dictionary form of verb in hiragana script

Menus for choosing grammar or verbs

動 Mini Doushi v1.5 - vježbanje japanskih glagola i pridjeva

Glagoli Gramatika (Genki 1) Gramatika (Genki 2) Pridjevi Statistika Pomoć

masu forma いく

いきません

Provjera Odgovor je: いきます

User input area

Check button

Answer in the case of an error
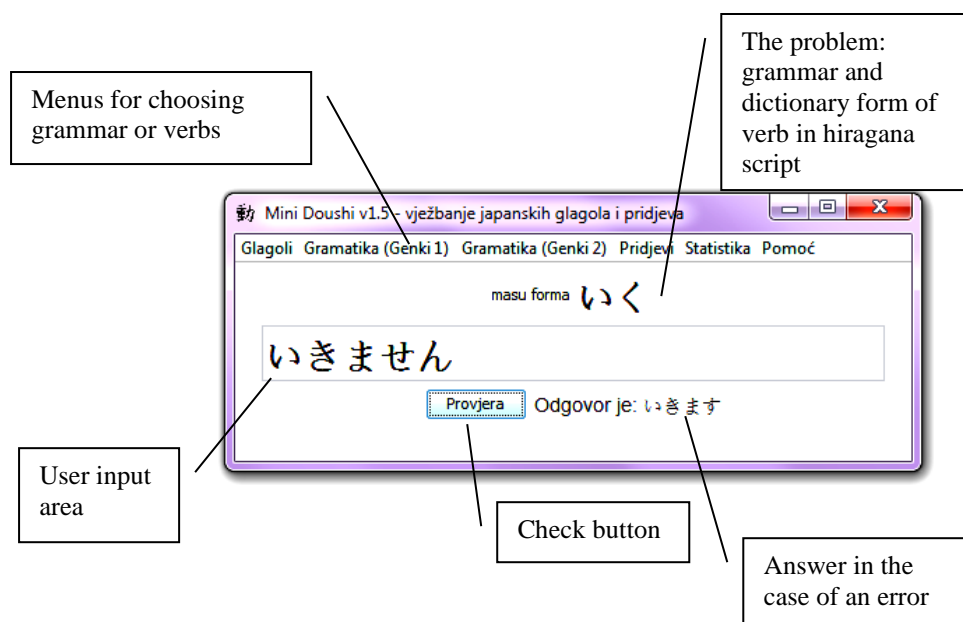
Figure 3: Japanese verb exercise application interface

As we can see from the Figure 3, the application is developed to be exceedingly simple to use by anyone, and only requirement is to have any Japanese input method available. If user does not know the answer, any input followed by an enter key will show the correct answer, but until it is typed (without the ability to copy and paste), one cannot proceed to the next task. Basic usage statistics are provided for the user, while more detailed reports are sent to our server. We have logged the time of usage, the verb, correct form and all the user's inputs. All these reports are sent deliberately by a user and no data is collected automatically. We have used these reports for error analysis in order to improve the proposed teaching methods.

Implementation in classroom and feedback

After the completion of testing and error checking of the first version of our application, we have implemented it in few classrooms. We have chosen one A1.2 Japanese course which has around 15 participants, one A1.1 Japanese course with 7 participants, one A2 course with 5 participants, and one B1 course with 4 participants for the first wave of classroom implementation. They have used the application consistently during one semester, and regularly sent the reports. Although there were more beginners then more advanced learners, we have chosen as many as possible students to test the majority of data in the application. The application covers at least two years of university study materials (A1 and A2), but for many students, reaching the A2 takes more than a year or two. There is also a considerable number of B1 (and above) students who have wanted to use the application in order to

improve their proficiency in some more complex grammar forms which are often mistaken, such as passive or causative.

The application was used for six months from March 2016 until September 2016 by 31 constant users, and a number of irregular users who used it at will but not as a part of their coursework. In this period we have collected more than 10.000 individual inputs from users, the properties of which will be discussed further in the following chapter. Additionally, the qualitative feedback from the users was collected on an irregular basis during the classes.

Most users reported satisfaction with the application, and agreed that it improves their speed of understanding and producing grammatical forms for verbs and adjectives. Bellés-Fortuño and Ramírez (2015) argue that motivation is the key success in second language acquisition. Generally, the students who were otherwise highly motivated to study Japanese used the application more and improved more, while the users who lacked motivation before the usage also procrastinated on the exercises and did not improve as much. It must be noted that additional survey is needed in order to understand students' feedback more thoroughly, since we have collected only qualitative data. This article mainly deals with the properties of the software and the analysis of users' outputs during six months usage, so detailed evaluation is not collected in this phase. We can only notice that it was used mostly enthusiastically during the classes.

Usage and error analysis results: typology of errors in learning Japanese verb conjugations

During the 6 months of usage by around 30 regular students and an unknown number of free users, we have collected 10.769 pieces of data with our application. The reports contained information, as it is shown in Figure 4, of the usage time, correctness of an answer, user input, the desired input, the verb in infinitive form and a Croatian language query.

10877	24.9.2016 20:52	T	もたなかったといっていました	もたなかったといっていました	もつ	reče da nije (prošlost)
10878	24.9.2016 20:53	T	かえったとおもいます	かえったとおもいます	かえる	mislim da je (prošlost)
10879	24.9.2016 20:53	F	のまないといっています	のまないといっていました	のむ	reče da ne..
10880	24.9.2016 20:53	T	のまないといっていました	のまないといっていました	のむ	reče da ne..
10881	24.9.2016 20:53	T	つくるとおもいます	つくるとおもいます	つくる	mislim da..
10882	24.9.2016 20:53	T	おきないとおもいます	おきないとおもいます	おきる	mislim da ne..
10883	24.9.2016 20:53	T	つけなかったといっていました	つけなかったといっていました	つける	reče da nije (prošlost)
10884	24.9.2016 20:54	T	あらったといっていました	あらったといっていました	あらう	reče da je (prošlost)
10885	24.9.2016 20:54	T	あめがふったとおもいます	あめがふったとおもいます	あめがふる	mislim da je (prošlost)
10886	24.9.2016 20:54	T	のらないといっていました	のらないといっていました	のる	reče da ne..

Figure 4: The format of user generated reports

The reports were then purged from the empty inputs, the nonsensical answers or Latin letter inputs, and results were organized in order to get as much data as possible. We were interested to find out the following:

1. How much do students err while learning new grammar;
2. What types of errors can a student make when conjugating verbs;
3. What types of errors are generally most common;
4. Which grammatical forms provided least accurate responses;
5. Which verbs produce most errors;
6. Which verbs are most likely to be confused by type (u- and ru-);
7. Which verbs are most likely to be confused during derivation;
8. Which verbs are most likely to be mistaken due to irregularity in verb.

Using our data, we have found answers to all these questions. Following paragraphs will describe the results and present them in tables. Even though the research was performed with

Croatian students, a number of this statistics can be applied to any language. For example, easily mixed up verbs are usually confused in any language, because of their Japanese properties, and this rarely has connection with a students' mother tongue. Language dependent information is marked in the tables with the asterisk sign.

Out of all unique users' inputs, there were 1400 errors, out of which some were subtracted as typos or written using wrong script by accident, which left us with 979 unique error out of 9168 unique user inputs. The average accuracy for all levels was 89,32%, i.e. only 10,67% tasks were not performed correctly on the first try.

A closer look at the errors enabled us to notice two large error making patterns – derivational errors and lexical errors, as well as the blank answer (complete yielding). Derivational errors constitute of grammar errors such as missing syllable in the pattern (e.g. *nomasu* where should be *norimasu*), extra syllable where it should not be present (e.g. *taberimasu* instead of *tabemasu*), wrong syllable somewhere in the suffix (e.g. *hanagemasu* instead of *hanasemasu*). Since Japanese has a syllabic script, most errors occur on this level. The expectation for derivational errors is the type of error where whole derivational logic was wrong, and not only one syllable (e.g. *mite ikimasu* instead of *mi ni ikimasu*). Most of the errors are logical due to the mix-up of the verb type, not knowing the rules, or lack of attention to a verb which was difficult to pronounce.

The second type of errors were lexical errors. They are caused by not knowing the nature of the verb in question, e.g. irregular verbs, mixing phonetically similar verbs (e.g. *tsukau* – to use, *tsukuru* – to make, *tsukeru* – to turn on), confusing u-verbs and ru-verbs[1] or i-/na- adjective types.

We did not specially analyze blank answers, typos or those which are related to technical errors. For the errors which could be analyzed, Table 2 provides the information of their frequency.

Table 2: Error typology and frequency in all user inputs

General type	Subtype	Count	Frequency
Derivation	Missing syllable	84	9%
	Extra syllable	49	5%
	Wrong syllable	176	18%
	Grammar uknown	144	15%
	Total	**453**	**46%**
Lexical	Irregular verb error	112	11%
	Mixed similar verbs	58	6%
	Confusing u- and ru- verbs	286	29%
	Confusing i- and na- adjectives	16	2%
	Total	**472**	**48%**
Blanks		53	5%
Total		979	100%

---

[1] Japanese verbs conjugate differently based on their stem type. Ru-verbs behave simply, just by subtracting last –ru syllable and adding a suffix, while u-verbs have a larger set of rules. There are also homophonic verbs which seem like one type, but conjugate like another, so this is often a source of confusion for some students.

As we can see, students err approximately equally often with both grammar and verb (lexical) knowledge. The most prominent type of error is confusing verb types, so we can stress its importance in the classroom. Teachers should provide special exercises to easily confused verbs. Also, adding wrong syllable in derivation, or not knowing the conjugation pattern (confusing with another grammar) is a prominent error. This information by itself is not enough – we need to understand which grammar patterns cause the most such errors. Irregular verbs are fourth most common error, so a special attention should be given to memorizing exceptions as well. It should be noted that our software has a special mode where you can practice only on irregular verbs, but we did not include a special mode for practicing easily confused u-verbs and ru-verbs. Before the analysis of this data, that was not possible, due to the fact that we did not have information about the verbs that are most easily confused.

The next version of this software will certainly include the mode for practicing verbs which are often confused or mistaken. Since this information is language-independent, we here provide the list of the most confused verbs. Table 3 shows three different types of information: the verbs which are confused by type (u-verb or ru-verb, which was the most common error all-around with 28%), the verbs which are mistaken during derivation due to their properties (any derivational error), and the verbs which are confused due to their irregularity (11% of all errors, on a relatively small set of verbs).

Table 3: Most commonly confused Japanese verbs

Rank	Confusing u- and ru-type	Confused because irregular	Most common derivational errors
1	かえる kaeru	いく iku	かく kaku
2	おきる okiru	くる kuru	いく iku
3	いる iru	しる shiru	かえる kaeru
4	ねる neru	する suru	おきる okiru
5	しる shiru	つれてくる tsurete kuru	はなす hanasu
6	たべる taberu	もっていく motte iku	よむ yomu
7	みる miru	もってくる motte kuru	のむ nomu
8	すわる suwaru	ある aru	まつ matsu
9	つける tsukeru	みる miru	おそくなる osokunaru
10	はいる hairu	つかう tsukau	ねる neru
11	つかれる tsukareru		くる kuru
12	きめる kimeru		たべる taberu

In order to learn more about grammatical (derivational) errors, we needed to understand what was it that users were practicing using this software, and where have they made mistakes. 82 different grammar forms were practiced at least once in six months of usage of the application, but the Table 4 shows the most commonly practiced tasks.

Table 4: Most commonly practiced grammatical forms and their accuracy

Rank	Grammatical form	Number of entries	Percentage	Accuracy
1	Te-form	1141	10,72%	90%
2	**Negation – short**	**1137**	**10,68%**	**84%**
3	Past – short	1071	10,06%	87%
4	Negative past – polite	922	8,66%	85%

Rank	Grammatical form	Number of entries	Percentage	Accuracy
5	*Invitational form*	*299*	*2,81%*	*79%*
6	Vollitional form	272	2,56%	85%
7	**Negation – polite**	**259**	**2,43%**	**82%**
8	Non-past – polite	236	2,22%	93%
9	Wanting – negative	214	2,01%	86%
10	Overdoing form	197	1,85%	89%
11	*Negative past - short*	*194*	*1,82%*	*68%*
12	Wanting – past	183	1,72%	90%
13	**Wanting – past negative**	**169**	**1,59%**	**83%**
14	Doing more activities	163	1,53%	86%
15	Wanting – non past	155	1,46%	88%
16	Having the experience	138	1,30%	91%
17	*Potential – polite*	*129*	*1,21%*	*64%*
18	Not having the experience	124	1,16%	86%
19	*Intentional – negative*	*122*	*1,15%*	*76%*
20	*Continious – te form*	*121*	*1,14%*	*74%*
21	Doing more activities – past	117	1,10%	85%
22	Intentional – past negative	112	1,05%	87%
24	Contiuous – negative past	110	1,03%	90%
25	*Potential – short*	*108*	*1,01%*	*73%*

Out of these grammatical forms, some have had a surprisingly low accuracy. Grammatical forms which are 5% or more below the average accuracy of 89% are marked bold in the Table 4, and those which are more than 10% below are marked bold and italic.

After careful analysis and overview of the properties of the grammar forms, they were combined in Table 5, which shows the most important result of this research – the grammar forms which are most difficult to accurately conjugate on A1 and A2 levels of Japanese language. They are described in English with definitions used by textbooks, with Genki series as a reference. Also the information for derivational basis is provided, in order to reflect which underlying grammatical knowledge may be lacking in students.

Table 5: Most commonly confused Japanese grammatical form

Rank	Grammatical form	Japanese suffix	Percentage of errors	Derivational basis	Genki lesson
1	Potential form	*-rareru, -eru*	26%	dictionary form	13
2	Doing by accident*	*-te shimau*	14%	te-form	18
3	Doing in advance*	*-te oku*	14%	te-form	15
4	Thinking that..	*- to omou*	12%	short form	8
5	Being forbidden	*- te wa ikenai*	12%	te-form	6
6	Continuous form	*- te iru*	11%	te-form	7
7	Wanting	*-tai*	11%	stem	11
8	Short forms	*various*	11%	short form	8, 9

Rank	Grammatical form	Japanese suffix	Percentage of errors	Derivational basis	Genki lesson
9	Please do..	*-te kudasai*	11%	te-form	6
10	Volitional form	*- mashou*	11%	stem	5, 6
11	Saying that..	*- to iu*	10%	short form	8
12	Going to do activity	*-ni iku*	10%	stem	7
13	Invitational form	*-masen ka*	10%	stem	3
14	Permission form	*-te mo ii*	10%	te-form	6
15	Intentional form	*-tsumori*	9%	short form	10
16	Polite form	*-masu*	9%	stem	3
17	Doing few activities*	*-tari suru*	9%	short past	11
18	Experiential form*	*-ta koto ga aru*	9%	short past	11
19	Te-form	*-te, -ite, -nde..*	8%	dictionary form	6
20	Doing too much*	*-sugiru*	5%	stem	12

This data can be helpful to both students and teachers, even though each student may have individual difficulty or easy portions of grammar acquisition. Those marked with asterisk symbol may be language dependent, because such forms are not gramaticalized in Croatian language, but rather expressed through lexical choices, so one can argue that they would be more difficult for a student to memorize. However, since they are not present in any Indo-European language either, we believe that this data is still useful not only to Croatian user, but to most Indo-European language speaking Japanese instructors and students.

Conclusion

In this article, we have dealt with very specific issue in Japanese language acquisition – the verb conjugation and their acquisition in matters of accuracy and speed of production. In order to improve these areas in Croatian students, we developed a simple Java application for all desktop platforms and tested it in use during the 6 months period of time. User inputs were sent in form of reports to our server, and amongst around 10.000 entries we have performed the analysis on most common grammatical errors.

We have found that students equally make grammatical and lexical errors, but most of the inputs were correct (89%). When divided by different grammatical forms, these numbers differed significantly. For example, students made most mistakes while learning potential form (26%), or some forms which do not exist in their mother tongue (*to do by accident*, *to do in advance* with 14% errors). Closer analysis found that some students may not have sufficient basic knowledge of underlying forms which are necessary for derivation, such as te-form or short form.

As for lexical errors, we have concluded that students most often confuse two main verb types in Japanese (u-verbs and ru-verbs) which follow different patterns, producing 26% of error. We have also found that irregular verbs should be studied more closely, and provided a list of common verbs which are easily confused simply due to their phonological properties.

Although the application was positively received amongst students, there was no official evaluation, which is planned after new version becomes available. Next version of the application will include all the information about common errors, in order to enable students to differentiate more precisely amongst most difficult verbs or grammar forms.

In conclusion, we believe that this way of drilling grammar is not only helpful to a student, especially if it follows the classroom lessons, but also provides valuable insight into

error typology. Most of these are applicable to any learner of Japanese language, and not only Croatian students, so the results of this research could serve both teachers who seek to improve their curriculum, and students who want to improve their grammatical skills in Japanese language.

References

[1]   Altiner, C. (2011) *Integrating a computer-based flashcard program into academic vocabulary learning*. Graduate Theses and Dissertations. Paper 10160.

[2]   Anki - powerful, intelligent flashcards. (2016). Ankisrs.net. Retrieved in November 2016, from http://ankisrs.net/

[3]   Banno, E., Ohno, Y., Sakane, Y., Shinagawa, C., Takashiki, K., Japan Times, ltd., & JP Trading, Inc. (1999). *Genki: An integrated course in elementary Japanese = shokyū Nihongo "genki"*. Tōkyō: Japan Times.

[4]   Banno, E., Ohno, Y., Sakane, Y., Shinagawa, C., Takashiki, K., Japan Times, ltd., & JP Trading, Inc. (2011). *Genki II: An integrated course in elementary Japanese = shokyū Nihongo "genki"*. Tōkyō: Japan Times.

[5] Bellés-Fortuño B., Ramírez, N. O. (2015) *Motivation: A key to success in the foreign language classroom? A case study on vocational training and higher education English courses.* 1st International Conference on Higher Education Advances, HEAd'15, DOI:http://dx.doi.org/10.4995/HEAd15.2015.431

[6]   Council of Europe. (2001). Common European framework of reference for languages: Learning, teaching, assessment (CEFR). Cambridge, the United Kingdom: Cambridge. Retrieved from http://www.coe.int/t/dg4/linguistic/cadre_en.asp._Framework_EN.pdf in November 2016.

[7]   Janjić M., Librenjak S., Kocijan K. (2016) *Croatian Students' Attitudes towards Technology Usage in Teaching Asian languages - a Field Research.* Proceedings of the 39th International Convention MIPRO, Rijeka. 1051-1055.Codd, E. (2005). Decoupling checksums from the transistor in DHCP. IEEE, USA.

[8]   Japan Foundation, e-learning portal. https://minato-jf.jp/ Retrieved in November 2016.

[9]   Librenjak S., Vučković K., Dovedan Han, Z. (2012) *Multimedia assisted learning of Japanese kanji characters.* Proceedings of the 35th International Convention MIPRO, Rijeka. 1284-1289.

[10] MemAzija official website. (2016). Retrieved in November 2016, from http://memazija.ffzg.hr.

[11] MemAzija online course list on Memrise. (2016). Retrieved in November 2016, from http://www.memrise.com/user/Memazija/courses/teaching/.

[12] Memrise - Learn something new every day. (2016). Memrise. Retrieved in November 2016, from http://www.memrise.com/

[13] Tam, V., & Huang, C. (2012). *An intelligent e-learning software for learning to write correct Chinese characters on mobile devices*. Interactive Technology and Smart Education., 9(4), 191–203