A Learning Analytics Approach to Investigating Factors Affecting EFL Students’ Oral Performance in a Flipped Classroom

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ABSTRACT

Flipped classrooms have been widely adopted and discussed by school teachers and researchers in the past decade. However, few studies have been conducted to formally evaluate the effectiveness of flipped classrooms in terms of improving EFL students’ English oral presentation, not to mention investigating factors affecting their flipped learning outcomes. In this study, an online community-based flipped learning approach was proposed for an EFL oral presentation course; moreover, a learning analytics approach was used to analyze factors affecting the students’ oral presentation outcomes. An 18-week research design was implemented with the online community-based flipped classroom using Facebook as the platform for facilitating and recording peer-to-peer interactions during the flipped learning process. In addition, the students’ learning performance and perceptions were collected in 3 learning stages during the 18 weeks. The experimental results reveal positive effects of the online community-based flipped instruction over the conventional video-based instruction. That is, first, the online community-based flipped instruction using mobile devices can enhance students’ English oral performance. Moreover, it was found that the high improvers had a significantly higher frequency of online participation, as well as more interactive behaviors and greater satisfaction with the flipped classroom than the low improvers. These results imply that the online community flipped classroom could not only provide learning materials and out-of-class learning for students, but could also help them become more responsible and autonomous in their learning and communication. These findings could be valuable references for those who intend to conduct effective flipped classrooms with an online community to facilitate students’ before-class learning participation and to improve their in-class learning performance.

Keywords

Flipped classroom, Mobile language learning, English oral performance, Learning analytics

Introduction

The significant rise in flipped teaching and learning in education (Bergmann & Sams, 2012) has not only changed the traditional learning patterns and teacher-centered learning modes, but has also improved students’ learning achievement and increased the interaction among learners and teachers (Hwang & Lai, 2017). Flipped learning has been recognized as a pedagogical approach to integrating instructional videos for students to self-learn outside of class by watching and reviewing the learning content or pre-class assignments before class (DeLozier & Rhodes, 2017). This learning mode may engage students in meaningful learner-to-learner or learner-to-teacher interactions in the community (Schultz, Duffield, Rasmussen, & Wageman, 2014). In flipped learning environments, there is more time to help students better prepare for and engage in learning activities or participate in classroom lectures (Bergmann & Sams, 2015; Cockrum, 2013), such as group project-based learning, in-depth discussion, or mobile technology-enhanced learning (Hwang, Lai, & Wang, 2015; Hwang & Lai, 2017).

Consequently, investigating factors affecting students’ language learning in flipped classrooms is a critical task for higher education institutions. In the past few years, various studies have been conducted to engage students in the flipped classroom approach in English language learning (Ahmed, 2016; Al-Harbi & Alshumaimeri, 2016; Asoodar, Atai, Vaezi, & Marandi, 2014; Basal, 2015; Han, 2015; Sam, 2016; Soliman, 2016; Stockwell, 2013; Zhang, Du, Yuan, & Zhang, 2016). Flipped teaching and learning involve regular and systematic use of interactive technologies in the learning process (Al-Zahrani, 2015).

This is an area that is of interest to researchers, teachers, material writers, and application developers in the digital world. Researchers have indicated that the improvement in students’ English learning performance, including listening, speaking, reading, and writing skills, is related to their preparation, participation, attitudes, learner autonomy, sense of community, collaboration, or different learning experiences (Ahmed, 2016; Al-Harbi & Alshumaimeri, 2016; Asoodar et al., 2014; Basal, 2015; Han, 2015; Sam, 2016; Soliman, 2016; Stockwell, 2013; Zhang et al., 2016). In addition, some researchers have attempted to improve students’ English speaking skills through video blogging, blogs or multimodal video technology as a learning instrument for improving English-speaking performance (Hung, 2016; Hung & Huang, 2015).
On the other hand, the individual learning process and learning traces play a central role in instructional management and in teaching development (Graf, Yang, Liu, & Kinshuk, 2009). Each learner has individual learning behaviors due to different learning abilities, attitudes, motivation, and so on. However, only a few scholars have investigated factors in flipped classrooms or have used a learning analytics approach to analyzing students’ feedback patterns in English language teaching.

In this study, an online community-based flipped learning approach was implemented using mobile technologies to facilitate students to engage in out-of-class learning as well as in-class activities of an English course. A particular strength of this study is that it focuses on the students’ English oral performance, participation, and feedback patterns using mobile technologies in the online community-based flipped classroom. An experiment was conducted using Oral-Aural Drills in an English course in my university to evaluate the consequences and effectiveness of the proposed approach, with the aim of answering the following research questions:

- Can the online community-based flipped learning approach improve the students’ oral performance in comparison with the conventional video-based learning?
- Does the online community-based flipped learning approach impact students’ participation, and is there a difference between high improvers and low improvers?
- Does the online community-based flipped learning approach impact students’ feedback patterns, and is there a difference between high improvers and low improvers?
- What are high improvers’ and low improvers’ perceptions of implementing the online community flipped classroom?

**Literature review**

The flipped classroom has recently been recognized as an effective learning approach in various courses (Lai & Hwang, 2016; Hwang et al., 2015). The adoption of flipped classrooms in ELT (Sam, 2016; Soliman, 2016) not only helps teachers reach students with different abilities or learning achievements, but also improves classroom management, giving teachers more time to interact with each student (Basal, 2015; Bergmann & Sams, 2015; Sung, 2015). In other words, flipping the classroom benefits students in various aspects, including enhancing their creative thinking (Al-Zahrani, 2015), listening comprehension (Ahmad, 2016), grammar skills (Al-Harbi & Alshumaimieri, 2016), reading comprehension (Huang & Hong, 2016), writing skills (Ahmed, 2016), English pronunciation (Zhang et al., 2016), and overall English proficiency (Wu, Hsieh, & Yang, 2017). The flipped classroom also helps students become more responsible for their learning (Han, 2015; Sung, 2015), and allows teachers more individual interaction with every student and the ability to develop better relationships with all their students (Zhang & Wu, 2016). Moreover, flipping the instruction significantly reduces negative behavior in the classroom (Cockrum, 2013).

In the past decade, many scholars and educators have engaged students in English language flipped classrooms and have distilled ideas in the flipped learning world to help more teachers chart a path towards pedagogical innovation. Conversation, public speaking, English speech, and presentation are essential components of English as a foreign language speaking skills (Koçak, 2010; Swain, 1985). Cockrum (2013) indicated that students can produce successful comprehensive speech or presentations in three ways. First, they can write effectively to convey the message. Second, teachers have students deliver a speech with appropriate enunciation, body language, gestures, volume, and demeanor. Third, students make several formal and informal presentations to practice these skills. In addition, Bergmann and Sams (2015) stated that various types of hands-on activities, such as working with different media, script writing, rehearsals, rewrites, and movie filming in the learning process allow students to engage more deeply and motivate them to learn, while also encouraging their creativity and understanding.

Consequently, teachers could use a flipped speaking course to increase students’ motivation and engagement to help them take more responsibility for their learning (Bergmann & Sams, 2015). Particularly in recent years, several studies have been conducted on flipping English language teaching. One of the examples is Hsieh, Huang, and Wu’s (2017) series of studies regarding flipped classrooms. They indicated the effectiveness of flipped classrooms in terms of enhancing students’ oral proficiency, and showed that the application of technologies can facilitate English language teaching. Their results also revealed that the students were satisfied with the flipped classroom, accepted the technology, and were motivated by the incorporation of mobile learning. They further reported that the students learning with the mobile-based flipped learning approach had better learning outcomes and attitude for active and continuous learning than those learning with the conventional lecture-based approach. However, in their study, students’ learning behaviors were not investigated to support the findings. Therefore, in the present study, an online community-based flipped classroom was
proposed and a learning analytic approach (Agudo-Peregrina, Iglesias-Pradas, Conde-González, & Hernández-García, 2014; Slade, & Prinsloo, 2013) was used to analyze factors and students’ interactive behaviors affecting students’ oral proficiency.

Online community-based flipped learning

In this study, the popular social networking site, Facebook, was adopted as the platform since all of the participants had Facebook accounts, and most of them used it frequently. It only required minimal computer skills and provided three essential functions: a wall, newsfeed, and live stream video. The teacher selected educational videos related to the target language from TED, VoiceTube, and YouTube and uploaded them to the wall. The students could view one or two videos each week in the newsfeed and respond to the designed open questions related to the video in comments area, as shown in Figure 1.

Outside the classroom, students could use their computer, iPad, mobile phone, or smartphone to watch the video and respond to the questions. If they did not complete the out-of-class learning (i.e., watch the video(s) and do the oral or written assignments on the newsfeed), they would be asked to complete it before the lecture started. The final function of the live stream video on Facebook was for the students to record dialogues and shares their videos. In addition, they could also give comments and get others’ feedback immediately, as shown in Figure 2. Therefore, each of the students in the experimental group was required to join the Facebook group for this class.

Experimental group (N=33) Out-of-class learning on Facebook

![Figure 1. Facebook as a platform for students’ online community-based flipped learning](image-url)
Research design

Context of the study

This research was conducted in 2017 as part of two Oral-Aural Drills in English courses in a Taiwanese university. The classes met for 2 hours per week, 18 weeks per semester, were taught by the same English lecturer, and shared the same objectives: (1) to enhance students’ English oral performance on the given topics and (2) to promote students’ English expression and oral presentation skills.

Participants

The study adopted a quasi-experimental design in which two classes of ELF (English as a Foreign Language) students were assigned to an experimental group and a control group. The experimental group with 33 students adopted the online community-based flipped classroom approach, while the control group with 16 students learned with the conventional video-based learning approach. The students in these two classes were freshmen who took the placement test set by the Language Center at the University and had the same level of English proficiency; that is, their test scores ranged from 350-550, which, according to the TOEIC official information, places them at the level of elementary proficiency plus, that is, they had the basic competence required for starting face to face conversations in English. The average age of the students was 18.

Instruments

We collected four types of data in this study: three oral performance video clips, students’ participation, students’ interactive behavior, and the survey questionnaire of the students’ perceptions of the flipped classroom. The level of the English oral tests was determined by the English lecturers in the Language Center at the University, and two English experts selected the oral topics from the elementary proficiency plus level and then assigned the topics to the Time 1 oral test, the Time 2 oral test, and the Time 3 oral test, indicating that the level
of difficulty of the three oral tests was the same. Within the 18 weeks, the students’ three video clips of English oral performance were uploaded to Facebook. The following section describes the rubric of English oral performance.

**The rubric of English oral performance**

The rubric for measuring the students’ English Oral Performance was developed by DePalma, Cartland, and Neumaier (2013). Table 1 shows the rubric, which consists of six dimensions with a total score of 24 points, 4 points for each dimension, that is accuracy, comprehensibility and pronunciation, fluency, comprehension, content, and maturity of language. These six dimensions measure how well the students used sentence structures, vocabulary, and correct grammar; how well they communicated ideas and used correct pronunciation with no significant errors; how well they understood all verbal cues and responded appropriately; whether their speaking content included information such as an opening, body, and conclusion; and whether they could communicate effectively by using appropriate words, expressions, eye contact, and gestures. The aim of this study was to develop an understanding of the experimental group and control group students’ English-speaking learning activities and practices. As a result, the students would be able to use English to communicate, present themselves, and engage in a real-world community.

**Table 1. The rubric of English oral performance**

<table>
<thead>
<tr>
<th>Scores</th>
<th>Accuracy</th>
<th>Comprehensibility and Pronunciation</th>
<th>Fluency</th>
<th>Comprehension</th>
<th>Content</th>
<th>Maturity of the Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Ability to use sentence structure, vocabulary, and grammar correctly with no significant errors</td>
<td>Ability to communicate ideas and be understood using correct pronunciation with no significant errors</td>
<td>Ability to communicate clearly and smoothly with only natural hesitation</td>
<td>Ability to understand all verbal cues and always respond appropriately</td>
<td>Inclusion of all required information, including opening, body, and conclusion</td>
<td>Inclusion of details beyond the minimum requirements (ex: using words/expressions/eye contact/gesture)</td>
</tr>
<tr>
<td>3</td>
<td>Ability to use sentence structure, vocabulary, and grammar correctly with minimal errors</td>
<td>Ability to communicate ideas and be understood using correct pronunciation with no minimal errors</td>
<td>Ability to communicate clearly and smoothly with minimal hesitation</td>
<td>Ability to understand most verbal cues and almost respond appropriately</td>
<td>Inclusion of most required information</td>
<td>Inclusion of details beyond the minimum requirements</td>
</tr>
<tr>
<td>2</td>
<td>Ability to use sentence structure, vocabulary, and grammar correctly with some errors</td>
<td>Ability to communicate ideas and be understood using correct pronunciation with some errors</td>
<td>Ability to communicate with some prompts</td>
<td>Ability to understand some verbal cues and sometimes requires prompts</td>
<td>Inclusion of some required information</td>
<td>Inclusion of minimal or no details beyond the minimum requirements</td>
</tr>
<tr>
<td>1</td>
<td>Inability to use sentence structure, vocabulary, and grammar correctly (many errors)</td>
<td>Inability to communicate ideas and be understood (many errors in pronunciation)</td>
<td>Inability to communicate ideas unless given prompts</td>
<td>Inability to understand verbal cues and respond appropriately</td>
<td>Inclusion of little no required information</td>
<td>Good Luck!</td>
</tr>
</tbody>
</table>

**Coding scheme for assessing students’ interactive behaviors**

To explore the students’ oral interactive patterns in the online community-based flipped classroom, a coding scheme was developed to code their behaviors. A model of interactive behaviors in an EAP (English for
Academic Purposes) classroom, originally developed by Unlu and Wharton (2015), was administered. The concept labels were used to generate a list of concepts representing all the feedback from students in their responses on Facebook. Two experts were invited to confirm the suitability of the codes and the corresponding definitions, and the accuracy of the coding result based on the coding scheme, as shown in Table 2. After the learning activity, two researchers were asked to code the students’ online interactive behaviors based on the coding scheme. For those inconsistent coding results, a judge discussed with the two researchers and came out with the final result of full agreement among all.

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Definition</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>feedback</td>
<td>CL</td>
<td>Clarification</td>
<td>Students’ attempts to explain reasons</td>
<td>I think Vincent Chao can be so successful because he has studied abroad and he is very</td>
</tr>
<tr>
<td></td>
<td>CO</td>
<td>Confirmation</td>
<td>Students’ validation to the significance of ideas</td>
<td>brave to deal with many challenges.</td>
</tr>
<tr>
<td></td>
<td>RE</td>
<td>Retelling</td>
<td>Students retell the sentences</td>
<td>Well, I agree that the speaking style comes a lot from listening to speeches over and over</td>
</tr>
<tr>
<td></td>
<td>CH</td>
<td>Challenge</td>
<td>Students’ response to the idea with some level of disagreement</td>
<td>again such as from American politicians.</td>
</tr>
<tr>
<td></td>
<td>SU</td>
<td>Suggestion</td>
<td>Students offering possible ideas or suggestions</td>
<td>“It is ok to step out and use a language even though you may not feel 100% confident in</td>
</tr>
<tr>
<td></td>
<td>SR</td>
<td>Surmise</td>
<td>Students guess something</td>
<td>it,” said Vincent Chao.</td>
</tr>
</tbody>
</table>

Table 2. The coding scheme of students’ interactive behaviors on Facebook

Questionnaire of students’ perceptions of the online community-based flipped classroom

The questionnaire of perceptions of flipped learning was modified based on the survey developed by Al-Zahrani (2015). It used a 5-point rating scheme (5 = “strongly agree” and 1 = “strongly disagree”) to evaluate the students’ views on the flipped classroom with the following 14 items:

(1) The flipped classroom offers me the opportunity to review the lectures as many times as I need to.
(2) The flipped classroom offers me access to the online course tools and materials.
(3) The flipped classroom helps me to use various e-learning resources.
(4) The flipped classroom helps me to enrich my learning experience.
(5) The flipped classroom helps me to connect theory with practice in real life.
(6) The flipped classroom helps me to effectively cooperate with my classmates.
(7) The flipped classroom facilitates more communication between me and my teacher.
(8) The flipped classroom facilitates more communication between me and my classmates.
(9) The flipped classroom helps me to effectively participate in the learning activities.
(10) The flipped classroom enables me to manage my learning activities.
(11) The flipped classroom helps me to develop my problem-solving skills.
(12) The flipped classroom facilitates my personalized learning.
(13) The flipped classroom is a very enjoyable approach.
(14) I prefer the flipped classroom over the traditional lectures.

These 14 items were divided into four dimensions: “content” dimension (items 1-5), such as “the flipped classroom offers me the opportunity to review the lecture as many times as I need to;” “communication” dimension (items 6-8), such as “the flipped classroom helps me to effectively cooperate with my classmates;”
“performance” dimension (items 9-12), such as “the flipped classroom helps me effectively participate in the learning activities;” “interest” dimension (items 13-14), such as “the flipped classroom is a very enjoyable approach.” The Cronbach’s $\alpha$ values of the individual dimensions were 0.85, 0.79, 0.78, and 0.87, respectively, showing acceptable reliability in internal consistency.

Experimental procedure

Figure 3 shows the experimental procedure of this study, which was carried out over a period of 18 weeks in 2017. An experimental group and a control group participated.

In the experimental group, an online community-based flipped classroom was constructed. There were 33 students in this group, which was taught as follows:

- In the first two weeks, the students in the experimental group received orientation and preparation for the use of the online community-based flipped learning and participation on the Facebook platform. They also learned basic knowledge of oral skills.
- Next, for a 5-week period as Time 1, a 5-week period as Time 2, and the last 5-week period as Time 3, the lesson themes were as follows for the experimental group: learning to speak English about topics related to celebrities, music, and food in Time 1, travel, festivals, and animals in Time 2, documentaries, talk shows, science, and others such as speech principles in Time 3. In Time 1, the students learned how to introduce themselves and talk about their interests, such as music or food. And in Time 2, they learned to talk more about life, including trips on holidays, Christmas stories, and animals. Finally, in Time 3, students learned how to express ideas and explain things; therefore, they watched learning videos including documentaries, talk shows, science and other videos. During these 3 time periods and the 9 topics, the teacher would like to enhance students’ English oral performance on the given topics and to promote students’ English expression and oral presentation skills.
- Out-of-class learning: instructional video learning contents uploaded on Facebook. Video lectures expose students to English listening with scripts before class and encourage them to be responsible for sharing their thoughts or comments on the video using their mobile phone or smartphone. In other words, the
students reviewed the video and said one or two things they had learned from the video and left a comment on Facebook before attending the lecture each week. Students with difficulties doing the out-of-class video learning were directed to individual learning during the in-class time.

- In-class learning: focused on discussion and practice for English speaking as well as writing. Each lesson took up two 50-minute class periods per week; the students worked in pairs or small groups to complete a communicative task in oral or written form. These activities were designed to enhance the students’ English learning, especially their speaking competency. Table 3 provides an illustration and examples of in-class learning activities, including oral English activities such as dialogue practice, short roleplays, and mobile language learning such as roleplay writing and Facebook Live Streaming.

On the other hand, the students in the control group without flipped learning received the same knowledge and information while attending traditional English lectures throughout the semester. The total number of students who participated in this group was 16. In this group, the students were taught using lecture-based and video-based approaches focused on individual discussion activities and pair roleplay in the classroom. Homework was assigned after the class. Students in the control group worked with the same learning activities including oral English activities and mobile language learning, but without Facebook Live Streaming or any other out-of-class learning activities on Facebook.

Table 3. The 18-week in-class learning activities focused on four aspects

<table>
<thead>
<tr>
<th>In-class Learning Activities (100 mins per week, 18 weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oral English activities</strong></td>
</tr>
<tr>
<td>The following activities were used each week with a thematic topic from an oral English textbook. It aims to improve students’ oral fluency practice.</td>
</tr>
<tr>
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<td></td>
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<td></td>
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</tbody>
</table>

**Results**

**English oral performance**

First, we examined the effectiveness of the proposed approach to ensure that this learning approach could benefit the students’ English oral performance. The inter-rater reliability of the ratings given by the two teachers was 0.764, showing high consistency between their ratings. An independent sample t test was conducted first to compare the three oral performance scores of the two groups.

- Time 1: the online community-based flipped classroom scores ($M = 18.60, SD = 1.69$) were higher than the conventional video-based learning classroom scores ($M = 17.12, SD = 1.89; t = -2.76, p < .01$).
- Time 2: the online community-based flipped classroom scores ($M = 20.36, SD = 1.51$) were higher than the conventional video-based learning classroom scores ($M = 19.15, SD = 1.50; t = -2.62, p < .01$).
- Time 3: the online community-based flipped classroom scores ($M = 22.12, SD = 1.26$) were higher than the conventional video-based learning classroom scores ($M = 19.62, SD = 1.20; t = -6.56, p < .001$).

In addition, one-way analysis of covariance (ANCOVA) was employed to evaluate the students’ oral performance in the experimental group and the control group by adopting the Time 3 scores as the dependent variable and Time 1 scores as the covariate. The test of regression coefficient showed that the assumption of homogeneity for the oral performance scores in Time 1 was not violated ($F = (1, 47) = 0.052, p = .82 > .05$), indicating that ANCOVA could be employed. Table 4 shows the ANCOVA result. It was found that the oral performance of the experimental group was significantly higher than that of the control group in Time 3 ($F = 34.30, p < .001$) by excluding the impact of the scores in Time 1. This result implies that the online community-based flipped learning can more significantly improve students’ learning achievement compared with the conventional video-based instruction. Furthermore, the effect size ($\eta^2$) of flipped learning was 0.43, representing a moderate effect size (Cohen, 1988).
### Table 4. The one-way ANCOVA result of the post test of the two groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Adjusted mean</th>
<th>Adjusted SD</th>
<th>F</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>33</td>
<td>22.12</td>
<td>1.26</td>
<td>22.10</td>
<td>0.23</td>
<td>34.30***</td>
<td>0.43</td>
</tr>
<tr>
<td>Control</td>
<td>16</td>
<td>19.62</td>
<td>1.20</td>
<td>19.71</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* ***p < .001.

**Participation between high improvers and low improvers**

To further understand the effects of the proposed approach on the learning participation of the students with different degrees of improvement in their learning achievement, the students were classified into high and low improvers based on the ranges of their scores in the final oral test in Time 3 and the first oral test in Time 1. The high improvers (n = 17) improved from 3 to 7 points in this semester, while the low improvers (n = 16) only improved 1 to 2 points. As shown in Figure 4, the high improvers on average participated in the out-of-class learning 4.47 times in Time 1, 3.65 times in Time 2, and 4.18 times in Time 3. In comparison, the low improvers participated on average 4.31 times in Time 1, 3.06 times in Time 2, and 2.75 times in Time 3. In other words, in terms of the high improvers’ and low improvers’ out-of-class learning participation in the flipped speaking on Facebook, the results showed that the high improvers participated much more than the low improvers.

![Figure 4. Analysis of the participation of the high and low improvers](image)

Furthermore, a sample *t* test was employed to examine the difference in the participation or change for the high and low improvers. The findings are presented in Table 5. The standard errors were 0.94 in Time 1, 1.53 in Time 2 and 1.01 in Time 3 for the high-improver group; and 0.87 in Time 1, 1.18 in Time 2, and 1.29 in Time 3 for the low-improver group. A significant effect was observed in Time 3 (*t* = 3.54, *p* < .01). This implies that there was no significant difference or change in the out-of-class learning participation for the high and low improvers in the online community-based flipped classroom in Time 1 or Time 2. However, in Time 3, the high improvers were motivated to engage more and had significantly higher participation compared with the low improvers. Moreover, the effect size (d) of participation for the high improvers was 1.23, representing a moderate effect size (Cohen, 1988).

### Table 5. t-test result of students’ out-of-class learning participation from Time 1 to Time 3 for the high and low improvers

<table>
<thead>
<tr>
<th>18 weeks</th>
<th>High improvers (n = 17)</th>
<th>Low improvers (n = 16)</th>
<th><em>t</em></th>
<th><em>d</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Time 1</td>
<td>4.47</td>
<td>0.94</td>
<td>4.31</td>
<td>0.87</td>
</tr>
<tr>
<td>Time 2</td>
<td>3.65</td>
<td>1.53</td>
<td>3.06</td>
<td>1.18</td>
</tr>
<tr>
<td>Time 3</td>
<td>4.18</td>
<td>1.01</td>
<td>2.75</td>
<td>1.29</td>
</tr>
</tbody>
</table>

*Note.* **p < .01.
Students’ interactive behaviors

Working from the descriptions of the students’ feedback and responses on Facebook during the 18-week flipped learning, the relationship patterns of the high and low improvers were collected and analyzed. Several previous studies have reported the potential impacts of learning achievement or performance in the flipped classroom, while several researchers have indicated that flipped classrooms could help students engage in tasks or learning activities. Therefore, we further examined the interactive behaviors in the online community flipped classroom by analyzing the feedback patterns of the students with high and low improvement to further investigate their learning analytics. Table 6 shows the frequency and percentage of the individual coded interactive behaviors of the high and low improvers. Among the 15 videos used as the out-of-learning lectures during the semester, 494 interactive behaviors were collected from Facebook. The students’ responses and feedback using mobile technologies were categorized into six types of talk, including clarification (CL) with 214 total occurrences, confirmation (CO) with 97, retelling (RE) with 97, challenge (CH) with 45, suggestions (SU) with 39, and surmise (SR) with only 2. “Clarification” was the most frequent feedback pattern, with an occurrence of 43.0% for the high improvers and 43.8% for the low improvers. Meanwhile, there was 20.4% “confirmation” for the high improvers, 18.6% for the low improvers; 16.5% “retelling” for the high improvers, 23.8% for the low improvers; 10.9% “challenge” for the high improvers, 6.7% for the low improvers; 8.5% “suggestion” for the high improvers, 7.1% for the low improvers and < 5% “surmise” for the high improvers and 0% for the low improvers.

Table 6. The frequency of coded interactive behaviors for the high and low improvers

<table>
<thead>
<tr>
<th>Categories of interactive behaviors</th>
<th>High improvers (n =17)</th>
<th>Low improvers (n =16)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of occurrences</td>
<td>% of occurrences</td>
<td>Number of occurrences</td>
</tr>
<tr>
<td>CL (Clarification)</td>
<td>122</td>
<td>43.0%</td>
<td>92</td>
</tr>
<tr>
<td>CO (Confirmation)</td>
<td>58</td>
<td>20.4%</td>
<td>39</td>
</tr>
<tr>
<td>RE (Retelling)</td>
<td>47</td>
<td>16.5%</td>
<td>50</td>
</tr>
<tr>
<td>CH (Challenge)</td>
<td>31</td>
<td>10.9%</td>
<td>14</td>
</tr>
<tr>
<td>SU (Suggestion)</td>
<td>24</td>
<td>8.5%</td>
<td>15</td>
</tr>
<tr>
<td>SR (Surmise)</td>
<td>&lt;5</td>
<td>5%</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Ave (Average)</td>
<td>284</td>
<td>100%</td>
<td>210</td>
</tr>
</tbody>
</table>

Figure 5 shows the number of occurrences of the coded interactive behaviors for the high and low improvers. It was found that “clarification,” “confirmation,” “challenge,” “suggestion,” and “surmise” were more commonly used by the students in the high-improvement group than by those in the low-improvement group. Only the number of occurrences of “retelling” was higher in the low-improvement group than in the high-improvement group. To further examine the six categories of interactive behaviors of the high and low improvers, a sample t test was employed to investigate the significances among the interactive behaviors. According to the results in Table 7, it
was found that the categories of interactive behaviors of clarification (CL) and challenge (CH) for the high improvers were significantly higher than those for the low improvers (CL: \( t = 2.69, p < 0.05, d = 0.94 \); CH: \( t = 2.33, p < .05, d = 0.83 \)). This result implies that the students in the high-improvement group exhibited significantly more occurrences of speaking and giving effective responses compared with the low-improvement group.

<table>
<thead>
<tr>
<th>Categories of interactive behaviors</th>
<th>High improvers (n = 17)</th>
<th>Low improvers (n = 16)</th>
<th>t</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL (Clarification)</td>
<td>7.17 1.42</td>
<td>5.75 1.61</td>
<td>2.69</td>
<td>0.94</td>
</tr>
<tr>
<td>CO (Confirmation)</td>
<td>3.41 2.26</td>
<td>2.43 1.96</td>
<td>1.31</td>
<td>0.46</td>
</tr>
<tr>
<td>RE (Retelling)</td>
<td>2.76 0.75</td>
<td>3.12 0.34</td>
<td>-1.75</td>
<td>-0.61</td>
</tr>
<tr>
<td>CH (Challenge)</td>
<td>1.82 1.38</td>
<td>0.87 0.88</td>
<td>2.33</td>
<td>0.83</td>
</tr>
<tr>
<td>SU (Suggestion)</td>
<td>1.41 1.46</td>
<td>0.93 0.92</td>
<td>1.12</td>
<td>0.39</td>
</tr>
<tr>
<td>SR (Surmise)</td>
<td>0.11 0.33</td>
<td>0.00 0.00</td>
<td>1.46</td>
<td>0.47</td>
</tr>
<tr>
<td>Ave (Average)</td>
<td>2.78 0.71</td>
<td>2.18 0.36</td>
<td>2.97</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Note. *p < .01; **p < .05.

### Students’ perceptions of the flipped classroom

The questionnaire survey, modified from Al-Zahrani (2015), was administered and the results analyzed, with the students’ perceptions of the flipped classroom shown in Table 8. The total score revealed high satisfaction with the online community-based flipped learning approach (\( M = 4.06, SD = .23 \)). High satisfaction rates were given for items 1 through 9, and for items 12 and 14. However, items 10, 11, and 13 indicate the students’ moderate satisfaction.

Table 8 shows t-test results of the high and low improvers’ perceptions of the flipped learning. It was found that the high improvers’ perceptions of Communication and Interest had significantly more positive perceptions than those of the low improvers in the dimensions of Communication (\( t = 2.74, p < .05 \)) and Interest (\( t = 2.10, p < .05 \)) with effect sizes 0.96 and 0.72 respectively.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>High improvers (n = 17)</th>
<th>Low improvers (n = 16)</th>
<th>t</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content (Items 1-5)</td>
<td>4.29 0.69</td>
<td>4.06 0.87</td>
<td>1.06</td>
<td>0.37</td>
</tr>
<tr>
<td>Communication usefulness (Items 6-8)</td>
<td>4.20 0.60</td>
<td>3.65 0.55</td>
<td>2.74</td>
<td>0.96</td>
</tr>
<tr>
<td>Performance (Items 9-12)</td>
<td>4.07 0.67</td>
<td>3.63 0.59</td>
<td>2.04</td>
<td>0.70</td>
</tr>
<tr>
<td>Interest (Items 13-14)</td>
<td>4.62 0.63</td>
<td>4.10 0.80</td>
<td>2.10</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Note. *p < .05.

### Discussion and conclusions

The need to enhance students’ English competency of using technologies and their behavioral patterns has been emphasized (Graf et al., 2009; Hwang, Hsu, Lai, & Hsueh, 2017; Unlu & Wharton, 2015). However, due to the limited learning time and English oral environment, students usually have few opportunities to practice their English oral skills in class. To better understand students’ English oral learning process, oral performance, participation, and interactive patterns, in this study, an online community-based flipped classroom was developed, and a learning analytics approach was employed to explore the learning differences between high improvers and low improvers in the proposed approach. According to the experimental results, the research questions of this study can be answered.

Taken as a whole, the results seem to indicate that the online community-based flipped learning approach using mobile technologies was effective in the English-speaking classroom (Bergmann & Sams, 2015; Sung, 2015). Figure 6 shows the conclusion of this research. First, for the performance aspect, flipped speaking plays a highly positive role in enhancing students’ learning performance over the conventional video-based learning approach. The results revealed that the students seemed to be motivated to learn by accessing a variety of English input or learning materials using their mobile devices. They used mobile technologies to watch videos before the lecture and could complete the pre-class assignments and respond to the comments. In other words, not only does
flipping speaking help students to learn English better, but it also gives teachers a better understanding of the
teacher-student feedback relationship and the students’ learning process (Zhang & Wu, 2016). Additionally, in
terms of participation, according to the instructor observations and analysis of the students’ participation during
the 18-week course, the students were motivated to participate in the out-of-class learning activities in Time 1
and Time 2, but especially in Time 3, the high improvers had a significantly higher frequency of online
participation.

According to the previous studies, Chen, Wang, and Chen, (2014), Han (2015), Jinlei, Ying, and Baohui (2012)
have indicated that the flipped language learning demonstrates significant potential for language classroom and
enhances learner autonomy. In the flipped classroom, the students had practiced autonomous English learning
materials before the lecture and the activities in class. At the end of the semester, the signs of successful
development of learner autonomy were also identified, such as their interactive feedback and submissions of the
video presentation during Time 1, Time 2 and Time 3. All students submitted at least three videos and responded
the interactive behaviors. Moreover, the impact was observed and analyzed for the interactive patterns. The
students actively and voluntarily contributed their time and effort to use mobile language learning in and out of
the class. Therefore, the study also demonstrated the development of students’ learner autonomy to enhance their
language abilities. This helped them quickly engage and learn before the class, encouraging them to become
more responsible people (Cummins, 2016; Han, 2015; Sung, 2015).

The online flipped classroom also helps teachers to manage the classroom time more efficiently (Cockrum,
2013). Third, according to the data from the students’ interactions using the proposed approach, we explored
factors which may influence the nature of the interactive behaviors in the online flipped speaking classroom.
Both high and low improvers showed awareness of “Clarification,” “Challenge,” “Retelling,” “Surmise,”
Confirmation,” and “Suggestion” in the speaking classroom. The results showed that the high improvers
exhibited a significantly higher frequency of “Clarification” and “Challenge,” suggesting that teachers could
help low improvers possibly desire them, but this does not necessarily mean that students in flipped speaking
classrooms equally desire these interactive behaviors. Teachers could use ways to stimulate students to
communicate and to use different interactive behaviors to express ideas. The online flipped classroom may be an
effective learning approach to provide students with opportunities to reflect on their practices in discussion with
peers and teachers. Finally, for the perception aspect, the research findings suggest that the high improvers were
significantly more satisfied with the online community-based flipped classroom than low improvers. As the high
improvers also expressed more positive perceptions of communication and interest, teachers could consider
leading in additional strategies to raise the interest and communication of low improvers in the future.
To sum up, the online community-based flipped learning approach using mobile technologies offers a rich, informal, and ubiquitous learning environment in which it is possible for students and teachers to better control English language teaching and learning and to improve the learners’ language proficiency (Hsieh et al., 2017). This study explored students’ oral performance, participation, interactive patterns, and their perceptions of the flipped classroom when using the proposed approach, and the findings highlighted how the online community-based flipped approach improved the students’ learning attitudes and dealt with the issues of student engagement with feedback using mobile technologies for flipping speaking on Facebook. With these results, regarding the students’ oral performance, participation, and interactive behavior, classroom lecturers using the proposed approach can consider more benefits over the conventional video-based English speaking classroom. Flipping speaking could be successfully recognized as an effective learning approach in this study. This proposed approach not only helps teachers reach students of different abilities or learning achievement, but also improves classroom management, giving teachers more time to interact with each student (Basal, 2015; Bergmann & Sams, 2015; Sung, 2015). Moreover, the flipped speaking classroom helps students become more responsible for their learning (DelOzier & Rhodes, 2017; Han, 2015; Sung, 2015), and allows teachers more individual interaction with students via the online community platform and the ability to develop better relationships with their students (Zhang & Wu, 2016).

In the future research on flipped English speaking classrooms, teachers could use more strategies to help students learn the concept of adapting their use of language to conform to standards or traditions in the given contexts, such as giving advice, asking questions, or proposing different ideas. In addition, by using the online community-based flipped learning and teaching, teachers could enhance students’ critical thinking and the collaborative relationship between the students and teacher (Unlu & Wharton, 2015). Consequently, several studies can be considered in the future, such as an investigation of the effects of interactive behaviors comparing different levels of autonomous learners or students’ learning performance with different flipped classroom approaches. Moreover, further research can probe the teacher-student use of the mobile-flipped pedagogical approach, such as planning, reflecting, or the detailed out-of-class learning and in-class learning activities using appropriate learning content so as to promote low improvers’ English oral performance, participation, and perceptions of the flipped classroom for better learning. Finally, further investigations into flipping speaking in English can provide a more holistic picture of English language teaching development. In the future, it would be worth investigating the impacts of the approach on students’ English learning performance and perceptions in other dimensions. Moreover, it could be valuable to investigate the impacts of the approach on the learning performances of the students with different personal characteristics.

References


Bergmann, J., & Sams, A. (2012). Flip your Classroom: Reach every student in every class every day. Alexandria, VA: International Society for Technology in Education.


