The impact of formative quizzes using CorrectWriting question type on learning word order in an ESL course

O A Sychev1, A A Prokudin1, O E Evtushenko1 and O V Toporkova1

1 Volgograd State Technical University, 28, Lenina Avenue, Volgograd, 400005, Russia
E-mail: oasychev@gmail.com

Abstract. Studying word order in English sentences is a problem for ESL students whose native languages allow flexible word orders. Developing skills in formulating English sentences often requires trial-and-error process that takes time and requires supervision. Quiz software that is able to analyse students’ answers, and give meaningful feedback on mistakes in word order and hints on fixing them allows training without teacher’s supervision that greatly enhances the amount of attempts a student can do. In this study, we used CorrectWriting question type for Moodle LMS to create formative and summative quizzes for Russian students learning English as a second language. The experiments show that the students who made more than one attempt of formative quizzes had significantly better learning gains than the students who didn’t use formative quizzes or attempted them only once. It also showed vulnerabilities in question design that need to be fixed to utilise software features better in learning process.

1. Introduction
While studying the English language, Russian students encounter different problems connected with differences of the two languages, one of those being the word order. It is common knowledge that English word order is a fixed one while the word order in the Russian language is rather flexible. While semantic word order functions are universal and represented in the same way in different languages, its grammatical functions, as well as rhythmic and stylistic ones differ significantly in different languages [6]. The mentioned differences can lead to difficulties both at early stages of teaching English as a second language and at higher levels [8]. Though learners at more advanced levels usually make fewer mistakes in word order compared to those at lower stages [8].

Taking into account the possible grammatical interference [3], it is highly important for Russian learners to master English word order at all stages in order to achieve good language competencies. Another fact that should be considered is that the students we are teaching today belong to the “digital generation” which makes the application of virtual learning environments and digital educational resources quite urgent [12].

Advances in technology are changing the way courses are designed and delivered around the world, especially in higher education. Information and communication technology (ICT) is increasingly being introduced and used by teachers every day. There are several major approaches to using ICT in teaching English:

- informal educational environment (communicating via social networks, chatbots and messengers, using video conferencing services for communication) [1, 10];
- learning management systems (Moodle, Canvas LMS or LearnDash used for training and controlling students’ educational activity) [13];
- virtual reality environments (Mondly, Samsung VR, Jigspace VR, etc) [11];
- artificial intelligence applications (ELSA (the English language proficiency app) and CALL (Computer Assisted Language Learning) [2], Socratic by Google [7]);
mobile applications ("Vocab", "Grammar" and "English advanced grammar") [9].

One of the most well-known ICT tool is the open source platform Moodle that is widely used at universities all over the world [5, 4]. Moodle is the most productive tool for training and successive control of spelling, word-building, word order and vocabulary usage skills [13]. It can be easily customised with over 1,700 plug-ins to improve and expand the educational experience. Some of these plug-ins were developed for teaching formal languages with the fixed token order that provides advanced functionality for determining word-order mistakes and correcting them. In this research we studied the suitability of a specialised question-type plug-in CorrectWriting for learning word order in English as a Second Language by the students at Volgograd State Technical University.

2. Software

CorrectWriting question type for Moodle LMS is designed for teaching formal and natural languages [14]. It breaks the answer into sequence tokens and searches for possible typos using Damerau-Levenshtein editing distance. It can also detect missing or extraneous separators. After that, sequence analyser computes the longest common sequence (LCS) of tokens between student’s and correct answers. This sequence is assumed to be the correct part of a student’s answer. The tokens that are present in both student’s and correct answers but missing in LCS are considered misplaced; the tokens that are present only in the student’s answer are considered extraneous while the tokens existing only in the correct answer are considered missing.

CorrectWriting supports extensive feedback system. In order to facilitate thoughts about grammar rules, mistake messages show teacher-entered token description instead of a token text (Figure 1), so, for example, a student will see the message “verb is misplaced” instead of “ate is misplaced.” If the student can’t understand and fix their mistake, they can use hints showing them the token text or its position. When the quiz is finished, CorrectWriting questions show the pictures transforming student’s answer to the correct answer (Figure 2).

![Figure 1. CorrectWriting question tokens description.](image1)

![Figure 2. CorrectWriting question after finishing quiz.](image2)

3. Materials and methods

In the experimental testing 45 students of the faculties of ChE (Chemical Engineering) and CpS (Computer Science), studying at the Bachelor’s and Master’s levels of Volgograd State Technical University took part. The average performance of the students in the discipline “English” is noted at the level of “satisfactory” and ”good”. The number of classroom hours for these levels of study is
rather limited - only 2 hours per week.

Figure 3. Distribution of students by their summative quiz scores.

The experimental quizzes contained questions covering 9 grammatical categories: the Statements, Negative sentences, General questions, Special questions, Tag questions, Alternative questions, Subject Questions, Reported speech questions, Adverbs with verbs in the statement. At first, students took the summative quiz (36 questions from all categories) to measure their baseline performance and identify problem areas. Then they were provided with 3 formative quizzes with hints feature enabled; the students could use formative quizzes freely to improve their performance. At the end of the semester, the students made the second attempt of the summative quiz to measure their progress. Attempting formative quizzes, the students were able to use hints, answer the questions several times; the time of their attempts wasn’t limited. The time of the summative quiz attempts was limited and each question could be answered only once.

4. Results and discussion

The resulting dataset contains the results of 2 rounds of testing for 27 CpE and 18 ChE students and the number of the formative-quiz attempts they made. Figure 3 shows the distribution of the students by the score of their first and second attempts and the average number of the formative quiz attempts.

Almost all the students improved their score during the semester. It can be seen that the students with the best final scores made more attempts of the formative quiz. However, this might be caused by their better initial knowledge. In order to study the influence of formative quizzes using CorrectWriting questions, we researched the relationship between the number of formative quiz attempts and the score increase between the first and the second attempts of the summative quiz.

Table 1. Increase in mean score for two testing groups.

|                                | 0-1 attempts | 2 or more attempts |
|--------------------------------|--------------|--------------------|
| Mean score increase            | 2.53         | 3.63               |
| Variance of increase           | 2.47         | 2.88               |
| Observations                   | 20           | 25                 |
| t                              | 2.26         |                    |
| t-Critical                     | 2.03         |                    |
| $p(T \leq t)$                  | 0.03         |                    |

We divided the students into different groups based on the number of their attempts of the formative quiz and compared the resulting sets using unpaired t-test. The test shows that the students who didn’t use the formative quiz or used it only once have lower score increase than the students who made two or more attempts, that is significantly different with $p=0.03$ (see Table 1). There was no statistically significant difference between the score gains of the students who performed 2 or more attempts of the formative quizzes.

Discussing these results, we must keep in mind that one attempt of a formative quiz allowed answering its questions unlimited number of times until a student answers correctly or gives up, so one attempt of a formative quiz doesn’t necessarily mean one attempt of answering its questions. So even two
attempts of formative quizzes allowed the students to achieve significant increase in their mastery of the subject compared to those students who didn’t attempt the quiz or made only one attempt.

However, the analysis of the student’s answers shows room for improvement. The quizzes asked the students to translate the sentences from Russian to English so not all the mistakes in formative and summative quizzes were caused by word order: the students also made mistakes choosing words and tenses for the sentence so narrowing down exercises to check word order may be desirable. Also, sometimes students found correct phrases that weren’t entered by the teachers as correct so the question base needs to be expanded. The token descriptions need to be improved.

5. Conclusion
The analysis of the experiments performed has shown that the students who made 2 or more attempts of the formative quizzes in addition to other exercises performed significantly better in the summative quiz so we can conclude that the formative quizzes with additional feedback help learning word order for the students learning English as a second language.

A brief analysis of student’s behaviour during quizzes shows that they used the formative quizzes differently: some answered problematic questions several times while the others replied only once and submitted the quiz to see the correct answer even if they made mistakes. Not everyone used hints. So an advanced study of the student’s behaviour during formative quiz sessions will allow us to better understand the impact of various quiz features on the learning process and help enhance non-supervised training of English grammar.

6. Acknowledgments
This paper presents the results of research carried out under the RFBR grant 20-07-00764 "Conceptual modeling of the knowledge domain on the comprehension level for intelligent decision-making systems in the learning”.

References
[1] Altiner C 2015 Perceptions of undergraduate students about synchronous video conference-based english courses Procedia - Social and Behavioral Sciences 199 627-633
[2] Anguera X and Van V 2016 English language speech assistant INTERSPEECH pp 1962-1963
[3] Belenkova N M, Kruse I I, Davtyan V V and Wydra D 2018 Language for students without interest in languages: Challenges of foreign language grammar XLinguae 11(1) 284-293
[4] Cabero-Almenara J, Arancibia M and Prete A 2019 Technical and didactic knowledge of the Moodle LMS in higher education: beyond functional use Journal of New Approaches in Educational Research (NAER Journal) 8(1) 25-33
[5] Carolina C, Alvelos H and Teixeira L 2012 The use of Moodle e-learning platform: a study in a portuguese university Procedia Technology 5 334-343
[6] Ilyushchenko N 2017 Comparative study of english and russian phraseology: Component theory of identity and difference of the same organization Journal of Language and Education 3(1)
[7] Kayi-Aydar H, Endacott J L and Goering C Z 2018 Using Socratic Circles to Engage English Language Learners in Historical Inquiry and Discussion Springer International Publishing pp 159-178
[8] Marijuan S, Lago S and Sanz C 2016 Can english-spanish emerging bilinguals use agreement morphology to overcome word order bias? The Usage-based Study of Language Learning and Multilingualism p 189
[9] Muhammed A 2014 The impact of mobiles on language learning on the part of english foreign language (EFL) university students Procedia - Social and Behavioral Sciences 136
[10] Nayoung K, Cha Y J and Kim H 2019 Future english learning: Chatbots and artificial intelligence Multimedia-Assisted Language Learning 22 32-53
[11] Peixoto B, Pinto D, Krassmann A, Melo M, Cabral L and Maximino B 2019 Using virtual reality tools for teaching foreign languages New Knowledge in Information Systems and Technologies pp 581-588
[12] Petruneva R, Vasilyeva V and Toporkova O 2020 Problems of globalization and pedagogical work with “digital natives” at technical universities In Growth Poles of the Global Economy: Emergence, Changes and Future Perspectives pp 1241-1246
[13] Lichun S 2014 Investigating the effectiveness of Moodle-based Blended Learning in College English course International Journal of Information Technology and Management 13(1) 83-94
[14] Sychev O A and Mamontov D P 2018 Automatic error detection and hint generation in the teaching of formal languages syntax using correctwriting question type for moodle lms. *3rd Russian-Pacific Conference on Computer Technology and Applications (RPC)* pp 1-4