



## High and Low Achievers' Accepted Workload, Preferred Work Form, and Perceived Usefulness in Flipped Classrooms

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Recently, flipped classrooms have received increasing research interest in various disciplines (Gaughan, 2014). Although researchers have identified major psychological factors affecting the quality of the flipped classroom, these factors have not been systematically or simultaneously examined. Drawing on the questionnaire data obtained from 39 university second-language learners of different achievement profiles, this study explores the relative effects of students' accepted workload, preferred form of work (group vs. individual) and perceived usefulness of flipped classrooms on these learners' perceptions and acceptance of a flipped classroom. Additionally, based on these university L2 learners' questionnaire responses, we examined if achievement levels (high vs. low achievers) would modulate the effects of the aforementioned factors. The results showed that high achievers could accept 2 hours of preparatory work prior to class, but that low achievers could only accept 1 hour of work. Additionally, while high achievers prefer individual work, low achievers like to work in groups. Based on the findings of the study, pedagogical implications for the implementation of the flipped classroom for mixed-level students are discussed.

**Keywords:** Flipped learning, Translation instruction, L2 learner attitude, L2 learner perception

### Introduction

The flipped classroom is a pedagogical practice that requires students to preview and study video learning materials before attending a class. In this case, students are more prepared and hence more likely to have the knowledge required for high-order class discussion (Chuang, 2017) and experiential tasks that require personal operation (see Bergmann & Sams, 2012). Due to the recent educational emphasis on students' autonomous learning in different disciplines, the flipped classroom has been researched and implemented in different subject areas (Bergmann & Sams, 2012; Bonyadi, 2018; Chen, Yang, & Hsiao, 2016; Teng, 2017; Tucker, 2012; Webb, Doman, & Pusey, 2014). Flipped classrooms are often combined with technology (Chuang, 2017; Hung 2015; Huang & Hong 2016; Guy & Marquis, 2016; Huang & Hong, 2016) to enhance the learning effect. Chuang (2017) contends that with the help of technology, instructors and students are able to obtain immediate feedback, as a result of which students' overall learning outcomes and engagement can be effectively enhanced (Chuang, 2017).

It is important to note that although a substantial number of studies have established the efficacy of flipped classrooms in terms of promoting students' affect and learning outcomes (Butt, 2014; Huang & Hong, 2016; Hung, 2015; Mok, 2014; Musib, 2014), this pedagogical practice is not without contention.

Some studies have also documented students' complaints about the flipped classroom practice (Ash, 2012; Milman, 2012). It is plausible to assume that, despite its merits, it may not work in all settings or for learners of certain profiles. In light of this, Hamdan, McKnight, McKnight, and Arfstrom (2013) noted that although many models and/or strategies for flipped classrooms have been developed, there are few investigations on the essential problems of the flipped classroom, namely, why it is capable of engaging some students, but not others.

To shed light on this issue, this study set out to explore the effects of three major determinants of students' perceived usefulness, satisfaction and learning outcomes in this technology-assisted autonomous learning setting: 1) workload before class; 2) preferred preparatory learning work prior to class (individual vs. group work); and 3) students' perceived usefulness of flipped classrooms. While these three determinants all exert a prominent impact on students' mindset in the face of the preparatory work prior to class, extant flipped classroom research either only targets one of the three determinants (e.g., Chuang, Weng, & Chen, 2018), or mainly focuses on issues related to in-class pedagogical practice (e.g., Hong, 2015; Huang & Hong, 2016). It is important to note that what sets flipped classrooms apart from traditional classrooms lies in the students' preparatory work prior to class (Bergmann & Sams, 2012). Insights into factors affecting the success and failure of the preparatory work in a flipped classroom—the foci of this current study—will therefore shed more light on what we can do to optimize the efficacy of flipped classrooms. In particular, the study explored the effects of the above three determinants in relation to students' achievement profiles, that is, high versus low achievers. To this end, we explored the following interlocking questions:

- (1) Is students' perceived acceptable workload before class affected by their achievement profile (high vs. low)?
- (2) Is students' preference for the type of preparatory learning tasks (individual vs. group work) in flipped classrooms affected by their achievement profile (high vs. low)?
- (3) Do students have higher perceived usefulness of flipped classrooms after having experiences with both a flipped classroom and a traditional classroom?

Although the three determinants have been discretely identified in the relevant literature as key components affecting the success or failure of flipped classroom instruction, they have not been simultaneously studied. Insights into the effects of these three determinants will help instructors fine-tune their implementation of flipped classrooms to better suit the needs of students of different achievement profiles.

## **Theoretical Backgrounds and Literature Review**

Existing studies on flipped classrooms have empirically established the positive impacts of this pedagogical practice on students' learning outcomes (e.g., Bishop & Verleger, 2013; Hung, 2015; Guy & Marquis, 2016; Mok, 2014; Musib, 2014; Tse, Choi, & Tang, 2017; Yang, 2017). Despite the merits identified in the flipped classroom, a number of researchers have cast doubts on the pedagogical potency of flipped classrooms. These researchers argue that given the differential successes and failures observed in flipped classrooms, more research—especially research conducted in classes consisting of multi-level students (e.g., Yang, 2017)—is warranted to shed light on how individual differences may affect the efficacy of flipped classrooms (Chuang, Weng, & Chen, 2018). In this vein, Engin (2014, p. 13) noted that “despite the positive response to the flipped model, [some] students were [still found to be] passive consumers rather than active producers” in the flipped classroom—a finding inconsistent with the goal of flipped classrooms, that is, transforming students into active and autonomous learners. Accordingly, the flipped classroom is still not unequivocally embraced by all researchers. Hitherto, three interlocking factors have been identified by researchers as key factors affecting the outcomes of flipped classrooms.

We will review these three factors in more detail in the ensuing subsections.

### Effects of Perceived Workload Prior to Class

Researchers generally agree that a successful flipped classroom depends on students' preparation before class. Students who do not see the preparatory work through a negative lens (e.g., seeing it as a source of pressure and/or as time-consuming work) are more likely to benefit from the flipped classroom practice. Svenson and Maule (1993) maintained that students' cognitive ability in a learning task is negatively influenced by the pressure and the stress they perceive; this in turn may disrupt their learning outcomes. In this vein, Hsieh, Huang, and Wu (2017) observed that students' achievement profiles may also be significantly affected by their perception of acceptable workload prior to class. Similarly, Yang (2017, p. 1) posited that "flipping a classroom may only be useful for more motivated students, and the extra workload of finding or making suitable pre-lesson online videos is the main concern for teachers." Despite the above finding, researchers have not yet arrived at a consensus on how much preparatory work is required for an optimal learning outcome. What complicates the picture even further is that even for instructors, the preparatory work in a flipped classroom is not always perceived in a positive light (e.g., Ash, 2012).

As pointed out by Hsieh et al. (2017) and Yang (2017), the unequivocal status of the flipped classroom can be attributed to a lack of consensus on how much preparatory work is required. Wagner, Laforge, and Cripps (2013) observed that 57.1% of the students in their study preferred videos that lasted for 10-15 minutes, and 35.7% preferred videos of less than 10 minutes. If part of the learning activity in class has to be completed and transferred to students' preparatory work prior to attending the class, it is important to know more about how much preparatory work is enough for students to really benefit from flipped classroom instruction.

### Effects of Students' Attainment Profiles

Wu, Wu, and Li (2017) observed that some students refused to join the class. Chuang (2017) also noted that despite the flipped classroom's potency to enhance students' overall learning outcomes, many students do not believe that flipped classrooms—which depend heavily on the collaborative preparative work between high achievers and lower achievers before class—"could stimulate their learning motivation...[and] increase their interest in and enjoyment of the class lectures" (p. 654). According to Guy and Marquis (2016), after experiencing flipped classrooms, 75% of the students in their study preferred the flipped classroom environment; but it is worth noting that 17%—nearly one-fifth—still expressed their preference for traditional lectured-based instruction.

Given that flipped classrooms are not unequivocally accepted by all students, it is important to gain a better understanding of the kind of learners that may and may not benefit from flipped classroom instruction. Such insight will allow instructors to provide additional *individualized* and *differentiated* scaffolding for learners who may or may not find flipped classrooms motivating and hence fine-tune the practice of flipped classrooms for maximized optimal outcomes. After all, one must not forget that the success of flipped classrooms depends on the collaboration among students of heterogeneous attainment profiles, and that the flipped classroom is a pedagogical practice through which "direct instruction is blended with constructivist learning pedagogies so that *individualized differentiated* learning is facilitated" (Davies et al., 2013, p. 565). In this endeavor, Tanner and Scott (2015) and De Grazia, Falconer, Nicodemus, and Medlin (2012) targeted the *cognitive* profiles and found that if elements or materials in flipped classrooms are not presented on a medium that students deem applicable to students' cognitive styles, the effects of the flipped classroom would be compromised. Despite this insight, existing research has not explored the effect of students' *linguistic* attainment profiles (i.e., high and lower achievers) on the efficacy of flipped classrooms.

## Effects of the Nature of the Preparatory Tasks: Individual vs. Group Work

Kirschner, Paas, and Kirschner (2009) insightfully pointed out that students' acceptance of flipped classroom instruction is critically determined by the nature of the preparatory learning tasks prior to the class. In particular, while exploring the impact of the nature of the learning tasks on flipped classrooms, Kirschner et al. (2009) targeted task complexity. They found that the complexity of the task critically determines the degree of collaboration among group members; the more complex a task is, the more closely and effectively it will be for group members to collaborate with each other. In light of this, Kirschner et al. urged that "the learning tasks given to the groups (e.g., problems, projects, etc.) [needs to be] complex in nature and thus cannot be easily carried out by an individual" (p. 39). Note, however, that this postulation is essentially premised on the *a priori* assumption that group work is superior to individual learning. Considering that individual work is still a part of any collaborative work and that individual and group work are both possibilities in a flipped classroom (see Hamdan et al., 2013), more research taking a closer look at the relative effects of individual work and group work on learning gains in a flipped classroom is needed.

## Method

### Participants

A total of 39 university foreign language (FL) learners<sup>1</sup> from south Taiwan participated in this study, including eight males and 31 females (Mean age: 21.5 years). They had comparable foreign language learning profiles (length of study and amount of exposure) in the classroom instructional setting at the time of the study, and deemed attaining a high level of proficiency in the L2 as a pivotal goal. This was the first time that the students participated in a flipped classroom translation course. Throughout this course, they had experiences both with the traditional and the flipped classroom.

### Design

These students took the translation class with the researcher. The class, which spanned 18 weeks, was designed based on the F-L-I-P<sup>TM</sup> principle prescribed by Hamdan et al. (2013)—one of the most widely cited and referred principles for practitioners and researchers when constructing a flipped classroom. According to this principle, there are four pillars that need to be considered when implementing a flipped classroom: 1) Flexible Environment; 2) Learning Culture; 3) Intentional Content; and 4) Professional Educator.

For the flexibility pillar, instructors are encouraged to provide instructional content—usually in the form of video content that can be retrieved and viewed any time—that allows students to flexibly decide when and where they learn. In this study, to offer students a flexible learning environment that allows them to retrieve and study the course materials anytime and anywhere, recorded video lectures on translation theories were uploaded onto a class site using an interactive class platform, *Zuvio*. With these online materials, the students were required to watch the videos on relevant translation theories prior to class and to familiarize themselves with the translation texts, so that they could get prepared for the

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<sup>1</sup> The participants were clearly informed about the experiment process/condition and voluntarily agreed to participate without any duress prior to the study. The participants clearly understood their right to withdraw at any time and their voluntary informed consent was obtained before research got underway. The experiment which took the form of a normal language learning task did not cause any emotional or physical harm to the participants. Results of experiments coding and analyses of results were immediately erased and substituted with ID codes after the information was being archived/analyzed confidentiality of data is ensured by identifying participants by their ID numbers.

in-class translation exercises. As the students gradually got more used to the above previewing work, they even needed to complete the translation exercise prior to class, which got longer and longer toward the end of the semester. The previewing video and the texts for the translation exercise also got longer and longer in each teaching unit. Due to the above design, the students needed more and more time to prepare before class (e.g., 30 minutes, 1 hour, 1.5 hours, and longer). The above design allowed us to test how much preparatory working load the students could accept. It is important to note that to explore students' preferred form of preparatory work prior to class, the teacher also instructed the students to complete the above preparatory work *in groups* for the first half of the semester and *individually* for the second half of the semester. This way, the students all had the chance to experience both individual and group preparatory work.

For the (autonomous) learning culture pillar, instructors are advised to foster a learner-centered culture where in-class time is mainly dedicated to exploring topics in depth and evaluating their own learning without heavy reliance on the teacher's constant and/or overt intervention. To this end, students came to the class with the knowledge learned from the videos (pre)viewed before class. During class meeting time, students spent most of their time comparing, discussing, and finetuning their translation work. In addition to face-to-face discussion, the teacher also encouraged the students to actively use *Zuvio* to share, discuss and compare various versions of the same translation text with their peers from the other groups. So, the input from their peers also played a pivotal role in their learning. After group discussion, the students used *Clicker* and *Kahoot* to choose the best translation. The above in-class protocol allowed students to collaboratively polish their translation skills through mutual discussion with timely guidance from the instructor.

For the intentional content pillar, instructors are to provide students with intentionally, carefully organized content or structure for them to explore. To this end, the instructor carefully selected the translation theories that best suited the students' level and progress.

For the professional educator pillar, while taking on the less visible role in their classrooms, instructors are advised to constantly monitor their students in the background, offering them professional feedback and formative assessment relevant to the moment; in other words, students' autonomous learning is still gently curated and assessed in order to optimize the use of classroom time. To the above end, the instructor monitored the students' translation and discussion using *Zuvio*, and *selectively* provided timely feedback when students were not able resolve their discussion on different versions of their translations, and when their translation was off-track or not aligned with corresponding theories.

## Instruments

For this study, the factor analysis verification framework was used, including two instruments (i.e., questionnaire survey and oral interview) and three verification tools used to validate the data collected from the two instruments (i.e., KMO, Cronbach's Alpha Test, and Fisher's exact test). The three verification tools are particularly useful when sample sizes are small, as in the case of this study.

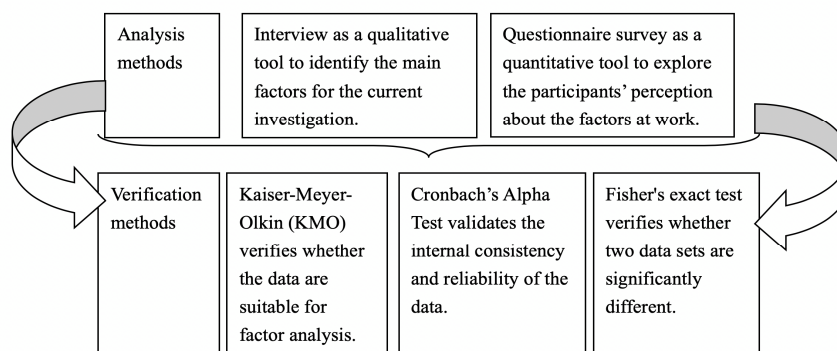


Figure 1. Factor analysis verification framework.

The data obtained from the two instruments were first validated by Kaiser-Meyer-Olkin (KMO) proposed by Kaiser (1974); such validation, which tests the proportion of variance among variables and the sampling adequacy for each variable in the model, establishes whether the obtained data were suitable for factor analysis. Second, Cronbach's Alpha Test was used to check the internal consistency and reliability of the obtained data; in particular, internal consistency allows us to test whether all the items in a test belong to the same concept or construct. Third, Fisher's (1922) exact test was used to verify whether the obtained (categorical) data that result from classifying objects in two different ways (e.g., samples of participants favoring vs. not favoring the flipped classroom) are discriminative. Thus, Fisher's exact test allowed us to make inferences regarding whether there exists a significant difference in responses between two sampling groups (i.e., high and low achievers). The following paragraphs will describe how the two instruments were used to address the three research questions.

To begin with, an oral interview was administered to the participants to identify the key factors and issues that may be at work in a flipped classroom. The students' qualitative data illuminated three key factors that significantly affected their perception of, and experience with the flipped classroom: 1) workload before class; 2) preferred preparatory learning work prior to class (individual vs. group work); and 3) students' perceived usefulness of flipped classrooms. The three factors were then built into the questionnaire, which was then used to shed further light into high achievers' and low-achievers' accepted workload (RQ 1), their respective preferred form of work (RQ 2), and their perceived usefulness of the flipped classroom and the traditional classroom (RQ 3). To this end, the questionnaire consisted of three 5-point Likert scale items written in the participants' first language (Chinese) (see Table 1 below), to which they had to indicate their accepted workload, preferred working form and perceived usefulness of the flipped classroom (Scale: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*).

TABLE 1  
*Content of the 5-point Likert-Scale Questionnaire Items*

Accepted workload before class	
1)	I can accept a workload of 30 min before class per week.
2)	I can accept a workload of 1 hour before class per week.
3)	I can accept a workload of 1.5 hours before class per week.
4)	I can accept a workload of 2 hours before class per week.
5)	I can accept a workload of 3 hours before class per week.
6)	It does not matter how much time I work before class.
Preferred working form (group work vs. individual work) prior to class	
7)	I prefer to work in a group because I enjoy working with others.
8)	I prefer group work because it suits my personality.
9)	I prefer group work because I can accomplish more.
10)	I prefer individual work because I enjoy working by myself.
11)	I prefer individual work because it suits my personality.
12)	I prefer individual work because I can accomplish more.
Perceived usefulness of the flipped classroom	
13)	I accept the flipped classroom as a useful form of instruction.
14)	I find the flipped classroom more useful, and I will choose to learn in the flipped classroom.
15)	I find the traditional classroom more useful, and I will go back to the traditional classroom despite the merits of the flipped classroom.

It is worth noting that a verification function was built into this questionnaire by including several statements about the same issue. For instance, one may notice that instead of simply providing one 5-point statement for each issue (say, workload before class), six statements were provided; each participant had to provide a rating for each statement. To illustrate this, let's say a given participant's most preferred workload is 1 hour and hence given a 4-point rating for the statement "I can accept the

workload for 1 hour,” his or her rating for the statements “I can accept the workload for 1.5 hour” should either be equal (4) or lower (say, 3). The above logic allows us to cross-check the *validity* of the participants’ ratings for relevant statements. This cross-checking also allows the researchers to ensure that students’ responses are reliable in relation to the issue of focus (e.g., preferred work form before class) and hence minimizes the chance of including mindless responses.

## Data Analysis

Although 39 students participated in this study, five students’ data were excluded from the analysis because they failed to fill in the survey questionnaire completely and consistently. The students were listed according to their long-term academic achievements in order to classify the high and low achieving students. To answer the research questions of this study (where students’ achievement profile is a key), high and lower achieving students’ data<sup>2</sup> must be teased out. To this end, we followed a common statistical procedure (i.e., the extreme groups approach), using the top 30.76% ( $N = 12$ ) and the bottom 30.76% ( $N = 12$ ) for our operationalization of high and low achievers, respectively (see Preacher, Rucker, MacCallum, & Nicewander, 2005). The remaining 10 intermediate students were excluded in order to highlight the differences between the high and low achieving students.

## Results and Discussion

### RQ 1: Is Students’ Perceived Acceptable Workload before Class Affected by Their Achievement Profile (High vs. Low)?

In this study, students’ accepted workload is defined and operationalized by the amount of time required by the preparatory work prior to class. One may recall that six 5-point Likert-scale statements were used to probe their accepted workload, with each statement increasing the workload by 30 minutes. To explore and quantify the proportion of the participants’ responses to each statement, we coded the data in the following way: all of the participants’ actual ratings for each statement were tallied and then divided by the sum of the highest possible total rating for each statement (5 points x 24 people = 120 points). This value is coined “acceptance value” in this study. To illustrate this, let’s say that all participants unequivocally gave a 4-point rating for statement #1, then the sum of all participants’ rating would be 96 points (4 points x 24 people = 96 points). In this case, the derived acceptance value for statement #1 would be 80% (96/120). By cross-comparing the values of the six statements, we could determine the participants’ relative acceptance for differential workload (the amount of time dedicated to the preparatory work). The aforementioned coding was also used for the participants’ responses to the statements probing their preferred form of learning task (group vs. individual) and perceived usefulness of the flipped classroom vis-à-vis the traditional classroom.

In Table 2, we could clearly see that when the achievement profile is not considered, the participants had the highest acceptance value for statement #1 (30-minute preparatory work) and had consistently lower ratings for statements #2-6. Specifically, for the 30-minute workload, the average acceptance value is 85%, while for the 1-hour workload, it is 75%. The acceptance value for the 2-hour workload is 50.00%, and the value for the 3-hour workload is even lower, that is, 40%. This shows that the overall results are consistent and logical.

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<sup>2</sup> The behavioral data of this study is available upon request to the corresponding author.

TABLE 2  
Summary of High and Low Achievers' Responses to Accepted Workload

	Total	High achievers	Low achievers	KMO	CA	Fisher's exact test
Statement #1: 30 mins	102/120 (85.00%)	60/60 (100%)	42/60 (70.00%)	0.675	0.843	.0001
Statement #2: 1 hour	90/120 (75.00%)	50/60 (83.33%)	40/60 (66.67%)			.0138
Statement #3: 1.5 hours	67/120 (55.83%)	39/60 (65.00%)	28/60 (46.67%)			.0152
Statement #4: 2 hours	60/120 (50.00%)	36/60 (60.00%)	24/60 (40.00%)			.0071
Statement #5: 3 hours	48/120 (40.00%)	28/60 (46.67%)	20/60 (33.33%)			.0603
Statement #6: time is not an issue	44/120 (36.66%)	26/60 (43.33%)	18/60 (30.00%)			.0776

To shed light on whether the above scenario regarding the participants' accepted workload varied as a result of their achievement profile, a closer look at their responses to the six statements was performed. It was found that for high-achieving students, the highest acceptance value (100%) goes to the 30-minute workload, second highest (83.33%) to the 1-hour workload, third-highest (65%) to the 1.5-hour workload, and fourth highest (60%) to the 2-hour workload. For the workload longer than 2 hours, high-achieving students only yielded an acceptance value of 46.67% or lower.

On the other hand, for the low achievers, the acceptance value is only 70% for the 30-minute workload, and 66.67% for the 1-hour workload. For the workload longer than 1.5 hours, low achieving students only yielded an acceptance value of 46.67%. The above results jointly indicated that while a 1-hour workload was probably the maximum workload for low achievers, a 2-hour workload was the maximum workload for high achievers.

Furthermore, the KMO Test proposed by Kaiser (1974) indicated that the minimum threshold value of 0.6 for factorial analysis. The KMO value for statements 1-6 reached 0.675, thus meeting the standard set by Kaiser. The Cronbach's Alpha Test (CA) was also used to check the reliability of the statistical results and yielded the value of 0.843—a value above the lowest acceptable threshold value of 0.5. Besides, Fisher's exact test was used here to test if there existed any difference between these high and low achiever groups. If the  $p$  value is less than 0.1, a significant difference appears between these two results. Based on the Fisher's exact test, we found significant differences between the two groups ( $p < 0.1$ ) for the workload of (a) 30 minutes (high achievers: 100% vs. low achievers: 70%), (b) 1 hour (high achievers: 88.33% vs. low achievers: 66.67%) (c) 1.5 hours (high achievers: 65.00% vs. low achievers: 46.67% and (d) 2 hours (high achievers: 60.00% vs. low achievers: 40.00%).

## Discussion

Although extant studies (e.g., Hsieh et al., 2017; Wagner, et al., 2013) have discussed this issue, we were not able to make any meaningful inferences about the principle for the recommended workload for high and low achievers from these previous studies due to comparability issues. For instance, the participants in Hsieh et al. (2017) used *Line*, and their results indicated that a third of students complained about spending “too much” time on the flipped classroom (without clear operationalization or specification of the time variable). The participants in Wagner et al. (2013) were involved in a video task; they found that 57.1% of the participants could accept viewing videos for 10-15 minutes and 35.7% preferred videos that could be viewed in 10 minutes. The differential task demands (*Line* chat vs. video viewing) make it impossible for meaningful comparisons across studies.

In our study, we controlled the task (demand) for high and low achievers and carefully manipulated the total time spent on the work. The finding was that while the majority of higher achievers could accept a maximal 2-hour workload, the majority of the lower achievers could only accept 1 hour of work (see



Table 1). This entails that when implementing flipped classrooms in a multi-level class, instructors might need to carefully consider the length of time required for the completion of the preparatory/previewing work prior to class; while high achieving students can accept longer preparatory/previewing work before class than low achieving students, 1 hour of preparatory work seems to work for both high and low achieving students—a pedagogical recommendation to consider when instructors implement flipped classrooms for a multi-level class.

## RQ 2: Students' Preference for the Type of Preparatory Learning Tasks (Individual vs. Group work) in Flipped Classrooms Affected by Their Achievement Profile (High vs. Low)?

Again, six statements were included to elicit students' preference of group work (statements #7-9) vis-à-vis individual work (statements #10-12). We will first report the participants' responses regarding their preference for group work (statements #7-9).

TABLE 3  
*Summary of High and Low Achievers' Preference for Group Work*

	Total	High achievers	Low achievers	KMO	CA	Fisher's exact test
Statement #7: Prefer group work due to preferred work mode	85/120 (70.83%)	37/60 (61.67%)	48/60 (80.00%)	.676	.789	.0078
Statement #8: Prefer group work due to personality	85/120 (70.83%)	37/60 (61.67%)	48/60 (80.00%)			.0078
Statement #9: Prefer group work due to productivity issue	80/120 (66.67%)	34/60 (56.67%)	46/60 (76.67%)			.0041
Average	69.44%	60.00%	78.89%			.0055

On the whole, the students generally perceived group work in a positive light (average acceptance value: 69.44%). Additionally, it was also found that low achievers generally saw the group work more positively (as indicated by higher acceptance values) than the high achievers, both in terms of work mode (statement #7), personality (statement #8), and productivity concerns (statement #9). Specifically, the acceptance values for statements 7-9 for low achievers are 80.00%, 80.00%, and 76.67%, respectively; and the acceptance values for statements 7-9 for high achievers are: 61.67%, 61.67% and 56.67%, respectively. The result of the KMO-Test showed the value of 0.676—a value higher than the threshold value 0.6—indicating that the participants' responses to the questionnaire items were generally suitable for factorial analysis. Next, the value of the CA-Test was 0.789, indicating that the results were reliable. The Fisher's exact test was also performed to detect if there existed any significant differences between the high and low achievers' preferences for group work; the obtained results for statements #7-9 are 0.0078, 0.0078, 0.0041, and 0.0055, respectively; all *p* values were smaller than 0.1, indicating that the differences between these two groups were significant.

Table 4  
*Summary of High and Low Achievers' Preference for Individual Work*

	Total	High achievers	Low achievers	KMO	CA	Fisher's exact test
Statement #10: Prefer individual work due to desired work mode	83/120 (69.16%)	51/60 (85.00%)	32/60 (53.33%)	.748	.922	.0001
Statement #11: Prefer individual work due to personality	89/120 (74.16%)	58/60 (96.67%)	31/60 (51.67%)			.0001
Statement #12: Prefer individual work due to productivity issue	73/120 (60.83%)	48/60 (80.00%)	25/60 (41.67%)			.0001
Average	68.05%	87.22%	48.89%			.0001

As for individual work, as can be seen from Table 4, high achievers generally preferred individual work than their low-achieving counterparts (high achiever: 87.22% vs. low achievers: 48.89%). The result of the KMO-Test was 0.748, which again showed that the participants' responses to the questionnaire items were suitable for factorial analysis. The value of the CA-Test was 0.922, indicating that the results were reliable. The Fisher exact test was run to explore if there existed any significant differences between the high and low achievers' preferences for individual work; the obtained results for statements #10-12 are all smaller than 0.1 and therefore the differences between the high and low achiever groups were significant.

On the whole, when achievement profile was not considered, we observed that the participants' preference for group work (69.44% in Table 3) was higher than that for individual work (68.05% in Table 4). However, when achievement profile was considered, we found the tendency that the low achievers seemed to exhibit stronger preference for group work (Table 3: average 78.89%) than for individual work (Table 4: average 48.89%). In contrast, the high achievers seemed to have stronger preference for individual work (Table 4: average 87.22%) than for group work (Table 3: average 60.00%).

## Discussion

Tanner and Scott (2015) insightfully pointed out that the acceptance of a flipped classroom depended on students' cognitive or linguistic profiles, which in turn may shape the kind of activities they prefer in a flipped classroom. Indeed, we found that high achievers preferred individual work and low achievers preferred to work in a group. Given that individual and heterogenous group work are both essential key events in a flipped classroom, instructors may need to strategically adjust the proportion of individual and group preparatory work based on the ratio of high versus low achievers in a class. Specifically, when implementing flipped classrooms in classes where the majority of members are high or high-intermediate learners, the instructor may need to enhance the weight and time for individual preparatory work. However, when implementing flipped classrooms in classes where the majority of members are low achievers or low-intermediate students, the instructor may need to enhance the weight and time for group preparatory work. Despite this pedagogical adjustment, the instructor probably may want to give advanced learners additional scaffolding and/or individual attention (e.g., provision of additional self-study materials) considering that group work is not their most preferred form of learning.

### **RQ 3: Do students have higher perceived usefulness of flipped classrooms after having experiences with both a flipped classroom and a traditional classroom?**

Statements #13-15 were designed to probe the students' perceived usefulness of the flipped classroom. In terms of overall perception of flipped classroom being a useful form of instruction, the majority of participants seemed to see the flipped classroom in a positive light (71.67%). Furthermore, the participants' perceived usefulness seemed to lead to higher intention to stay in a flipped classroom (68.33%) than in a traditional classroom (50%). This finding needs to be interpreted with caution after considering the influence of the participants' achievement profile. To begin with, in terms of overall perceived usefulness of the flipped classroom (Statement #13), the acceptance values for the higher and low achievers are 85% and 58.33%, respectively. This suggests that high achievers were more inclined to see the flipped classroom as a useful asset to their learning. Consequently, the majority of the high achievers showed a higher preference for continuing their learning in the flipped classroom (Statement #14: 80%) than to returning to the traditional classroom (Statement #15: 40%). In contrast to the scenario of the high achievers, the low achievers' preference to continue in the flipped classroom (56.67%) is lower than their predilection to go back to the traditional classroom (60%). Last but not least, after considering the usefulness of the two types of instruction, the lower achievers' intention to go back to the traditional classroom was higher (60%) than the high achievers' (40%).

TABLE 5  
*High and Low Achievers' Perceived Usefulness of Flipped Classroom Instruction*

	Total	High achievers	Low achievers	KMO	CA	Fisher's exact test
Statement #13: Overall perceived usefulness of the flipped classroom as a useful instruction	86/120 (71.67%)	51/60 (85.00%)	35/60 (58.33%)	.652	.795	.0001
Statement #14: Will continue learning in the flipped classroom due to higher perceived usefulness	82/120 (68.33%)	48/60 (80.00%)	34/60 (56.67%)			.0007
Statement #15: Will go back to the traditional classroom due to higher perceived usefulness	60/120 (50.00%)	24/60 (40.00%)	36/60 (60.00%)			.0071

The result of KMO-Test showed the value of 0.652—a value higher than the default value 0.6—indicating that the participants' responses to the questionnaire items were generally suitable for factorial analysis. Next, the value of the CA-Test was 0.795, suggesting that the results were reliable. The Fisher's exact test was also performed to detect if there existed any significant differences between the high and low achievers' responses; the obtained results for statements #13-15 are .0001, .0007, and .0071, respectively. All  $p$  values were smaller than .1, indicating that the differences between these two groups were significant.

## Discussion

As seen in Table 5, we found that high achievers generally exhibited higher perceived usefulness of flipped classrooms after having experience with these two instructional possibilities. However, the low achievers generally preferred to go back to the traditional classroom. We found that the flipped classroom was not unequivocally accepted by high and low achievers as a useful pedagogical practice, probably due to their habitual past lecture-based learning experience. A substantial number of high and lower achievers still preferred the lectured-based traditional instruction (low achievers: 60% and high achievers 40%). Several participants—in particular the lower achievers—indicated in a post-study conversation that despite the fact that they felt more engaged and more (pro)active in the flipped classroom learning tasks, they felt psychologically more *secure* in the traditional classroom; that is, they were more used to being given the information. To reduce students' insecurity, it is imperative for instructors to provide students with clear instruction and unambiguous structure for students' responsibilities and output in a flipped classroom.

## Conclusions

Although this study has established that workload has a differential impact on students of different profiles, this finding is based on operationalizing workload in terms of the amount of time dedicated to a given task—a standard also used in extant flipped classroom research. Further research may want to verify the findings of this study using another manipulation facet of workload—work complexity; this is a potential factor affecting the amount of time dedicated to a given task.

Additionally, future research might want to further draw on students' performance data to examine if the three determinant factors investigated in this study would affect their learning outcomes. This way, researchers would be able to explore whether the flipped classroom has the potency to enhance high- and low-achieving students' affect and/or learning outcomes to the same extent, and whether positive affect (e.g., perception, motivation) is able to contribute to the learning outcome in a flipped classroom setting.

## Declaration of Conflicting Interest

The authors declare that there is no conflict of interest.

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