Flipping the Classroom to Enhance Academic Vocabulary Learning in an English for Academic Purposes (EAP) Course

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Abstract
The present study explores the efficiency of the flipped classroom approach on English for Academic Purposes (EAP) students’ academic vocabulary acquisition in comparison with the conventional teaching approach. The efficiency is examined by evaluating students’ post-test performance, self-perceived mental effort employed in completing post-test tasks, and perceptions regarding the learning experiences. To this end, 60 undergraduates divided into flipped (E) and conventional (C) group participated in the survey. Quantitative data analysis revealed that the flipped classroom approach showed higher instructional efficiency than the conventional approach as the E group significantly outperformed the C group and reported investing considerably lower mental effort in completing the post-test tasks. In addition, the E group expressed significantly more positive perceptions toward the learning experience than the C group. Considering the positive results obtained in the study, the article points out the use of the flipped approach as an example of good practice for enhancing academic vocabulary acquisition in EAP context.

Keywords
flipped classroom, academic vocabulary, mental effort, perceptions toward learning, instructional efficiency

Introduction
Vocabulary learning is an integral part of any second or foreign language (L2) course. Although L2 pedagogy offers a number of approaches to vocabulary acquisition, vocabulary teaching and learning is still an on-going challenge as there has not been a method that best enhances the learning of this segment of L2 knowledge (Schmitt, 2008).

In recent years, an emphasis has been placed on the use of technology in vocabulary teaching and learning by means of personal computers, mobile phones, and various online resources and the effects of these technology-supported approaches have widely been examined (Groot, 2000; Ma, 2017; Stockwell, 2010). A pedagogical model that relies on the use of online technology and is currently attracting attention of many educators is so called flipped classroom (FC) approach. It is “a learning strategy that offers preparatory or foundational content outside of the classroom and uses class time for active learning” (L. Cobb & Steele, 2014, p. 2). In other words, the flipped classroom is an instructional approach in which lecture material typically covered during class is instead delivered online to the students. As such, it is a less teacher- and more learner-centered approach offering self-directed and self-regulated learning which, in turn, is seen as one of the main predictors of greater academic achievement (Zimmerman & Kitsantas, 2014). Being learner-centered, the approach also appears convenient for classes with mixed-ability students, or in the context of L2 teaching, groups of students with various levels of background knowledge, which for example, often happens to be the case with English for Academic Purposes (EAP) courses (Carkin, 2005). In spite of its current popularity among educational specialists, the flipped classroom approach still seems to be in its infancy, as there is limited evidence of studies that have examined the approach under a pedagogical microscope (Abeysekera & Dawson, 2015). Referring to this lack of empirical evidence and all positive aspects of the FC stated above, as well as considering the aforementioned lack of a method that would best enhance the learning of L2

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vocabulary, the present study aims at examining the effects of the FC model on learning academic vocabulary in EAP context.

The knowledge of academic vocabulary is central to EAP teaching and learning. Gardner and Davies (2014), for example, ascribe academic vocabulary a central role in school success for both native and non-native speakers. Nonetheless, EAP students are often challenged by limited vocabulary (Carkin, 2005), and this particularly happens to be the case with first-year undergraduates (Li & Pemberton, 1994, in Hyland & Tse, 2007, p. 236). Addressing the above issues, the present study investigates the use of the FC approach in teaching and learning the Academic Word List (AWL) items (Coxhead, 2000) to a relatively large group of first-year EAP students with varying levels of English proficiency. The efficiency of the approach is assessed by means of pre- and post-test methodology that measures students’ progress in the knowledge of the AWL words, their self-perceived mental effort employed in dealing with the AWL items, and the perceptions toward the learning experience.

**Literature Review**

**Learning of Academic Words**

According to Nation (2001), vocabulary can be divided into three large categories: *high frequency words*—the most widely useful 2,000-word families in English, covering about 80% of most texts; *academic vocabulary*—words which are reasonably frequent in academic writing and comprise some 8% to 10% of running words in academic texts, and *technical vocabulary*, the vocabulary that differs by subject area and covers up to 5% of texts. Academic vocabulary, therefore, refers to items which are common to a wide range of academic genres but relatively uncommon in other kinds of texts (Coxhead & Nation, 2001). These items are usually identified through corpus-based analyses and compiled into refined vocabulary lists which often provide a solid basis for vocabulary teaching and learning. Some of the lists that have been most commonly addressed in the relevant literature include Coxhead’s (2000) Academic Word List, Paquot’s (2010) Academic Keyword List (AKL), and Gardner and Davies’ (2014) new Academic Vocabulary List (AVL) (for further reference on the evolution of academic vocabulary lists, see Goulart, 2018). A brief review of the three lists is given in the following paragraph.

The AWL includes 570 word families or head words found in academic texts that cover four major fields (arts, commerce, law, and science) and 28 subject areas within them. It is divided into 10 sublists according to frequency. The list is reported to provide a 10% coverage of academic written texts (Chen & Ge, 2007; Coxhead, 2000) and together with West’s (1953) General Service List (GSL) covers about 90% of texts (I. S. P. Nation, 2004). Opposed to it, the AKL offers a selection of words based on keyness, that is, the words that appear significantly more in the academic corpus than in a corpus of fiction. Another distinction of this list is the inclusion of non-professional, students’ writing in its corpus. As far as the organizational pattern is concerned, the AKL items are classified in relation to the parts of speech, so that the list comprises 930 words divided into nouns, verbs, adjectives, adverbs, and others. Finally, as the most recent of the three lists, Gardner and Davies’ (2014) AVL represents a list compiled on the largest corpus—120 million words whose selection is based on ratio (the words occurring at least 50% more often in the academic corpus than in any other non-academic corpora), frequency, range, dispersion, and disciplinary coverage. What makes this list also unique is its presentational pattern into a list of lemmas, that is, words with a common stem, related by inflection only, and coming from the same part of speech (Gardner & Davies, 2014). In this respect, the list offers a more accurate presentation of the items than it is the case with the AWL, as items in one word family may have different meanings. In spite of this, however, word families have been extensively used in the production of word lists (Goulart, 2018), and even the AVL has a version of word families for research and teaching purposes, as they are easier to be used as a reference in research (Gardner & Davies, 2014).

Although all three lists represent useful resources for academic vocabulary learning, for the purpose of the current research the AWL was chosen. The decision was mostly guided by practical reasons. Namely, in analyzing available online resources for developing academic vocabulary, it was the researchers’ impression that the largest number of these resources were devoted to the AWL items and that they also showed the greatest diversity regarding the type of activities. This factor, naturally, seemed very convenient for designing the flipped instruction in the research. The researchers’ observation can be supported by literature (Goulart, 2018) stating that the AWL has had more applications in the development of textbooks, tests, and other pedagogical resources than any other list so far. Additional reason for choosing this list is its organizational concept into 10 sublists which has been found useful in setting goals for learning (Snow et al., 2009), as it makes it easier for learners to approach the learning of the items in separate groups. Finally, in spite of the criticism that the AWL does not clearly distinguish between academic and general vocabulary (Gardner & Davies, 2014), and that the list does not contribute significantly to general academic success (Masrai & Milton, 2018), there has been a consistent empirical evidence that the knowledge of these words is essential for L2 learners’ comprehension and composition of academic written text (Choo et al., 2017; T. Cobb & Horst, 2004; Dang & Webb, 2014).

An important question that needs to be addressed regarding the pedagogical use of the AWL is the teaching approach. Modern L2 pedagogy favors a learner-centered approach that takes into account individual learner differences, such as learning styles and preferences and the use of learning
strategies. The importance of language learning styles and strategies for vocabulary learning and teaching has been addressed in a number of studies (e.g., Gu, 2010; P. Nation & Gu, 2019; X. Zhang & Lu, 2015). Paying attention to learning styles and strategies requires an instructional approach that implies a rather flexible way to teaching, with the teacher playing the role of a facilitator. As far as deliberate vocabulary list learning is concerned, most of the learning takes place outside of the classroom and therefore this type of vocabulary learning is especially useful for independent learning as students are in class for a limited amount of time (Klapper, 2008). As an innovative approach that relies on the use of modern technologies, the FC model incorporates many of the characteristics mentioned above and this is the main reason why it was chosen to be tested in this research.

**Flipped Classroom Approach**

Flipped classroom, by some authors addressed as inverted classroom (Strayer, 2012), refers to a relatively new pedagogical approach which reverses classroom and homework activities. Opposed to a common method of instruction where new knowledge is presented in class and later practiced at home (hereafter referred to as the conventional instruction), the FC implies that students acquire new knowledge at home, via digital media, and practice the skills in class, where the teacher monitors students (Chen Hsieh et al., 2017). Abeysekera and Dawson (2015) define the FC as

a set of pedagogical approaches that: (1) move most information-transmission teaching out of class, (2) use class time for learning activities that are active and social and (3) require students to complete pre- and/or post-class activities to fully benefit from in class work. (p. 3)

Such being the case, it can be said that the FC consists of two disjoint components: interactive learning activities inside the classroom and direct computer-based individual instruction outside the classroom (Bishop & Verleger, 2013, in Teng, 2017). Although the majority of studies on the FC rely on the use of videos created by the teacher or a subject expert, this second, computer-based, component can actually take various forms, not only videos and podcasts, but also other multimedia resources, online interaction, printed material, and so on (Chen Hsieh et al., 2017; Leis, 2016). The instructional concept of FC offers a number of benefits to students: It allows them freedom to choose the most convenient time for learning and to learn at their own pace, as there is a possibility to pause and replay the content. In this respect, it represents a highly personalized concept of learning suitable to students’ individual needs and study habits. At the same time, the approach can be rather effective as repeated exposure to the content of learning, as Chen Hsieh and associates (2017) observe, strengthens and deepens the students’ understanding of the content. These benefits, however, may turn into problems. Johnson and Marsh’s (2014) study on L2 teachers’ stances toward the flipped approach, for example, shows that time management may turn into a critical factor as some students display poor organization of their study time. The study also points to the lack of the required level of maturity as some students tend to perceive online studying as simply make-work and not regular learning. These, certainly, remain as some of the challenges of implementing the FC into the learning process.

Referring to the use of the FC model in English Language Teaching (ELT), Turan and Akdag-Cimen (2020) observe that the FC gained popularity in the field of ELT after 2014. Apart from describing how to implement the FC model, most studies so far have examined the effects of the FC application in comparison with the conventional teaching approach by analyzing the learning outcomes. Thus, the research on FC has revealed significant improvements in students’ performance regarding their writing skill (Adnan, 2017; Baranovic, 2013, in Teng, 2017; Wu et al., 2019), listening skill (Leis, 2016), oral proficiency (Wang et al., 2018), pragmatic competence in relation to the use of refusals (Haghhighi et al., 2019), and idiomatic knowledge (Chen Hsieh et al., 2017). At the same time, students’ positive perceptions toward implementing the FC approach have been reported by Adnan (2017), Teng (2017), Hung (2015), and M. Webb et al. (2014). When it comes to vocabulary teaching and learning, just few studies conducted so far report on higher vocabulary gain and more positive perceptions toward learning in favor of the FC model compared with the conventional approach (Xiao-Qing, 2016; H. Zhang et al., 2016). Narrowing this review to the field of EAP and academic vocabulary, the literature is quite scarce, with a report only on the improvement in students’ academic writing after the FC implementation (Pavanelli, 2018) and none, to the best of the authors’ knowledge, on academic vocabulary. Considering this gap in the relevant literature, the present study is designed to examine the effect of the flipped approach on students’ academic vocabulary gain by comparing this approach with the conventional way of learning.

Finally, as a highly self-centered approach, FC may provide better managing of working memory while learning and is worth being examined from a cognitive load perspective (Abeysekera & Dawson, 2015). As a load imposed on a cognitive system of an individual during the learning of a new content or in solving a particular task (Plass et al., 2010; Sweller et al., 2011), cognitive load is a multidimensional construct which, among a number of factors, includes mental effort. Mental effort is perceived as an individual’s invested cognitive capacity while working on a task (Krell, 2017) and defined as the number of non-automatic elaborations applied to a unit of material (Salomon, 1983a, in Cennamo, 1993, p. 33). It depends both on the characteristics of the task and the characteristics of the educational model (Plass et al., 2010; Sweller et al., 2011) and can be considered a measurable dimension of the cognitive load. As it reflects an individual’s invested
cognitive capacity, subjective measurement of mental effort can be applied. Paas and associates (Paas et al., 2003) claim that subjective measures have proven to be valid and reliable and many of the studies so far have relied on the subjects’ self-report on the invested mental effort upon the completion of a task (e.g., Milenković et al., 2014; Radulović et al., 2016; Županec et al., 2018). In addition, this dimension, together with students’ achievement, has been widely used by education researchers for determining the instructional efficiency of a teaching approach (Van Gog & Paas, 2008). According to the authors, instead of evaluating the quality of an instructional approach based only on the students’ performance, this two-dimension measure represents a better and more reliable indicator of instructional efficiency. The measure, therefore, is used in the present study for assessing the implementation of the FC in relation to the conventional approach in teaching and learning academic vocabulary. Additional reason for including this dimension in the study is the fact that there are some reports (Mattis, 2015; Županec et al., 2018) of students investing less mental effort in solving tasks when taught in the flipped environment. None of these reports, to the best of the authors’ knowledge, fall within the scope of L2 learning.

Method

The aim of the present study is to examine the efficiency of the FC approach in the teaching and learning of academic vocabulary (more precisely the AWL items) as part of an EAP course, compared with the conventional approach. The efficiency is assessed in relation to the students’ test performance, their self-perceived mental effort invested in solving test tasks and perceptions related to their AWL learning experiences. Correspondingly, the following research questions are addressed:

**Research Questions 1:** Which approach, the FC or conventional, shows greater efficiency considering the students’ acquisition of the AWL items?

**Research Questions 2:** Which approach, the FC or conventional, shows greater efficiency considering the students’ self-perceived mental effort invested in solving tasks related to the AWL?

**Research Questions 3:** Which approach, the FC or conventional, results in higher instructional efficiency value?

**Research Questions 4:** Which approach, the FC or conventional, shows greater efficiency considering the students’ perceptions toward their AWL learning experiences?

To address these questions adequately, the research design employed in the study included the pedagogical experiment with parallel groups.

**Participants**

The participants were 60 first-year students at the University of Novi Sad, 30 of them majoring in biology and comprising the experimental (E) group, while the other 30 were students of biochemistry who comprised the control (C) group. Even though the participants’ subject areas differed, this factor was not perceived as crucial for affecting the findings for several reasons: First, the study focused on general, and not subject-specific vocabulary; second, all participants were first-year students, which meant that most of the courses they had at that time were of common ground and not so subject specific. The factor that did seem crucial for establishing the homogeneity of the groups was the students’ language learning background. Referring to this, all of them studied English through their primary and secondary education and at the beginning of the course their language competence was tested (Quick Placement Test, OUP 2001) and assessed between the levels B1 and B2 according to the Common European Framework of Reference for Languages (CEFRL). The participants of both groups attended an identical EAP course taught by the same instructor, one of the researchers in the present study, and the lectures were held in two separate departmental buildings (so that the contact and exchange of information between the groups during the treatment was minimal). All of the participants voluntarily accepted to take part in the research. They also had an opportunity to exclude themselves from the research at any time of its implementation without having any consequences.

**Instructional Procedure**

During the treatment period, the E group was exposed to the FC approach and the C group experienced the conventional lecture-based instruction while acquiring the AWL. The experiment was performed at the beginning of the spring semester in the academic year 2017/2018 and lasted for 8 weeks. In the first week, both groups completed a pre-test that checked the students’ knowledge of the list items. In the following 5 weeks, the participants acquired the AWL items (their form, meaning, collocational and contextualized use) from 10 sublists, two sublists per week, including class periods of 90 min that were held weekly. As already stated, the groups were exposed to different teaching approaches.

The FC approach conducted with the E group comprised two components: pre- and in-class activities. In pre-class activities the students were directed to two online resources: the institutional Moodle platform where the teacher uploaded material referring to the AWL and the website https://emedia.rmit.edu.au/learninglab/content/academic-word-list-tool, the resource available at the website of RMIT University under the section Improve your English. This learning tool was chosen because of its conciseness, good organization, and a wide range of tasks: It offers the separate AWL sublists, two sublists in one section together with a variety of activities that focus on different aspects of vocabulary knowledge—the form, meaning, spelling, and collocational use of the AWL words. The tool offers clear and simple instructions to the activities, various formats of activities including games and quizzes, an option for students to test their progress, and
Knežević et al.

links to other useful resources related to the AWL. As for the Moodle platform, the uploaded material included the AWL sublists (two sublists given each week) and the explanation and contextualized use of those items that the teacher expected the students to be unfamiliar with. For example, to explain the term constraint, apart from explaining its meaning, the students were provided with several sentences that exemplified its semantic and collocational use (examples taken from Longman Dictionary of Contemporary English Online, https://www.ldoceonline.com):

*Constraints on* spending have forced the company to rethink its plans. Exams are always done under strict *time constraints*. With any new project, you have to be aware of the *budget constraints*. Lack of funding is putting severe *constraints on* research.

Moodle environment also provided direct links to two online dictionaries, Oxford Advanced Learner’s Dictionary (https://www.oxfordlearnersdictionaries.com/wordlist/english/academic) and Longman Dictionary of Contemporary English Online (https://www.ldoceonline.com). The recommended dictionaries provide clear explanation of the meaning and plenty of sentences to illustrate the contextualized use and most common phrases and collocations. In addition, the first of these provides direct access to the AWL sublists.

Prior to each class period, the students were first expected to visit the Moodle platform, analyze two of the sublists, familiarize themselves with the items, and after that visit the recommended website and complete the activities related to the specific sublists. Two days prior to their English class, the students were required to submit their own lists of unknown items from each two sublists to the teacher via email or Moodle platform. The required lists included several categories that had to be filled in: Words that were totally unfamiliar to me; Words that I met before but was not sure about; Confusing words to me; Questions and Comments. Regarding the last two categories, the students received a feedback from the teacher with relevant explanations after which they were expected to include these words into one of the first two categories. As for these categories, the students were supposed to write dictionary entries in their vocabulary notebooks relying on the recommended dictionaries and the Moodle material. The entries should include example sentences and other family words with specified parts of speech. In case the word was already explained and exemplified in the Moodle material, additional example sentence was required. By submitting these lists regularly, the students actually created their personalized AWL lists and this was one way of ensuring that the participants did take part in pre-class segment of the implemented approach. Accordingly, the E group sample in this research included the students who regularly submitted these lists.

During in-class activities, instead of presenting the items and explaining their meaning and use, the teacher had more time for interactive discussion with the students and more time for practice. Thus, the first part of the class (5–15 min) was devoted to analyzing and discussing the items that the students had included in their personalized lists and in that way it was additional opportunity for students to revise, compare their own and other classmates’ glossaries, and clarify and deepen their understanding of the items. It was also an opportunity for students to ask questions in relation to some particular items or the website activities referring to them. The next segment of the class (10 min) included a brief revision based on a selection of the sentence examples offered in Test yourself section of the website. The selection of particular examples was based on the students’ responses, that is, the items that most of them classified as unfamiliar or confusing to them. After this, the rest of the class time (65–75 min) was devoted to activities that required more productive use of the AWL items, including collaborative activities that enhanced critical thinking and creativity. Thus, one of the common activities was a game where students divided into teams were supposed to think and provide the synonyms or explanations of 10 items from two specific sublists for their opponent team to guess under a tight time constraint. As for the written production, the teacher provided the students with a number of verbs, nouns, and adjectives selected from two specific sublists and the students, working in small groups, were expected to write original sentences containing as many of the enlisted items as possible within a given time. For example, the items given from the first two sublists included the following verbs, nouns, and adjectives: conduct, estimate, indicate, occur; analysis, assessment, issue, research, survey; consistent, major, relevant. The students were particularly encouraged to combine more items in a single sentence or a few coherent sentences and their outcomes were read and analyzed in class, discussing their semantic, grammatical, and collocational accuracy. In so doing, the students could learn from and evaluate one another.

The conventional approach with the C group implied frontal lectures in which the students were supplied with the AWL sublists in printed form. In comparison with the E group, the instructional procedure was organized in the following way: the first part of the lecture (30–45 min) was devoted to elaboration and discussion on the form, meaning, and use of the AWL items and the students were provided with the same examples and explanations as their flipped group peers in the pre-class phase; the rest of the class time (45–60) also included activities from the E group pre-class phase, as the students completed the tasks from the above website but presented in the form of a handout that completely hid the source they originated from. Due to the lack of time, some of the activities included a smaller number of examples and the last activity was always the shortened version of Test yourself section of the website, the same one as used with the E group in the first part of in-class activities. There was no time for implementing those collaborative and productive activities and games that were practiced with the
E group. Instead, the students were given the same selection of words to use them in their original sentences for homework.

The described treatments were applied for 5 weeks, the seventh week class time was reserved for general revision with both groups and in the following week a post-test was implemented.

**Instruments**

As already stated, the participants took pre- and post-tests at the beginning and after the treatment period. The tests were created for the purpose of this study and to test their reliability and validity they had been piloted with a group of Maths students who had their EAP course one semester before the research was performed. The pre-test and the post-test included the same task types but with different selection of the AWL items that were tested. In selecting test tasks, a multidimensional aspect of measuring lexical knowledge (Pigada & Schmitt, 2006; S. Webb, 2007; Yamamoto, 2014) was applied, that is, the tasks implied the proper use of the AWL items regarding semantic, grammatical, and collocational contexts. The tests consisted of two cloze/gapfill tasks focusing on contextualized use of the AWL at the sentence and discourse levels. These tasks were chosen for several reasons: They require the semantic, grammatical, and collocational knowledge and accuracy, the three aspects that were practiced with both groups; they are easy to score; and the students of both groups were familiar with them. The first task included eight sentences with one omitted word and three offered items after each sentence for students to choose the one that is correct. The second task included a passage of approximately 220 words out of which 10 items had been removed and given below. For this purpose, the AWL highlighter and gap-fill tool available at https://www.eapfoundation.com/vocab/academic/highlighter/ was used. Each correctly chosen item scored one point, thus making the total test score of 18 points. The Cronbach’s alpha values obtained for the pre- and post-tests equalled 0.882 and 0.844, respectively.

In addition to the use of AWL items, the post-test measured the students’ self-perceived mental effort invested in solving the 18 items. For this purpose, a 7-point Likert-type scale was applied, and the descriptors were graded from extremely easy (1) to extremely difficult (7). As already stated, this method, belonging to the group of empirical indirect subjective measures, has been applied in a number of studies that measured this variable (e.g., Milenković et al., 2014; Radulović et al., 2016; Županec et al., 2018). The post-test is included in Appendix A.

Along with the post-test, the students completed a 10-item questionnaire on their perceptions toward academic vocabulary learning (Items 1–6) and the learning approaches (Items 7–10) in a 5-point Likert-type scale (Appendix B). Two education experts reviewed the questionnaire to improve its validity. Cronbach’s type value of 0.861 proved the questionnaire reliability.

**Data Analysis**

To test the differences between the groups in relation to dependent variables (the pre-test and post-test performance, self-perceived mental effort invested in the post-test and the perceptions toward the learning experiences) descriptive statistics, analysis of variance (ANOVA), and independent samples t test were applied. To compare the instructional efficiency of the two approaches, the calculation procedure as described in Paas et al. (2003) was applied. Data were analyzed using SPSS statistics 20 software package.

**Results**

The obtained results are presented in four subsections, following the set research questions.

**Flipped Classroom and Conventional Approaches Impact on Students’ Performance**

The results referring to the students’ performance in the pre-test are given in Table 1. The table contains the descriptive statistics and the corresponding t value.

| Group | N  | M   | SD  | df | T   | p   |
|-------|----|-----|-----|----|-----|-----|
| E     | 30 | 11.03| 4.63| 58 | −.192 | >.05 |
| C     | 30 | 11.26| 4.78|    |      |     |

As it can be seen, there is no significant difference in the mean score between the groups. ANOVA results also show the absence of statistical difference, $F(df = 1) = 0.037, p = .849$. On the basis of their pre-test performance, we can say that at the beginning of the intervention period there were no differences regarding the students’ AWL knowledge.

After the intervention period, both groups of students took the post-test and the results of their performance are given in Table 2. Similar to the previous results, the table contains the descriptive statistics and the corresponding t value.

As shown in Table 2, both groups showed improvement in relation to the pre-test performance, but the improvement of the flipped group is noticeably higher. As the presented results show, the E group achieved a significantly higher...
mean score (82.59%) in comparison with the C group (67.59%). ANOVA also pointed to a significantly higher performance of the E group ($F(df = 1) = 8.645, p = .005$, while the eta-squared value (0.13) indicated medium to large effect of the applied approach on the E group performance. The findings indicate that the gain of the AWL items is considerably higher when the items are taught and learnt in the FC environment than in conventional instructional procedure.

### Flipped Classroom and Conventional Approaches

#### Impact on Students’ Self-Perceived Mental Effort

The efficiency of the approaches has also been examined in terms of the students’ mental effort investment and the results of the students’ report on mental effort employed in the post-test are presented in Table 3. The table contains statistical parameters referring to the students’ self-perceived mental effort invested in completing the post-test items.

The results suggest, as shown in Table 3, that the E group reports less mental effort invested in dealing with the post-test tasks than their C group peers. ANOVA results point to statistically significant difference between the groups, $F(df = 1) = 23.402, p = .000$, while eta-squared (0.287) shows large effect of the FC on perceived mental effort. The obtained values indicate that the tasks dealing with the AWL items are less demanding to the flipped group than the conventional group students, thus pointing to the greater efficiency of the FC approach in this segment as well.

### Instructional Efficiency of the FC and Conventional Approaches

To compare the quality of the two approaches in terms of their effects, the instructional efficiency of the FC ($E_E$) and conventional approaches ($E_C$) was assessed by combining the values of the post-test performance and the students’ self-perceived mental effort invested in the post-test. The obtained values are presented in Figure 1.

The value for the instructional efficiency of the FC ($E_E = 0.630$) is found in the upper left quadrant, which suggests a high level of efficiency, while the obtained negative value for the conventional approach ($E_C = -0.630$), placed in the lower right quadrant, suggests a low level of instructional efficiency. Comparing the obtained values using the principles outlined by Paas and associates (2003), we can say that this measure of instructional efficiency points to greater potentiality of the FC for acquiring the AWL items in the context of EAP teaching and learning than it is the case with the conventional approach.

#### Flipped Classroom and Conventional Approaches

#### Impact on Students’ Perceptions Towards Learning

Finally, the application of the two approaches was assessed by comparing the students’ perceptions in relation to learning academic vocabulary and the experience with the particular instructional procedure. The $t$-test results, as shown in Table 4, indicate that the E group students on the whole expressed significantly more positive perceptions than their C group peers. ANOVA results, $F(df = 1, N = 59) = 30.928, p = .000$, also point to the significant difference between the groups, indicating that the FC approach appears as more suitable to the students participating in this research than the conventional instruction.

Considering individual items in the questionnaire, higher values in the E group are observed in all 10 items, while significant differences between the groups are noticed in eight out of the 10 items. These results are presented in Table 5.

As presented above, the flipped group expressed more positive opinions toward learning academic vocabulary, as the values are generally higher regarding all six items and significant differences are seen in all items in the FC group (items 7–10). Such being the case, these results give additional value to the teaching and learning of the AWL in the flipped environment and back up the previously presented findings.
The objective of the present study is to examine how efficient the FC approach is for acquiring academic list vocabulary in the context of EAP classes regarding the students’ performance, self-perceived mental effort invested in dealing with AWL tasks, and perceptions toward the learning experience. The main findings show a considerably higher vocabulary gain, a lower mental effort self-report, and more positive perceptions among the flipped group participants, suggesting thus a greater instructional benefit of the FC in comparison with the conventional approach. A possible reason for the obtained results may lie in the application of technology in the FC approach as there is empirical evidence that technology stimulates intrinsic motivation in L2 learners (Stockwell, 2013). In this case, the pre-class segment of the FC could have made the E group students more motivated for learning and therefore showing better results. Another explanation for these findings may be found in the organizational concept of the FC approach. Namely, by familiarizing the E group students with the AWL material before class, in-class time could immediately start with interaction, first with teacher–student interaction in discussing and clarifying the items, and later with more interaction among students, as the practice tasks were designed in this way. Interaction is a key term in the constructivist method which also applies to L2 vocabulary learning. It states that students need to be actively involved in learning to gain command of L2 vocabulary, and it is through interaction that students actually learn the meanings of the words and their related contexts (Yingyu, 2015).

### Table 4. Descriptive Statistics and the t Value for Students’ Perceptions on Learning.

| Group | N  | M   | SD  | df  | t    | p    |
|-------|----|-----|-----|-----|------|------|
| E     | 30 | 4.13| .31 | 58  | 50.403| p < .05|
| C     | 30 | 3.56| .46 |     |      |      |

**Figure 1.** Graph of instructional efficiency for the flipped classroom and conventional approaches.
seems to hold true in the present study. Due to spending class time on introducing and explaining the AWL items, the C group had less time for practice, particularly for the activities aimed at production that required collaboration and interaction among students, which was the case with the E group class time. In addition, being involved in the activities that required production, such as creating their own sentences, for example, the flipped group was required to activate a number of complex mental processes, such as critical thinking and decision making. These, in turn, made the students apply the higher order skills of analyzing, evaluating and creating, as opposed to the conventional group that focused on remembering, understanding, and applying in their class time (Anderson et al., 2001).

Regarding the E group performance, the findings are in line with a number of studies reporting higher achievement after implementing the FC in various fields in higher education (Bernard, 2015; Morton & Colbert-Getz, 2017; Seery, 2015). Focusing on English courses in the context of higher education, better achievement of the flipped group in relation to the conventional approach group has been reported regarding the improvement of students’ pragmatic competence related to refusals (Haghighi et al., 2019), general academic performance (Hung, 2015), the knowledge of English idioms (Chen Hsieh et al., 2017), and in academic writing (Pavanelli, 2018).

With more interaction among students, as here it was the case with the E group, the teacher is less engaged as a lecturer and more as a guide or facilitator, which helps students to become more active and more confident learners (Sarawagi, 2014). Raising students’ confidence may be associated with the findings related to self-perceived mental effort. As already stated, the results show that after the treatment the flipped group reported significantly lower level of mental effort in completing the test tasks than their control group peers. Similar results have been reported in other fields, such as mathematics (Mattis, 2015) and biology (Županec et al., 2018). Radulović and associates (2016) report that multimedia environment lowers the level of mental effort. This observation may be used for interpreting the present results, as the FC involves multimedia dimension. Moreover, the pre-class component of this approach leaves more space for in-class practice and offers more opportunities to discuss and clarify any of the problems observed in the pre-class phase and these factors may well be associated with the reduction of mental effort. The effect of pre-learning on reducing the cognitive load has also been highlighted by Seery (2015). The reduction of mental effort has also contributed to higher instructional efficiency value of the FC approach. Referring to this, Clark and associates (Clark et al., 2006) claim that efficient instruction leads to better learning outcomes with less mental effort, that is, better achievement and/or faster learning. In this respect, the obtained results support the view that the FC approach represents a more efficient instruction for teaching and learning academic vocabulary.

Finally, when it comes to the students’ perceptions, the findings reveal a significant difference between the groups. The flipped group students reported more positive perceptions and expressed greater satisfaction in learning, suggesting thus that they perceived the FC environment as more suitable and enjoyable for acquiring academic vocabulary.

### Table 5. Descriptive Statistics and Analysis of Variance Results for Individual Items in Students Perceptions Questionnaire.

| Item | Group | M    | SD  | df | F    | p    |
|------|-------|------|-----|----|------|------|
| 1    | E     | 4.90 | 0.30| 58 | 7.370| .009 |
|      | C     | 4.47 | 0.81| 58 |      |      |
| 2    | E     | 4.97 | 0.18| 58 | 6.180| .016 |
|      | C     | 4.53 | 0.93| 58 |      |      |
| 3    | E     | 3.73 | 0.64| 58 | 8.198| .006 |
|      | C     | 3.10 | 1.02| 58 |      |      |
| 4    | E     | 4.47 | 0.63| 58 | 16.900| .000 |
|      | C     | 3.60 | 0.97| 58 |      |      |
| 5    | E     | 3.80 | 1.03| 58 | 1.302| .259 |
|      | C     | 3.47 | 1.22| 58 |      |      |
| 6    | E     | 3.90 | 0.99| 58 | 1.463| .231 |
|      | C     | 3.57 | 1.13| 58 |      |      |
| 7    | E     | 2.53 | 1.14| 58 | 5.697| .020 |
|      | C     | 2.33 | 1.13| 58 |      |      |
| 8    | E     | 3.83 | 0.75| 58 | 14.106| .000 |
|      | C     | 2.87 | 1.19| 58 |      |      |
| 9    | E     | 4.67 | 0.48| 58 | 19.845| .000 |
|      | C     | 3.70 | 1.09| 58 |      |      |
| 10   | E     | 4.67 | 0.48| 58 | 5.093| .028 |
|      | C     | 4.30 | 0.75| 58 |      |      |
This affective dimension is very important as learners’ satisfaction leads to successful learning and satisfied learners usually make good students (Haghighi et al., 2019), so the better results obtained for the flipped group may be explained by this factor as well. These findings are in line with the reports of Hung (2015), Pavanelli (2018), and Teng (2017), who all found that the FC mode contributed to highly positive perceptions toward learning experiences in the context of English teaching and learning. However, it should be noted that outside the context of ELT there have been some opposite reports as well. Herreid and Schiller (2013), for example, claim that students may express skepticism and resistance to novel methods, while Strayer (2012) reports that the participants were less satisfied with the way in which the flipped approach oriented them toward the learning tasks.

As deliberate vocabulary list learning occurs for the largest part outside of the classroom (Elgort, 2011; Yamamoto, 2014), this study was aimed at examining which of the two approaches that imply out-of-classroom learning (either prior or after the actual class) results in better learning outcomes in relation to the AWL. An additional reason for conducting the research was a relatively small number of teaching hours in the current EAP course, so the idea of familiarizing the students with the AWL before class time seemed very convenient. Indeed, one of the characteristics of EAP courses is that they are usually short-term preparatory courses with very dense syllabus as they are supposed to prepare students in all aspects of using English for academic studies in a relatively short period of time. In this particular case, the FC approach also appeared suitable for teaching and learning the AWL as the students, being at level B1–B2 of English language proficiency, were already familiar with a number of the items, so this pre-class component was not intended to impose much of the workload for them. In this way, dissatisfaction with the FC reported in Strayer’s (2012) study could be avoided and the learning situation seemed to align with a recommendation made by this author that the flipped approach is not to be so preferred for introductory courses but for those more advanced ones. Further consideration of the pedagogical implications of the present study should include the negative aspects of this approach as well. One of the reported disadvantages of the FC is the students’ perception of imposing more workload on them, considering that they are expected to study before class time (Chen Hsieh et al., 2017). The same may hold true for the teacher, as in applying this pedagogical model the teacher is expected to plan and prepare the pre-class session as well (Herreid & Schiller, 2013). Another disadvantage is observed in the fact that the FC heavily relies on the use of technology, which implies that students need to possess appropriate devices, stable internet connection, and so on. This also imposes additional requirement for the teacher—high-level knowledge of modern technology. The problem of not receiving preparation in implementing information and communications technology (ICT) in their teaching process has been recognized as one of the challenges of many L2 instructors (Johnson & Marsh, 2014). As far as this aspect is concerned, the implementation of technology in the current study does not seem to impose great requirements, neither upon the students nor the teacher’s technological skills and expertise, as the sources used in the study are easily available and simple to use.

**Conclusion**

Taking into account all the aspects stated above and the positive results obtained, the use of the FC appears to be a suitable pedagogical tool for academic vocabulary learning in EAP courses. What is more, as a learner-centered approach, the FC contributes to the elimination of the traditional teacher-centered approach that still proves to be dominant in higher education context and, from the perspective of ELT, appears as neither effective nor efficient in enhancing the students’ L2 knowledge (Chen Hsieh et al., 2017). As for vocabulary teaching and learning, being less teacher-centered, the approach provides more time for practice and this also means more space for contextualized practice of vocabulary items. In this way, the FC minimizes decontextualized learning which has been recognized as one of the main disadvantages of vocabulary list learning (Elgort, 2011). As already stated, more time for in-class practice also increases opportunities for collaboration and interaction which in turn provides a more supportive environment for learning (Long & Porter, 1985). At the same time, the pre-class component of the FC offers opportunity for personalized learning, which, apart from paying attention to the individual needs and study habits of students, also appears suitable for large L2 classes, especially in situations when students’ previous knowledge varies, which may be the case with the vocabulary. More globally perceived, the application of the FC approach, as observed by some authors (e.g., Mehring, 2015, in Leis, 2016), can also produce some indirect effects, such as more peer-evaluation, self-reflection, and the use of metacognitive strategies among students.

As far as the present study is concerned, a number of limitations need to be acknowledged. The major one certainly refers to the fact that the teacher was one of the researchers and that the findings may have been biased by this. Additional limitations are related to a short intervention period and a small sample size. All these should be taken into consideration and overcome in possible replicating of this research in the future. Nonetheless, for the time being, the contribution of the study to L2 pedagogy lies in the fact that it addresses an approach that deserves attention as it is relatively new and insufficiently investigated. In addition, to the best of our knowledge, none of the studies on the FC approach have investigated its effect on academic vocabulary learning.

In conclusion, we can say that the findings of this study show that the FC approach has a good potential for academic vocabulary learning and deserves more empirical attention of L2 education specialists as the obtained results point to greater efficiency of this approach than the conventional way.
of teaching and learning. The results, however, should be taken with caution as the flipped approach, as stated above, is still insufficiently researched. In addition, although studies on the use of the FC in the context of ELT so far have pointed to the benefits of this approach (Turan & Akdag-Cimen, 2020), there have been some reports of better student performance in conventional as opposed to flipped classroom approach in teaching other disciplines (e.g., Gundlach et al., 2015). Bearing this in mind and referring to the limitations stated above, the article concludes with a call for more research on the impact of the FC on students’ gain of academic vocabulary in EAP setting.

Appendix A

Post-Test Used in the Study

I Please circle a letter with the word that best fits the context of the sentence:

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

1. Students are expected to write an outline of their oral presentation, with a strong _______________ placed on the development of central idea.
   a) Reaction       b) emphasis       c) distinction

Now tick one of the boxes below to assess how difficult this item was for you:

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

2. The results are _______________ with Langham (2007), indicating a cyclical pattern of behavior in this species.
   a) diverse       b) consistent       c) assessable

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

3. They have been authorized to widen the _______________ of their research to include gender differences.
   a) scope         b) decline         c) ratio

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

4. It is anticipated that demand for drinking water will soon _______________ the availability of global water resources.
   a) enforce       b) exceed          c) bond

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

5. We need to work effectively within the _______________ of our limited resources.
   a) constraints   b) consent         c) contributions

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

6. He wrote an article for an academic journal, and the letters that were received on the topic and printed in _______________ issues were quite favorable.
   a) corresponding   b) initial        c) subsequent

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|

7. The government is expected to _______________ environmental laws and regulations for proper environmental management.
   a) enable         b) enforce         c) expose

| Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|----------------|-----------|------|----------------------------|-----------|----------------|---------------------|
8. Many physicists ______________ to explain the atom, but it was Bohr who paved the way for quantum physics as we know it today.
   a) occurred                                  b) sought                                  c) emerged

### II Read the passage carefully and complete it using the words given in the box:

| focus | significant | assumed | individual | occurred | maintenance |
|-------|-------------|---------|------------|----------|-------------|
| range | incidence   | proportions | establishing |          |             |

The 20th century saw 1) _______________ advances in medical knowledge. At the end of the 19th century, life expectancy was comparatively short for people in Britain and many children did not survive to adulthood. By the end of the 20th century, however, perinatal mortality was low and many people anticipated living beyond their three score years and ten. This rapid progress 2) _______________ as a result of a series of microbiological and technological breakthroughs, along with a political 3) _______________ on social welfare and public health.

Today, however, we face new threats. Although it had been 4) _______________ that infectious diseases would be eliminated, new strains of TB and malaria have recently emerged and are fast 5) _______________ themselves. The viral infection, Aids, has reached epidemic 6) _______________ in some countries. The 7) _______________ of heart disease is increasing, along with other so-called “self-inflicted” illnesses. Superbugs, resistant to our 8) _______________ of antibiotics, continue to evolve.

Predictions for the 21st century suggest that we will see the development of our understanding of the role of genes in the 9) _______________ of good health. Many diseases will be prevented as screening for susceptibility allows defective embryos to be identified. Those who do get ill will receive drugs tailored to suit their 10) _______________ needs and thus more effective in action. Will there also be surprises awaiting us as the world population ages?

### Please tick one of the boxes below to assess how difficult each item in this task was for you:

|       | Extremely easy | Very easy | Easy | Neither easy nor difficult | Difficult | Very difficult | Extremely difficult |
|-------|----------------|-----------|------|-----------------------------|-----------|----------------|---------------------|
| 1)    |                |           |      |                             |           |                |                     |
| 2)    |                |           |      |                             |           |                |                     |
| 3)    |                |           |      |                             |           |                |                     |
| 4)    |                |           |      |                             |           |                |                     |
| 5)    |                |           |      |                             |           |                |                     |
| 6)    |                |           |      |                             |           |                |                     |
| 7)    |                |           |      |                             |           |                |                     |
| 8)    |                |           |      |                             |           |                |                     |
| 9)    |                |           |      |                             |           |                |                     |
| 10)   |                |           |      |                             |           |                |                     |
Appendix B

Questionnaire on Students’ Perceptions Toward Vocabulary Learning and the Learning Approaches

1. I absolutely disagree
2. I mostly disagree
3. I am not sure
4. I mostly agree
5. I absolutely agree

| 1. Learning academic vocabulary is important to me. | 1 | 2 | 3 | 4 | 5 |
| 2. I want to improve my academic vocabulary. | | | | | |
| 3. I don’t have time for learning academic vocabulary. | | | | | |
| 4. I like learning academic vocabulary. | | | | | |
| 5. It’s time-consuming to learn academic vocabulary. | | | | | |
| 6. It’s boring to learn academic vocabulary. | | | | | |
| 7. I liked the way in which I learned academic vocabulary. | | | | | |
| 8. This way of learning is suitable for me. | | | | | |
| 9. I am satisfied with my progress. | | | | | |
| 10. I want to continue learning vocabulary in this way. | | | | | |

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