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## THE USE OF CLICKERS TO ASSESS KNOWLEDGE IN FOREIGN LANGUAGE CLASSES AND THEIR FAILURE TO INCREASE READING COMPLIANCE

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**Abstract:** *This is the first quantitative research on reading compliance in FL courses. It investigated the effect of clickers on learning gains for regularly assigned readings, determined by 16 quiz grades during a semester. 38 intermediate L2 Spanish students assigned to two group conditions also completed a questionnaire at the end of the semester about their preparedness for the quizzes and their opinions about the use of clickers. Results indicated that participants in the Clicker condition obtained significantly lower grades in the quizzes than those in the Paper and Pencil one, despite clickers receiving positive feedback and comments, and even though students in the Clicker condition reported preparing for class more often than those in the Paper and Pencil condition.*

**Keywords:** *reading compliance, Spanish, foreign language, quiz, clickers.*

### 1. INTRODUCTION

Most foreign language (FL) students attending college nowadays were born approximately between the early 80's and 2000. Howe and Strauss (2000) referred to them as the Millennial Generation. They are all "native speakers of the digital language of computers, video games and the Internet" (Prensky, 2012: 69) rather than becoming fascinated by and adopting many or most aspects of the new technology at some later point in their lives. That is the fundamental observation that differentiates what Prensky (2012) calls the Digital Natives (i.e., the Millennials) from the Digital Immigrants (i.e., all previous generations).

Besides an information technology mindset, Millennial students seem to have zero tolerance for delays and demand immediate feedback and gratification. According to Spodark (2010), this need for immediacy has implications in the way they approach reading, i.e., they avoid reading any text of considerable length, even if it is work-related material. And this picture seems to be no different in the school context.

#### 1.1. Reading compliance at college

In 2000, Burchfield and Sappington reported a steady and dramatic decline on compliance with the required reading assignments from introductory to graduate-level psychology courses from 1981 to 1997. Reading compliance was determined by the grade on the first surprise quiz of the semester on an assigned reading. They found that, on average, only about a third of the students will have completed their reading assignment on any given day. In 2002, Sikorski, *et al.* corroborated this trend after surveying 1,178 students at two different institutions who reported either not reading or reading sparingly the text for their Introductory Psychology class. Similarly, in 2004 Clump, *et al.* surveyed students from eight psychology courses and they also found that, on average, less than a third of the students completed the assigned readings before class.

Failing to do the reading assignment and coming to class unprepared are examples of what Burroughs, *et al.* (1989) called "destructive resistance" which, not surprisingly, affects students' learning and achievement. For example, Karp and Yoels (1976) found that more than three quarters of students from a wide range of departments, chose not to talk in class, remaining silent and uninvolved, because they have not done the assigned reading.

In FL classes, remaining silent as a result of not coming prepared to class has greater dramatic consequences. In the field of second language acquisition (SLA) it is now generally agreed that output, or the language that learners produce in speech or in writing, plays a central role in the learning process in several ways: a) to test learners' developing hypotheses (Swain, 1995), b) to enable learners to search for additional confirmatory or non-confirmatory evidence after receiving feedback or negative evidence (Gass, 1997), c) to develop fluency and automatic processing via consistent and successful mapping of grammar to output (Gass and Selinker, 2008), and d) to force the learner to move from semantic processing to syntactic processing (Swain, 1985).

To the best of my knowledge, there is no study addressing reading compliance in SLA and how it compares to the rates found in other disciplines. The amount of content to read for FL courses is generally limited to less than three pages of grammar explanations and examples or lists of vocabulary items. But if FL teachers want to use a true communicative teaching approach, they have to rely on the students' preparation for each class to practice the language in a more natural way. Otherwise, teachers will be forced to introduce and explain the content from the assigned grammar or vocabulary section before practicing the language, valuable time which could have been better employed to provide opportunities for practicing and using the language.

One of the most effective ways to promote reading compliance at college is frequent quizzing. There is a body of research showing that when students are tested on the contents of the assigned readings, with a grade percentage of their final grade stemming from these quizzes, reading compliance increases. Thorne (2000) noted that administering randomly assigned quizzes promoted pre-class preparation and increased class attendance. Similarly, Connor-Greene (2000) found that 60% of her Women and Psychology students, who had daily quizzes, always completed their reading by the assigned date, with 92% of them reading it before class. Ruscio (2001) data from four psychology courses indicated that when students were given quizzes at random on less than half of all class days, they completed the assigned reading at impressive rates (passing an average of 74% of the quizzes with full credit) and that most students (85.7%) recognized finishing at least half of the assigned readings before class. Sappington, *et al.* (2002) found a significant correlation between students' first surprise quiz grade and final exam scores and, accordingly, they recommended surprise quizzes and their percentages. Clump, *et al.* (2004) found that the average of students completing the readings before class in eight psychology courses more than doubled (from less than a third to almost 70%) if the material was to be included on an upcoming test. Finally, Ryan (2006) and Rodríguez Prieto (2008) developed focused homework assignments based on the assigned reading, which could also serve as study guides later in the semester. Students who had the focus worksheets with teacher comments (Ryan, 2006) or who used them at the beginning of class to start the class discussions (Rodríguez Prieto, 2008) performed better on the regularly scheduled exams than those who did not.

The current study aimed at increasing reading compliance in FL courses so that teachers can devote more class time to quality practice and less time to redundant grammar explanations. Daily quizzing was incorporated in two intermediate Spanish courses because, as described before, it has consistently proved to rise reading compliance among college students.

## 1.2. The use of clickers

As mentioned earlier, Millennial students have a strong interest in using technology in every aspect of their lives. But technology is not only an asset for them but also a learning preference, whose other learning preferences include structure as well as entertainment and excitement (Raines, 2002). Explorations in the field of FL teaching using technology is a reasonable way of motivating and connecting with the new waves of students entering college.

Beekes (2006: 33) recognized that the potential benefits of using clickers for class tests were still unknown and Reese (2010) suggested that a useful tech idea could be integrating clickers to assess knowledge. The current study aims to fill that void in the field of FL learning by using quantitative as well as qualitative data to evaluate the impact this technology might have for assessing the contents of grammar and vocabulary classes via regular quizzing.

Clickers are wireless personal response systems which typically resemble a TV remote (see Figure 1) and that each student can use to select the answer for any question posed during a lecture. A small receiver connected to the instructor's PC collects all students' votes which can be immediately displayed onscreen as a bar graph. Once the instructor is familiar with the system, it literally requires a couple of minutes to plug the receiver to the PC and open a new session. Some current models do not require the use of specific software to write the questions, and that allows the instructors to pose questions in several ways: in a Powerpoint® slide, while watching a video on YouTube®, and alike. This technology ensures anonymity to the students' responses, allows for the comparison of student's votes with those from the rest of the class, and can be used to provide immediate feedback to the class



**Figure 1.** Clicker used in the current study.

The pedagogical value of clickers in the academic setting has been studied in a diversity of disciplines whose common denominator was a large number of students per section. The vast majority of these studies (Hake, 1998; Burnstein and Lederman, 2001; Jones, *et al.*, 2001; Elliott, 2003; Wit, 2003; Draper and Brown, 2004; Kennedy and Cutts, 2005; Beekes, 2006, 2009; Bunce, *et al.*, 2006; Ewing, 2006; Freeman, *et al.*, 2006, 2007; Lee and Bainum, 2006; Narloch, *et al.*, 2006; Poirier and Feldman, 2007; Stowell and Nelson, 2007; Cotner, *et al.*, 2008; King and Joshi, 2008; Morling, *et al.*, 2008; Gier and Kreiner, 2009; Mayer, *et al.*, 2009; Marlow, 2010) provide converging evidence that students as well as professors agree that clickers afford the following benefits: a) they increase motivation and interest for the class, b) they increase participation and involvement, c) they allow students to self-assess and compare their performance to the rest of the class, d) they provide immediate feedback, e) they are easy and fun to use, f) they can provide anonymity of the students' response, and, more importantly, g) they are believed to contribute to learning. This short outline of the many benefits for using clickers should be enough to justify their embracing; however, a recurrent limitation from many of these studies is that they simply rely on qualitative methods such as questionnaires, interviews, and classroom observations. Accordingly, there is a decisive need to conduct more studies using quantitative methods to validate these encouraging results.

In the field of SLA, the use of clickers has been barely investigated. There are only four published studies (Cutrim Schmid, 2007, 2008; Cardoso, 2010, 2011), all of which relied exclusively in qualitative methods and did not test the effectiveness of clickers in producing learning gains. Cutrim Schmid (2007) used clickers with 30 English learners and collected data from classroom observations, questionnaires, and oral interviews with the students. She found out that the technology provided immediate feedback the participants could use for self-assessment and self-esteem, as they could compare their progress in relation to the rest of the class. Cutrim Schmid (2008) used the same data as in her previous study but focused on interactivity or increased interaction and she discovered that clickers increased the scope of interactivity as students participated more actively. But a closer look at the videos also showed that the level of interactivity was relatively shallow as students provided answers to the questions posed but rarely justified their answers, forcing the teacher to comment on their responses. Similarly, Cardoso (2010, 2011) examined the perceptions of 30 English learners on the use of clickers via questionnaires and oral interviews. Participants agreed for the most part that clickers were a positive addition to the class, increased their participation and enjoyment of the classes, allowed them to self-assess and compare their performance with that of their peers, fostered interaction, and contributed to learning. But none of these four studies really quantified whether the use of clickers had an effect on FL learning outcomes such as better grades.

The rationale for choosing clickers for the daily quizzes in the present study was twofold: a) to allow Millennials to receive immediate feedback for their responses, as one of their main liabilities is zero tolerance for delays, and b) to allow them to compare their responses to those of their classmates, information they could use to increase their self-esteem. But the main goal was to check the effectiveness of using clickers in increasing the likelihood that students read the material and have some prior knowledge of the day's topic, given that today's students spend many hours a day interacting with technology, which is also one of their learning preferences.

The present study addressed the following research questions:

1. What is the effect of using clickers on students' compliance with the reading assignments, as measured by regular quiz scores and their reported preparedness?
2. What are the students' opinions about the use of clickers to increase their preparedness, based on their preferred delivery method for quizzes and their comments on the use of this technology?

The current study is breaking new ground in the field of SLA for being the first quantitative research measuring the effect of clickers on learning gains. It is also one of the very few studies dealing with reading compliance in FL courses, an often neglected area of research in SLA.

## 2. METHOD

### 2.1. Participants and setting

The study was conducted in a state-run public university serving more than 22,000 students in Muncie, Indiana. 38 college-level students of L2 Spanish enrolled in the second semester of second-year Spanish participated in the study. All participants were recruited from two intact Spanish classes. Each section was randomly assigned a treatment condition at the start of the semester: the Clicker group, who used clickers to buzz in their responses from the daily quizzes ( $n = 19$ ), and the Paper and Pencil group, who used the traditional method of writing their responses in quizzes ( $n = 19$ ).

Participants met for 75 minutes twice a week, with the same instructor, who is also the author of this study, covering the same content by using the exact same materials and syllabus. Participants' ages ranged from 18 to 22 with a mean age of 19.2 years. There was a similar distribution by gender, with 18 males and 20 females. Most of the participants were freshmen, 22 of them, with 9 sophomores, 5 juniors, and 2 seniors. More than three fourths (76.3%) were taking the class to fulfill the university requirement but the great majority of them (81.6%) also had plans to continue studying Spanish after that class.

### 2.2. Instruments and data collection

All students were required to purchase a clicker for the whole semester, irrespective of the treatment condition. Clickers were used in one or two activities per class session to review the contents of the class and to check the students' progress, as well as to promote discussions in the FL.

During the semester, all participants were reminded about the following's class reading assignment with the textbook pages written on the board. And at the beginning of each of the 16 classes with an assigned vocabulary or grammar reading section, all students had a quiz about the contents of the reading, for a 10% of the final grade and as stated in the syllabus. Each quiz had 10 multiple-choice questions, e.g., 5 or less options per question, true/false, matching... Most questions were fill-in-the-gap Spanish sentences or some information about the reading in Spanish. Here is an example: *Dudo que mis hijos \_\_\_\_\_ mucha televisión durante la semana.* a) *mirando*, b) *miran*, c) *miren*, d) *mires*. Quizzes generally lasted no more than 10 minutes.

Participants in the Clicker group took the daily quizzes using their clickers. They had no time restrictions to vote for each question and once all students voted, which could be checked in a small display box onscreen, their voting results were displayed in a bar graph, hence receiving immediate feedback about their performance. There was time for some discussion about their results after completing all the questions. Participants in the Paper and Pencil group completed the exact same quizzes but in a piece of paper and they received the corrections and grades in the next class.

During the last 25 minutes of a class in the last week of the semester, the instructor left the classroom and students received a questionnaire with a variety of questions about some personal information, their reported preparedness for class, their opinions about clickers, and their preferred quiz delivery method.

### 2.3. Data analysis

All statistical analyses were carried out with SPSS, v.17.0. for Windows. The alpha level for significance was set at  $p < 0.05$ . An independent-samples  $t$  test was used to compare the participants' average quiz score taking the use of clickers (or not) for the quizzes as the grouping variable. Frequencies and descriptive statistics were used elsewhere.

## 3. RESULTS

The first research question examined whether clickers had any effect on reading compliance or students' preparation for each class. In order to answer that question, participants' reported preparedness for class during the semester was collected and analyzed as well as their averaged grade on the 16 daily quizzes.

Participants' averaged grade on the 16 quizzes was calculated. In accordance with previous research (Connor-Greene, 2000; Thorne, 2000; Ruscio, 2001; Clump, *et al.*, 2004), reading compliance was around two thirds ( $n = 38$ ,

M = 65.132, SD = 13.920), given that they were regularly quizzed during the semester. However, the students in the Paper and Pencil condition obtained greater scores on the averaged quiz grades ( $n = 19$ ,  $M = 67.368$ ,  $SD = 16.575$ ) than those in the Clicker condition ( $n = 19$ ,  $M = 62.895$ ,  $SD = 10.631$ ). The quiz grades were analyzed by comparing the groups using an independent-samples  $t$  test. There was a significant result ( $n = 38$ ,  $t = -.990$ ,  $df = 36$ ,  $p < 0.05$ ) between the groups, indicating that students in the Clicker condition obtained significantly lower quiz grades during the semester than those in the Paper and Pencil condition. These data suggest that students who completed the quizzes in a piece of paper obtained better scores on the regular quizzes than those who took the quiz using the clickers.

Students were asked in the questionnaire if they prepared on a regular basis before taking the quizzes. Results indicated that about two thirds of the students in each class recognize preparing for the quizzes ( $n = 38$ ,  $M = 65.8$ ,  $SD = 0.481$ ). But it was those participants in the Clicker condition, as shown in Figure 2, who prepared for the quizzes more often, despite obtaining significantly lower scores on the quizzes.

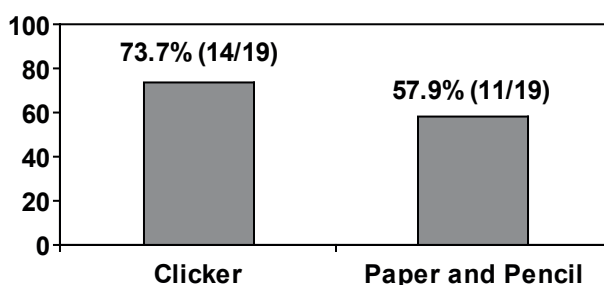


Figure 2. Reported preparation for the quizzes on a daily basis ( $n = 38$ ).

The second research question investigated whether participants preferred the clickers for taking the quizzes or the traditional paper and pencil format. Their opinions about the use of clickers were gathered with the help of statements they could agree or disagree with, and by open-ended questions in the questionnaire.

Students indicated in the questionnaire whether their preferred method for taking quizzes was in a piece of paper or with clickers, irrespective of how quizzes were delivered to them during the semester. As shown in Figure 3, results indicated that clickers were the main preferred delivery method only for those participants who actually used them for that purpose during the semester, i.e., only for students in the Clicker group (18/19, 94.7%), but not for those in the Paper and Pencil group (5/19, 26.3%).

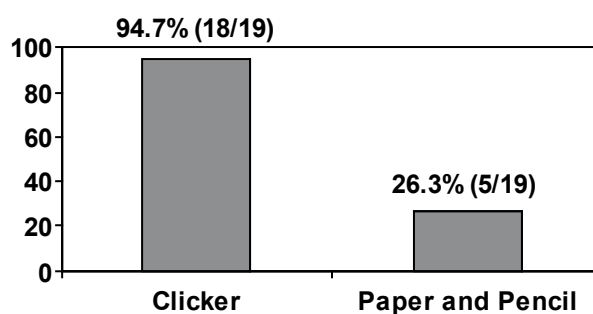


Figure 3. Clickers as the preferred delivery method for the daily quizzes ( $n = 38$ ).

When participants were asked to explain why they preferred such quiz delivery method, most participants who chose clickers reported that clickers were easy to use while at the same time they got their results right away, receiving immediate feedback on their answers. Here are two verbatim samples from the dataset:

- It's easier and get's you results faster. Also allows instructor to give reasons for the answer.
- It is much simpler and graded right there and get explanation as you go, not 2 days from the quiz, also very interactive.

On the other hand, students who preferred to complete the quizzes on a piece of paper mentioned that they chose that method because it allowed them to take their time and to focus on each individual question. They also mentioned that this method provided them with the ability to refer to previous answers and make changes if necessary. Two verbatim samples from the dataset include:

- You have more time and no pressure, and you can go back & change answers.
- When the quiz is on a paper I can easily review, or change my answers, as well as skip and return to answers that are hard.

Students who used the clickers to complete the quizzes were asked to agree or disagree with six statements about that tool. In addition to those statements, participants in the Clicker Condition were asked to comment on the usefulness of the tool for taking the quizzes. Results indicated that participants mostly agreed with all the proposed statements about clicker use but for the fifth statement, which established that they studied more often because they took the quizzes with the clicker ( $M = 52.8$ ,  $SD = 0.506$ ). More specifically, they felt clickers made quizzes easier to complete ( $M = 97.2$ ,  $SD = 0.167$ ), were useful for that purpose ( $M = 97.2$ ,  $SD = 0.167$ ), enjoyed using them for the quizzes ( $M = 88.9$ ,  $SD = 0.319$ ), granted them reasonable time to respond to each question ( $M = 83.3$ ,  $SD = 0.378$ ), and would like to use them again in future Spanish courses ( $M = 86.1$ ,  $SD = 0.351$ ). This indicates that no matter how much they enjoyed using clickers for the quizzes, or how useful and easy they were to complete the quizzes while allowing them enough time to answer to the questions, still they will not study more often nor prepare a little bit more on a regular basis to obtain higher scores in future quizzes.

When participants were asked to provide some comments on the usefulness of taking quizzes using clickers, most participants agreed that they were helpful, easy and simple to use, provided immediate feedback about the right answer, and were a faster method than paper and pencil. The very few negative comments received mentioned that sometimes they felt rushed to provide an answer (even though there was no time limit imposed to buzz in an answer) and that clickers were easy to lose or forget at home.

#### 4. DISCUSSION

The present data show that students in the intermediate Spanish classes under study prepared for class regularly, as measured by their average grade on the daily quizzes, which ranged from 62.9 in the Clicker group to 67.4 in the Paper and Pencil group. Those averages are more than double of the students who regularly come prepared to class when they do not have quizzes, which typically represent about a third of the class (Burchfield and Sappington, 2000; Sikorski, *et al.*, 2002; Clump, *et al.*, 2004). Without a control group covering the same contents but not taking the quizzes, it cannot be ensured that those positive averages were mostly the direct result of the quizzes. However, there is enough converging evidence about the positive effect of regular quizzing on students' increased preparation in other disciplines (Connor-Greene, 2000; Thorne, 2000; Ruscio, 2001; Clump, *et al.*, 2004) as not to expect the current results or to deny the positive effect of quizzes on reading compliance.

This is the first quantitative study measuring the effect of clickers on students' average quiz grades during a semester and in the field of SLA. The independent-samples *t* test results indicated that clickers affected negatively these scores, as students in the Clicker group obtained significantly lower scores on the quizzes than the Paper and Pencil group. One of the reasons for this result is that this technology by itself did not encourage participants to study more often prior to the quizzes, as evidenced by the participants' low agreement level (52.8%) on the statement "I studied more frequently because I took the quizzes with the clicker." Participants' lower scores on the quizzes may be explained in part by the limitations imposed by this technology, such as the inability to go back and correct answers in more difficult questions. Although there was not a time limit to select the correct answer for each question, some students may have felt pressured to respond when they saw most of their peers had already voted. The immediate feedback and the possibility of comparison with the rest of the class, which at first were the main benefits of this technology to increase students' self-esteem and willingness to comply with the assigned readings, may actually provoked the opposite effect by pressuring and frustrating students who needed to think their responses more carefully or who would have preferred to go back and forth before making a final decision in the hardest questions. This technology mainly helped in the collection and grading of students' responses, taking into account Millennials lack of tolerance for delays, their need of immediate feedback, and their passion for all things technology. Unfortunately, our quantitative results did not extend to class tests the converging qualitative positive benefits on adopting clickers in FL classes found in other areas such as self-assessment, self-esteem, interactivity, participation, and enjoyment (Cutrim Schmid, 2007, 2008; Cardoso, 2010, 2011).

Besides the negative effects on students' quiz scores, impressionistic students' behavior throughout the semester in relation to the potential increased participation, voluntariness, and class involvement thanks to the use of clickers was anything but positive. Aside from quizzing, participants in both groups seemed to associate

class participation with buzzing in an option for the daily clicker activities and then remaining passive. More silences were observed in response to a question if it was displayed onscreen and students used clickers for their answers than if they did not use clickers. This is exactly what previous research also found, that reluctant and quiet students did not behave differently after using the clickers (Jones, *et al.*, 2001) or that shy students feel the technology did not allow them to express their opinions (Lee and Bainum, 2006). In sum, the more this technology was incorporated in the classroom dynamic for regular activities and quizzing, the more evident it became that it was not producing the expected effects.

A final comment should be made about the observation that our students mostly preferred the quiz delivery method to which their group was assigned. This indicates that students in the Clicker group were not aware of the negative effect clickers had on their quiz performance. Lantz (2010) previously stated that students generally do not realize how effective any given learning strategy might be. Specifically, he mentioned that clickers may affect student learning without the students realizing their effectiveness, to which I add that this is even possible if the effect is negative, which is more worrying. On the other hand, students may simply be satisficing with the researcher, a possible limitation of the present study to which we turn in the following section.

## 5. LIMITATIONS AND FUTURE RESEARCH

This study was limited in several ways. As in all research on teaching techniques, variables other than those included in the present study may have influenced the results. The number of students in each section was low and there was not a control group without regularly-scheduled quizzes to compare their reading compliance with that from the experimental groups.

Having the main author as the instructor for the experimental groups was a potential source of subjectivity, but active measures were taken to minimize this effect: a) by using the same teaching and testing materials, b) by covering the same contents per class session, c) by leaving the class while participants completed the questionnaires, d) by assigning participants to a randomly-selected experimental condition based on two intact classes at the same level during the same semester and at the same institution, and similar. On the other hand, this also ensured the uniformity of the teaching and testing materials and the consistency on the amount and quality of content covered during the semester, which would have been difficult to ensure with different instructors even if sharing the same syllabus and textbook.

When measuring subjective and attitudinal variables, participants select responses that are socially acceptable and according to how they would like to portray themselves, with a tendency for self-enhancement (Oller, 1981, 1982; Krueger, 1998; Sappington, *et al.*, 2002). Nonetheless, the propensity for self-enhancement and satisficing with the researcher (Krosnick, 1999) was minimized by taking the following actions: a) the instructor left the classroom during data collection and a peer delivered and collected the questionnaires; b) the volunteer instructor read an introductory paragraph to the participants stating that their responses will be sealed in an envelope and will not be delivered to the instructor until final grades were submitted to the university; and c) the instructions in the questionnaire asked participants to be sincere and give the response that best described them, not what they thought should be the best answer.

Despite these limitations, it should be recognized that these findings are strong in that the effect of clickers on FL reading compliance was attested via different statements on the questionnaire, the participants' opinions and comments, and, more importantly, their averaged quiz grades during the semester. This is the first exploratory and quantitative study in SLA measuring the effectiveness of clickers to assess knowledge and boost reading compliance. Ideas for future quantitative research studies include the impact of clickers in the classroom dynamics, such as willingness to communicate in the FL after voting or the amount of sentences students provide in the FL if they were asked to buzz in a single option after a discussion in small groups.

## 6. CONCLUSIONS

This initial exploration on the effectiveness of clickers on students reading compliance indicated that the use of clickers affected negatively students' performance on quizzes as the tool did not facilitate access to the readings neither reminded them about the reading assignments nor motivated them to try and best their scores for the following classes, despite providing them with immediate feedback and the ability to compare their scores with those of their classmates. More quantitative research studies are needed until these results can be generalized to the population of FL learners.



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