ARTICLES

The Impact of the Flipped Classroom on Students' Performance in Grammar in Moroccan High Schools
A Mixed-Methods Approach

Jillali Nakkam

This study aims to investigate the impact of the flipped classroom (FC) on students' grammatical competence. To achieve that, a mixed-methods approach was adopted using a quasi-experimental research design to examine the differences between a control (n=20) and an experimental group (n=20) from two different high schools based in Morocco. The control group was taught by the author using computer-assisted instruction, while the experimental group was taught by a teacher using FC methodology. A post-test was used to test the two groups as well as interviews with a randomized sample of students from the experimental group. The findings suggest differences in favor of the treatment group, but the results were not statistically significant. While the interviews indicated high satisfaction with FC because it gave students opportunity for more interactions with teachers and peers, it also made students autonomous and fully engaged in the classroom activities.

Keywords: flipped classroom, computer-assisted learning, student-centered learning, grammar, Morocco.

INTRODUCTION

The main objective of this study was to address the limited research evidence on the effect of the flipped classroom model on students' academic achievement and attitudes in high school in Morocco.[1]

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The flipped classroom (FC) is a recent pedagogy that emphasizes learner-centeredness, promotes students' higher-thinking skills, and engages learners in the learning process (Morgan et al., 2015; Alsowat, 2016; Smallhorn, 2017; Wilson, 2020). The FC, also referred to as the inverted classroom (Lage et al., 2000) and the classroom flip (Baker, 2000), is a recent approach to education that incorporates moving the traditional instruction outside the classroom walls. According to Lage and colleagues (2020), "Inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa" (p. 32). In other words, the FC is based on the premise that what conventionally takes place in a classroom has become a homework activity; the class time is allotted to participatory activities of discussion and problem-solving (Bergmann & Sams, 2012). Based on the social constructivist theory, the theoretical framework of this paper, flipping the classroom consists of two phases: In the first phase (*content attainment phase*), students gain a conceptual understanding of the subject matter at home. In this phase, self-directed learning is emphasized, where learners are held responsible to prepare for the in-class activities. In the second phase (*concept application phase*) students put into practice and evaluate the concepts learned in the first phase under the guidance of the instructor in the classroom (Jensen, et al., 2014). Put differently, students receive input in a form of videos or reading assignments prior to class time. Classroom time is then allocated to engage students in deep learning activities such as discussions and problem-solving (Lage, et al., 2000). Additionally, the FC model allows instructors to individualize the learning of all students. Instructors can roam around the room to observe and check students' understanding by asking low-order questions or stimulate students' thinking by asking high-cognitive questions (Bergmann & Sams, 2012).

Bloom's taxonomy of learning objectives is used as a basis for designing outside and inside classroom activities in the flipped classroom. In their influential work, *Taxonomy of Educational Objectives*, Bloom et al. (1956) classify the educational objectives according to their levels of complexity. The first three levels (knowledge, comprehension, application) are classified as low thinking skills, while the other levels (analysis, synthesis, evaluation) are graded as high-level thinking skills. Halpern (1998) revisited Bloom's taxonomy and stated that "high-order skills are complex; require judgement, analysis and synthesis; and are not applied in rote mechanical manner" (p. 451). In the traditional classroom, low-thinking skills are accomplished in class, while high-thinking work is done at home. In contrast, prominent

FC advocates (Lage et al., 2000; Bergmann & Sams, 2012; McLaughlin et al., 2014; Jensen et al., 2014) suggest that these cognitive levels need to be reversed. At home students are required to decode meaning, take notes, and set a list of questions to be tackled in the classroom. In class, students are engaged in higher cognitive levels (Strayer, 2012, Morton & Colbert-Getz, 2017, Singh, 2020). Consequently, this teaching approach has shifted the role of the instructor from an all-knowing and spoon-feeding figure to the role of a mentor or facilitator of the learning process that engages students to think beyond knowledge and comprehension levels (Vygotsky, 1978; Bergmann & Sams, 2012; Singh, 2020). The FC environment provides opportunities for learners to work in groups, to voice opinions, negotiate meaning, and solve problems. Based on this rationale, this study was expected to achieve the objectives of shifting the role of the teacher from "a sage on the stage" to "a guide on the side" (King, 1993) and fostering student-centeredness by upgrading generic skills of communication, self-study, and self-regulation.

BACKGROUND/CONTEXT

For the last 20 years, reform measures in education have occurred in Morocco with respect to the methodology of teaching and syllabus design (El Karfa, 2019). In 1999, the National Charter for Education and Training (Charte Nationale d'Education et de Formation) emphasized that promoting learner-centered pedagogy is the major objective of the reform. It states that "the reform of education and training places the learner in general and the child in particular, in the center of reflection and action on learning" (Ministère de l'Education Nationale, 1999). After some years, it was found that the objectives of the reform were not fully attained. In reaction, the High Council of Education, Training and Scientific Research2 (Consiel Superieur d'education, de la Formation et de la Recherche Scientific, 2015) was appointed with the purpose of diagnosing the educational situation and then looking for innovative ways to upgrade it. As a result, the Strategic Vision of Reform 2015–2030 was launched. Along with its emphasis on transitioning from a traditional education that emphasizes deductive learning, teacher-centeredness, and rote learning to a modern education that stresses active engagement of learners in the activities of teaching and learning, the strategic vision calls for promoting students' skills of problem-solving and critical thinking. Another aspect of this reform is the integration of Information and

Communication Technology in education. The Moroccan ministry of education has promised to equip all schools with computers and internet connections (Ministère de l'Education Nationale, 1999). The official pedagogical guidelines in secondary school state that among the goals of teaching English is to develop competencies of effective communication, such as listening, understanding, and responding to others appropriately. The pedagogical guidelines also stress the importance of helping learners "to develop their ability to think rationally and critically" (Ministère de l'Education Nationale, 2007, p. 11), that is, to develop high-thinking and meta-cognitive skills (logical reasoning, critical thinking, decision-making, and problem-solving). More importantly, the guidelines state that the objective of teaching English is "to develop skills leading to learner autonomy" (p. 12). For instance, students are required to search for information from different sources and "monitor and evaluate their own learning process in an appropriate way" (Ministère de l'Education Nationale, 2007).

REVIEW OF LITERATURE

The Effect of FC on Students' Performance

The flipped classroom (FC) is one of the burgeoning research areas that has received little interest in secondary school (Al-Harbi & Alshumaimeri, 2016). Research has documented that FC has the potential to improve students' performance in different disciplines; English language is not an exception (Köroğlu & Çakır, 2017; Bazzazi, 2017; Pudin, 2017; Al-Naabi, 2020). Al-Naabi (2020) employed a quasi-experimental one group reach design. The study included EFL university students in Oman and found that FC instruction impacted positively on students' performance in grammar tests. Similarly, Pudin (2017) carried out a study in a Malaysian university to gauge the effect of the FC in a grammar classroom in the university. The results showed that students improved their understanding of grammar thanks to the FC instruction. Köroğlu and Çakır (2017) conducted a study in Turkey to examine the effect of the FC on preservice English language teachers' speaking skills development. The authors found that the participants in the experimental group developed their grammatical competence in speaking compared to their counterparts in the control group. In the same vein, Bazzazi (2017) used a quasi-experimental study to investigate the effect of flipped learning on students'

grammar proficiency. The posttest results suggested that the experimental group scored better than the control group. Nevertheless, Al-Harbi & Alshumaimeri's (2016) findings were different from the aforementioned studies. The authors used a mixed-methods research design to examine the effect of the FC on secondary school students' performance in English grammar in Saudi Arabia. The posttest indicated that the flipped group got higher scores than the control group, but the results were not statistically significant. It is clear from the multiple experimental studies mentioned here that there are benefits of this FC model to students' performance in various cultural contexts, similar to the one in Morocco.

Students' Perceptions of FC

Almost all the aforementioned studies reported that the FC model had a positive impact on students' gains and achievements. There is also evidence that this model is preferred by students, for example, Lo and Hew (2017) conducted a systematic review of literature about the FC in K-12 and found that students' attitudes toward FC were positive. It is reported that FC increases students' level of satisfaction (Roehling, 2018; Bezzazi, 2017). The findings also indicate that the FC enables students to learn at their own pace and come to class well prepared (Bezzazi, 2017). Furthermore, flipping the learning environment provides opportunities for learner centeredness for it enables students to become autonomous and actively engaged in the learning process; that is, they are no longer passive recipients of knowledge (Noroozi, 2021; Lee & Wallace, 2018). These studies provide strong evidence for positives opinions about the FC pedagogy.

However, the FC could be challenging for students and teachers alike. It was found that some students felt that they were overloaded with homework, or they came to class unprepared (Al-Naabi, 2020; Lee & Wallace, 2018; Pudin, Ibid). Other challenges are linked with information technology resources: "It was found that although most participants had their own mobile devices, many did not have enough Internet access authorization at home" (Wang 2016, p. 411) and "students' being unable to load and play the videos at home if they had any kind of technological problems" (Chen 2016, p. 418). Moreover, this model can also be challenging for educators who are accustomed to traditional teaching or not tech-savvy. These challenges are related to teachers' preparation of videos. Teachers spend a lot of time searching for videos that match what they want to teach (Chen, 2016). It is also time-consuming for those who want to generate their own videos (Snyder et al. 2014).

The Flipped Classroom in Morocco

The FC is still an underresearched topic in Morocco. A handful of studies have been conducted at the university level (Wahib & Tamer, 2021; Boubih et al. 2020; Jaafari, 2019). However, there is a gap in knowledge based on research conducted in high schools. One of the few recent studies, by Wahib and Tamer (2021) on the effect of FC on students' achievement in phonology at two Moroccan higher education institutions, suggested that the positive effect of this model is attributed to several factors, and two are relevant here. The first factor is that this model provides students with more time to prepare well. They come to class with background knowledge that make them more curious and motivated to learn more about the content. The second factor is credited to the extensive exposure to content. Students in the experimental group are found to learn more than their counterparts in the control group. Previously, Bensoukas (2016) examined the effect of the FC on students' performance in phonetics. The results showed that watching videos at home helped students understand the content much better. However, the study found that FC can be challenging to teachers who are not comfortable with using technological tools to deliver content.

Based on the review of the previous studies and the best knowledge of the researcher, the FC model has not received much attention in English language teaching especially in secondary school. Hence, this study was conducted to fill the gap by examining the impact of the FC on students' achievement in grammar and their perceptions about this innovative model in high school in Morocco. The study seeks to address the following research questions:

- What is the impact of flipped classroom instruction on students' grammatical competence?
- What are students' perceptions of flipped classroom instruction?

METHODOLOGY

This study adopted a mixed-methods approach. This approach, also called the third path (Gorard & Taylor, 2004) and the third paradigm (Johnson & Onwuegbuzie, 2004), is a "research in which the investigator collects and analyses data, integrates the finding and draws inferences, using both quantitative and qualitative approaches or methods in a single style or program of inquiry" (Tashakkori & Creswell, 2007, p. 4). The advantages of mixed-methods research are manifold. First, it provides a holistic understanding of the topic under study. Second, the two

approaches complement each other. A mixed-methods approach may offset the weaknesses of the other. Third, this approach offers more evidence and credibility for the study of the research problem. Finally, the use of mixed methods may aid in answering questions that cannot be answered either quantitatively or qualitatively (Creswell & Clark, 2018).

Research Design

This study adopted a posttest-only quasi-experimental design to investigate the effect of the flipped classroom instruction on students' achievement in grammar. A semistructured interview was used as a follow-up.

Participants and Settings

The study involved 40 students (23 females and 17 males) of two groups (control, n=20; experimental, n=20) from two different high schools in Larache, a small seaside city in the north of Morocco. These are science students whose levels of English are assumed to be pre-intermediate. English is taught as a second language and its coefficient is lower compared to mathematics and physics. However, a proportion of learners excel in English because it is the language they encounter in their daily use of technological gadgets while playing video games or using social networking sites.

Procedure

Technological tools were used in both groups to teach grammar, but the methodology was different. Students in the experimental group were provided with a video of the grammar lesson and a follow-up PDF-document three days before the assigned class. Both the video and the PDF document were uploaded to students through he WhatsApp application (almost all students own smartphones or use their parents'). They were asked to watch the video as many times as they can and do the homework activity. In-class time was allotted to correcting homework activities and then engaging students in group work activities in which they were guided to interact with each other using the different types of conditionals. The control group, on the other hand, was taught by the researcher who used computer-assisted instruction to explain the lesson. The mode of instruction adopted in the control group was inductive. The researcher first presented a set of examples about the grammar content. Students were then asked to notice, compare, and then formulate rules about the different types of conditionals. The follow-up exercises were assigned as a homework activity.

Data Collection

To achieve triangulation, both quantitative and qualitative data were collected sequentially. First, a posttest was administered to compare the performance of the flipped and nonflipped groups. Second, a semistructured focus group interview was used.

Posttest. The posttest included 20 multiple-choice statements of the four types of conditionals, namely types 0, 1, 2, and 3. In Moroccan public high schools, students are supposed to learn different conditional structures. In the first and second years, they study conditional types 0, 1, and 2; in the third year, they are exposed to all conditionals, including type 3. The grading system in Morocco is based on a 20-point scale; each statement in this test is graded 1 point. The test was administered in multiple-choice questions. To ensure validity, the test was revised by two other teachers working in the same area. The revision addresses the relevancy of the test to the students' level of proficiency.

Focus Group Interview. Five randomly selected students from the treatment group were asked to express their perceptions of flipped classroom instruction. The questions were adapted from Yang's (2017) study. Yang used a semistructured interview to investigate students' perceptions about the FC model in secondary school. The questions were open-ended and were asked first in English and then translated into Arabic. An example of the questions asked is "What are your general feelings about the idea of receiving lesson content at home?" We accepted students' responses both in English and Arabic.

Flipped Classroom Video. Research was done on YouTube to find an appropriate video that explains the different types of conditionals in a simple and comprehensible language. The content of the video was validated by two teachers.

Data Analysis

Data were analyzed both quantitatively and qualitatively. First, the method of statistical descriptive analysis was used to compare the means of the two groups in the posttest. After that, an independent samples T-test was employed to examine whether the means of posttest scores were statistically significant. Second, the interview data were analyzed using the qualitative content analysis.

RESULTS

To answer the first research question ("What is the impact of flipped classroom instruction on students' grammatical competence?") means and standard deviation of posttest scores were calculated as shown in Table 1.

Table 1. Means and Standard Deviation of Posttest Scores Group

Measure	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest scores	Control group	20	13,95	1,432	,320
	Experimental group	20	14,15	1,424	,319

The findings in Table 1 indicate that the mean for the control group is 13,95, and the standard deviation is 1,432. As for the experimental group, the mean is 14,15 and the standard deviation is 1,424. Table 1 reveals that there is a slight difference in the means of the posttest achievement in favor of the experimental group. Hence, it can be assumed that the high achievement of the treatment group may be attributed to the use of the flipped classroom model. But the difference was not statistically significant. To examine this difference statistically, an independent samples T-test was carried out. We have set the level of significance at $p < 0,05$. The results of this test are shown in Table 2.

Table 2 shows that the means are not statistically different. This non-significance in the averages of the two groups may be explained by the teaching paradigms being adopted in teaching the two groups. The non-flipped group was not totally traditional; that is, the mode of instruction (inductive) and the use of the computer-assisted instruction in the control group might have helped students to achieve almost the same as the flipped group, or there might have been some other factors affecting the results that were not controlled for beforehand, such as students' proficiency in the English language, for the researcher did not administer a placement test.

To answer the second research question ("What are students' perceptions of flipped classroom instruction?"), five participants of the treatment group were interviewed. The overall responses indicated that students had positive attitudes toward FC instruction. When asked about their feelings about receiving lesson content outside the classroom, all participants expressed their satisfaction with this pedagogy. They appreciated the idea of receiving the lesson content in their phones. One participant said, "I really liked the idea of getting the lesson in my phone. I wish all teachers

Table 2. Independent Samples T-Test

Measure		**Levene's Test for Equality of Variances**		**t-test for Equality of Means**						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
post test score	Equal variances assumed	.086	.770	-,443	38	,660	-,200	,452	-1,114	,714
	Equal variances not assumed			-,443	37,999	,660	-,200	,452	-1,114	,714

could do that." Another participant added that "grammar lessons are boring when the teacher spends more time explaining rules." When asked how receiving lessons outside the classroom walls could be helpful in understanding the content much better than when done in the classical way, students evinced that receiving the input before the assigned class gave them the chance to prepare well for the in-class activities by taking notes and posing questions. Students said that watching videos helped them easily understand the content. An interviewee said, "It is one of the rare times that I understand the lesson well; pausing and rewinding for many times helped me a lot."

When asked "what are the benefits of being exposed to lessons before the assigned class?" participants responded almost identically. One participant said, "I felt that I could do things on my own." Another student said, "Thanks to this model I could talk more in class." It can be inferred from students' responses that autonomy and active engagement in the classroom activities are two main skills they have developed during this instruction. FC instruction enabled students to understand lesson content independently and work at their own pace by watching the video multiple times.

DISCUSSION AND CONCLUSIONS

The present study examines the impact of the flipped classroom on students' achievement in grammar. The results showed that the experimental group (14, 15) achieved better than the control group (13,95). However, the independent T-test indicated that the posttest scores were not statistically significant. This nonsignificance is probably attributed to the duration of treatment, for the flipping pedagogy was used just once. More time is needed to get a reliable evaluation of this pedagogy. In a similar cultural context to this study, Al-Harbi & Alshumaimeri (2016) found that the students of the experimental group achieved better than their counterparts in the control group in the grammar test, but the results were not statistically significant. Findlay-Thompson and Mombourquette (2014) supported the previous findings and indicate that this model did not have any significant effect on students' performance. In contrast, numerous researchers found that FC instruction impacted positively on learners' academic achievements (Bergmann and Sams, 2012; McLaughlin et al., 2013; Davies et al., 2013). Fadhilah et al. (2021) examined the effect of the FC on students' grammatical competence in high school and found that the scores of the treatment group in the posttest were statistically significant. Fadhilah et al.

(2021) concluded their study by emphasizing that "the Flipped Classroom strategy was impactful for EFL students in comprehending and using English grammar" (p. 69).

Although there were no quantitative gains, the results of the semi-structured interview indicated that students had positive opinions about the flipped model. It was reported that this model increased their level of satisfaction. These findings align with previous results, which found that this pedagogy increased students' level of satisfaction (Roach, 2014; Martínez-Jiménez & Ruiz-Jiménez, 2020). Additionally, the flipped model helped students to prepare well for the in-class activities. At home, students had more time to pause and rewind the video as many times as necessary. This helped students achieve deep understanding. These findings confirm the previous results of Smallhorn's (2017) study, which found that the FC provided students with "a forum to ask questions both of peers and educators" (p. 11). In the FC, students also learn at their own pace; hence, self-paced learning is attained (Roach, 2014). The interviewees' responses shed further light on the reasoning students gave for preferring the flipped classroom as they emphasized that the flipped model improved their active engagement, sense of responsibility, and autonomy, which is consistent with Han (2015), who found that FC pedagogy impacted positively on students' autonomy in English learning. This was manifested in their voluntary efforts to search for resources and technological tools that can help them develop their English language skills (Han, 2015). In addition, this pedagogy increased students' engagement, consistent with Fredricks et al. (2004), who proposed a multidimensional approach to engagement that involves three important components, namely, behavioral engagement, emotional engagement, and cognitive engagement. In other words, engagement refers to the active participation of the learner inside and outside classroom activities; the positive feeling toward subject matter, classmates, and teachers; and the willingness to engage in comprehending and solving complex ideas using high-cognitive thinking skills (Fredricks et al., 2004). It can be inferred from the interviews that the first two types of engagement were achieved. The behavioral engagement is manifested in the students' willingness to actively prepare for the in-class activities. The emotional engagement is shown in the feeling of satisfaction with the FC pedagogy. Besides, although the content lesson in this study is rule based, students in the flipped group had more chances to communicate with their peers and teacher. This agrees with the findings of McLaughlin and colleagues' results (2014), which suggested that students in the flipped

group developed techniques of active learning such as engaging inclass discussions with peers.

The findings, notwithstanding their nonstatistical significance, indicated that the students had positive opinions about this innovative pedagogy, which enabled them to promote skills of active learning. Accordingly, the present study contributes to the growing body of work on the FC in providing new information on this model and the way it is perceived among students taking English language classes in high school. It also opens the door for further research and scaling up this one to include larger samples and more schools and content areas in the local context of Morocco.

However, several limitations need to be considered. First, the researcher did not use a placement test to examine students' English proficiency for the flipped and nonflipped groups. Second, the study relied on a posttest only to collect the quantitative data, which is not enough to obtain reliable judgment about the efficiency of the FC. A pretest should have been administered before the treatment to be used in evaluating how much of a change or development had occurred. Finally, the third limitation is associated with the choice of research design itself. The focus on preexisting groups (the two intact groups) cannot be controlled due to the lack of randomization. Hence, further research should be done to investigate the extent to which the FC approach can be an added value to teaching and learning English in Morocco.

Note

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1. High school in Morocco consists of three years (10th, 11th, and 12th grades).

2. The Council was created on May 16, 2014, to replace the High Council of Education (le Conseil Supérieur de l'Enseignement).

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