1. Introduction

Learning English, particularly acquisition of culture-specific idiomatic expressions, holds the key to effective communication in the field of language education around the globe, whether in a native language learning environment or in foreign/second language instructional contexts. Nevertheless, the importance of idioms has not been sufficiently reflected in education, given that conventional EFL instruction still focuses more on vocabulary, grammar, and sentence structure. Previous studies concerning English idiom acquisition have been mainly restricted to English-speaking settings; relevant probes into pedagogies and use of English idiomatic expressions in EFL contexts remain scarce (Asl, 2013; Khan & Daşkin, 2014; Târcăoanu, 2012). Moreover, when it comes to language learning, human factors (e.g., gender differences, individual traits, perception and attitude, cognitive styles, or prior knowledge) have been recognized as important issues, as reflected in the substantial number of existing research in the field of language education (e.g., Dörnyei, 2006; Granena, 2015; Grey, Williams, & Rebuschat, 2015; Tagarelli, Borges Mota, & Rebuschat, 2015). Among those human factors, one important issue that needs to be addressed is the individual’s proficiency level (such as high-/low-achieving learners), since instructors often face the challenge of teaching in class settings combining students of diverse proficiency levels.

Yet, such importance has not been appropriately reflected in current instruction, because conventional learning still prevails with a static and one-size-fits-all teaching/learning model requiring all learners to learn with “the same information in the same structure using the same interface” (Wauters, Desmet, & Van Den Noortgate, 2010, p. 549). Therefore, language practitioners have endeavored to seek innovative instructional pedagogies to enhance language learning outcomes (Johnson, Adams Becker, Estrada, & Freeman, 2014).

Among innovative pedagogies having recently drawn global attention, flipped learning has become a unique approach that has gained growing popularity among diverse fields. Flipped learning reverses the role of homework and classroom activities, with students engaged in pre-class tasks for the acquisition of knowledge, such as viewing instructional videos or doing related requirements.
and involved in practicing acquired knowledge or skills in class while the teacher monitors and corrects the student.

Flipped learning was purposefully chosen as the major pedagogical approach in this study. Its inclusion of technology, per se, created an appropriate context enabling the researchers to examine ELF learners’ perception of technology via the affordances of a chosen technology (LINE, as it was used in this study). Furthermore, contrary to static and one-size-fits-all teaching/learning models, flipped learning in this study transformed teacher-centered, lecture-based instruction into a student-centered, task-based learning context, providing “a dynamic and interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter” (Flipped Learning Network, 2014, p. 1).

With the advance and prevalence of modern technology, particularly owing to the widespread use of smartphones, society has gone mobile. Individuals are more inclined to communicate with others using diverse synchronous communication tools or mobile messaging applications such as LINE, WhatsApp, or WeChat (Pew Research Center, 2015). The ubiquitous nature of such mobile apps has not only affected various aspects of education but also offers the potential to foster an innovative learning environment beneficial to knowledge delivery by instructors and profound engagement in learning activities among learners (Pimmer, 2016; Zhang, Song, & Burston, 2011).

In this study, the smartphone app LINE was chosen as the mobile technology used to facilitate oral interaction among the students. Its functions, such as oral recording and text messaging, fit in with the nature of the innovative flipped instruction as well as the research design. LINE provided affordances vital to the instructional design of the flipped learning. Moreover, with its cross-platform capacity (Android, iOS, tablets, and PCs) and features including not only individual and group text messaging but also sending audio messages and files, LINE has achieved high popularity, with over 600 million users (Eun-ji, 2015). The students in this study were highly familiar with the app and therefore required no extra training session in its functions.

Nevertheless, Huang and Liaw (2005) stated that regardless of how powerful and sophisticated the technology is, it is the user who decides whether to use it or not. Therefore, a scrutiny of learner acceptance or unwillingness to use digital devices is one of the challenging issues for researchers. Among models that examine the reasons behind acceptance or rejection of use digital devices by learners, the Technology Acceptance Model (TAM) has become a valid model widely applied to technology acceptance and use (Hidayanto, Febriawan, Sucahyo, & Purwandari, 2014; Hsia, Chang, & Tseng, 2014; Lee, Hsiao, & Purnomo, 2014; Tarhini, Hone, & Liu, 2014; Wu & Zhang, 2014). However, few studies have addressed technology adoption in an innovative mobile-based flipped learning context, let alone among learners of different proficiency levels in an EFL setting such as Taiwan. To fill in this gap in previous literature, therefore, the researchers created an innovative mobile-based flipped instructional design which examined the students’ (high-/low-achieving students) in terms of their adoption of mobile app LINE in English oral training.

To address these goals and purposes, the following research questions guided this study:

1. How did the flipped instruction differ from the conventional instruction with respect to the participants’ English oral proficiency?
2. Which factor could best predict the participants’ behavioral intention of using LINE in a flipped oral training instruction? Were there any differences between high achievers and low achievers?
3. How did the students perceive the LINE-assisted flipped oral learning?

The significance of this study lies in its detailed probe into the relationships among the five constructs of TAM (System characteristics, Perceived ease of use, Perceived usefulness, Attitude about use, Behavioral intention) embedded in an innovative flipped oral instructional methodology incorporating the smartphone app LINE. Specifically, this study examined attitudes about mobile technology in language learning as well as behavioral intention to use the chosen technology among ELF learners of diverse proficiency levels. What also sets this study apart from previous research is the way “proficiency level” was treated and examined. In general, external variables related to the behavioral intention to use technology or to the actual use of technology have been grouped into four categories, including individual context, system context, social context, and organizational context (Park, 2009). “Proficiency level” fit into the individual context, the given construct in this study, rather than defined as an external variable. It served as an overarching perspective that enabled the researchers to understand technology adoption among learners of different English proficiency levels clearly. Such exploration of diverse learner perceptions concerning mobile-assisted language learning is of immense importance to researchers and language instructors, because it yields insights into factors that affect learners’ acceptance of a chosen technology in language education.

2. Literature review

This paper centers on technology acceptance among learners of different proficiency levels in an innovative mobile-based flipped learning in an EFL context. Relevant literature is detailed as follows: (a) related studies on flipped learning, (b) related studies on EFL learning using innovative pedagogical practices, and (c) related studies on technology adoption. The review culminates in the need to use TAM as the major framework to study the effectiveness of flipped learning using LINE for EFL oral training.

2.1. Studies on flipped learning

Learning English has been a global necessity and countries around the world have endeavored to develop innovative language pedagogies. However, instructional pedagogies have hardly kept pace with the changing needs of today’s students and English is still often delivered with conventional lecture-based drills, covering micro-level linguistic aspects such as grammar usage and vocabulary memorization rather than macro-level applications of acquired knowledge to real-life tasks (Ning, 2011). Such instruction is neither efficient nor effective in enhancing EFL abilities. Therefore, researchers as well as language practitioners have attempted to seek innovative approaches to instruction for enhanced efficacy and better learning outcomes. Among those pedagogical innovations, flipped learning has gained global popularity and has become widely adopted in diverse fields.

With the four components defined by the Four Pillars of F-L-I-P™ incorporated into courses (i.e., flexible environment, learning culture, intentional content, and professional educator, as shown in Fig. 1) flipped learning is an alternative to conventional pedagogy that requires students to acquire information by viewing instructional videos ahead of physical class meetings, allowing instructors to have students apply that knowledge in the classroom, engaging students in higher order active, constructive, and interactive activities (Chi, 2009). This approach frees up in-class time otherwise allocated for conventional lectures, allowing more use of in-depth application of knowledge in the classroom (Means, Toyama,
Murphy, Bakia, & Jones, 2009), thus contributing to ample opportunities for students to learn (Chen Hsieh, Wu, & Marek, 2016; Hung, 2015; McLaughlin et al., 2014) and enhancing the learning outcomes (Boucher, Robertson, Wainer, & Sanders, 2013).

Key elements embedded in flipped learning include (1) student exposure to new knowledge prior to class (e.g., instructional materials recorded by the teacher), (2) an incentive for students to prepare for class (e.g., pre-class online quizzes), (3) mechanism to assess student understanding of pre-class material (e.g., in-class anonymous quizzes), and (4) sufficient time for students to be engaged in in-class activities requiring higher-order cognitive abilities such as critical thinking, collaborative learning, or problem-solving (Abeysekera & Dawson, 2015). Studies have shown the positive effects of adopting flipped instruction in comparison with more traditional teaching approaches, improving learning outcomes (Han, 2015; Love, Hodge, Grandgenett, & Swift, 2014; Sahin, Cavlazoglu, & Zeytuncu, 2015), student engagement (Chen Hsieh et al., 2016; Dill, 2012), and learning motivation (Strayer, 2012; Wu, Yen, & Marek, 2011).

2.2. Studies on EFL learning using innovative pedagogical practices

Researchers have acknowledged the significance of technology use in teaching and learning (White, Syncox, & Alters, 2011; Yu & Liu, 2014; Yu, Chen, Kong, Sun, & Zheng, 2014), particularly with advanced technology acting as a convenient medium in both instruction and learning. Technology is often utilized to facilitate outside-the-classroom learning in a flipped classroom (e.g., developing instructional videos, having students watch those materials, or asking them to finish other learning tasks on an online platform). The effects of this approach have demonstrated the educational benefits of technology-enhanced language learning (TELL) (Amer., Jones, 2009), thus contributing to ample opportunities for students to learn (Chen Hsieh, Wu, & Marek, 2016; Hung, 2015; McLaughlin et al., 2014) and enhancing the learning outcomes (Boucher, Robertson, Wainer, & Sanders, 2013).

Other researchers have proposed the use of gamification to facilitate learning, as illustrated in studies by Palomo-Duarte et al. (2016) and Spires (2015). Among those game mechanisms, some studies focus on badges, points, and leaderboards (Dicheva, Dichev, Agre, & Angelova, 2015), while others highlight the importance of serious games (such as Chua, Banerjee, & Lee, 2015). Pervious probes into gamification in education have revealed the positive effects of gamified-based learning on motivating and engaging students (Bourgonjon et al., 2013; Sahliu, Ahmad, & Haron, 2011) as well as on enhanced learning outcomes (Escudero & Carvalho, 2013).

The rapid advancement of mobile technologies has found a role in education, because such technology has opened up new opportunities for teaching and learning (Motiwalla, 2007; Wang, Wu, & Hsu, 2017) and has been integrated in classroom practices, as documented by Chun, Smith, and Kern (2016), Chwo, Marek, and Wu (2016), El-Gayar, Moran, and Hawkes (2011), Wu and Marek (2016), and Zydnei and Warner (2016). Among advanced mobile technologies, diverse synchronous communication tools and instant text messaging applications (such as LINE, WeChat, WhatsApp, Viber, Twitter, Skype, and more) have provided a convenient medium for communication (Pew Research Center, 2015).

The popularity of instant or text messaging has resulted in a burgeoning integration of such communication tools in higher education (Bakker, Sloep, & Jochems, 2007; Frohberg, Göth, & Schwabe, 2009; Lauricella & Kay, 2013). Moreover, a plethora of research has probed into how such tools could be used for language learning (Cavus & Ibrahim, 2009; Chen Hsieh et al., 2016; Lu, 2008), peer collaboration (Ng'ambi & Brown, 2009; Timmis, 2012), and classroom interaction and discussion (Hou & Wu, 2011; Jeong, 2007; Markett, Arnedillo Sánchez, Weber, & Tangle, 2006).

Research has shown that instant and text messaging technologies can be regarded as educational facilitators because they provide not only platforms for socializing, sharing information, and communicating (Sweeney, 2010), but also generate stronger motivation, support, and recommendations for revision (Coniam & Wong, 2004; Traxler & Riordan, 2003). Numerous attempts have been made to examine the effects of mobile technologies in education and most of the studies have reported positive learning outcomes generated by mobile learning (Godwin-Jones, 2011; Hwang & Tsai, 2011; Kim & Kwon, 2012; Wu et al., 2012). Abachi and Muhammad (2014) noted that students involved in digital learning favored such learning experience (i.e., anywhere and anytime learning) because of easy access to “new strategies, practices, tools, applications, and resources to realize the promise of ubiquitous, pervasive, personal, and connected learning” (Wagner, 2005, p. 44).
2.3. Studies on technology adoption

With attempts to probe learner acceptance or resistance to using digital devices, diverse theoretical models have been proposed to account for a user’s final acceptance behavior, such as TAM, TAM2, or Unified Theory of Acceptance and Use of Technology (UTAUT). With high reliability and validity, as reported in Adams, Nelson, and Todd (1992) and Chau (1996), TAM developed by Davis, Bagozzi, and Warshaw (1989) has been proven to be “a valid and robust model” (King & He, 2006, p. 740) and offers a theoretical basis for user acceptance and usage behavior of technology. It specifically examines the influence of four variables on actual usage of technology, including perceived usefulness, perceived ease of use, attitude toward use, and behavioral intention or willingness to use the technology (see Fig. 2). Perceived usefulness is defined as “the degree to which an individual believes that using a particular system would enhance his or her productivity” (Davis, 1989, p. 320). Perceived ease of use is characterized as “the degree an individual believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Based on the model, an individual’s intention to use a technology is determined by perceived usefulness and perceived ease of use. Intention equates to willingness to use the technology, including perceived usefulness, perceived ease of use, attitude toward use, and behavioral intention or willingness to use the technology (see Fig. 2). Perceived usefulness is defined as “the degree to which an individual believes that using a particular system would enhance his or her productivity” (Davis, 1989, p. 320). Perceived ease of use is characterized as “the degree an individual believes that using a particular system would be free of effort” (Davis, 1989, p. 320). Based on the model, an individual’s intention to use a technology is determined by perceived usefulness and perceived ease of use. Intention equates to willingness to use the system and mediates the actual system use. That is, the two core beliefs, perceived usefulness and perceived ease of use, affect an individual’s behavioral intention/willingness to adopt, accept, or use a system, with perceived ease of use having a direct effect on both perceived usefulness and technology usage (Adams et al., 1992; Davis, 1989). An individual adopts a technology if it is useful, convenient, and socially desirable even though it might not be enjoyable to use (Saga & Zmud, 1994).

TAM posits an individual’s behavioral intention as the result of a cognitive process by which a decision is made (Drucker, 2006; Hughes & Ooms, 2004; Venkatesh, Morris, Davis, & Davis, 2003), having been applied to a variety of studies to examine the factors affecting an individual’s use of new technology (as documented in Venkatesh & Davis, 2000). Previous research has also demonstrated that the weight of these factors might differ as a function of different user types and technology systems (Shroff, Deneen, & Ng, 2011). With the popularity of emerging technology such as mobile devices, TAM has been used in a wide variety of contexts, where researchers attempted to identify the factors affecting an individual’s behavioral intention to use as well as the actual use of mobile learning devices. While applied to the field of language learning, TAM therefore assumes that the user’s acceptance of mobile apps in learning a target language is influenced by the perceived usefulness of the mobile apps as well as the perceived ease of mobile apps use, which affect subsequent attitudes about mobile app usage and behavioral intention to use.

With the popularity of TAM, studies examining factors that influenced the two major constructs (perceived usefulness and perceived ease of use) have been abundant, covering diverse aspects such as personality traits, computer self-efficacy, technology anxiety, prior usage and experience, self-efficiency, confidence in technology, subjective norm, expectations, user participation, and trust (as illustrated in Marangunic & Granić, 2015). More recently, in a quantitative meta-analysis of 107 papers covering the last ten years that aimed to identify the most commonly used external factors of TAM in e-learning adoption, Abdullah and Ward (2016) found that the most frequently used external factors were Self-Efficacy, Subjective Norm, Enjoyment, Computer Anxiety, and Experience. Nevertheless, demographic characteristics have been relatively insufficiently investigated, focusing mainly on gender, social influence, control, and emotion (Venkatesh & Morris, 2000; Venkatesh, 2000). Consequently, there has been a growing need to understand various unexplored aspects that could potentially contribute to the predictive validity of TAM (Marangunic & Granić, 2015), such as difference in technology acceptance among learners of diverse proficiency levels.

Despite the fact that the growing development of technology has been widely applied to facilitate learning and that TAM has become a dominant model in exploring factors affecting acceptance of technology as well as explaining behavior concerning technology, a careful scrutiny into the acceptance or rejection of new technology, particularly mobile-based communicative technologies in educational settings, remains scarce. Even more uncertain is the difference in technology acceptance among learners of diverse proficiency levels, because the paucity of such research in the EFL context is far more pronounced. Furthermore, even though the literature is replete with findings supporting the students’ preferences for flipped instruction over traditional learning environments (Butt, 2014; Enfield, 2013; Kim, Kim, Khera, & Getman, 2014; McLaughlin et al., 2013; Sarawagi, 2014), related studies have varied greatly in the particular components of specific flipped courses and in methodological rigor. This challenge further highlights the burgeoning need for researchers to direct their attention to the lack of evidence supporting this pedagogical approach and of systematic scrutiny into individual decisions about accepting or rejecting a technology integrated in educational contexts, particularly in light of TAM.

Therefore, it was the purpose of this study to address the gap in the higher education literature by using TAM for critical analysis of the use of LINE for flipped learning. Accordingly, the researchers conducted this study to examine the effectiveness of a flipped oral training instructional design incorporating LINE, based on evaluation of how mobile-assisted flipped learning affected EFL learners’ attitudes and perceptions in light of TAM.

The original TAM model developed by Davis et al. (1989) was chosen as the major theoretical framework in this study. Diverse theoretical models have been proposed to account for a user’s final acceptance behavior (Lee, Kozar, & Larsen, 2003) and TAM has been extended in numerous ways over the years (e.g., Abdullah & Ward, 2016; Mohammadi, 2015; Ros et al., 2015). The researchers concluded that original TAM best suited this study for two main reasons. First, TAM was an appropriate model for this study because of the major research focus of the study, attitude and behavioral intention to use LINE in flipped EFL oral training among English majors of different proficiency levels. In other words, this study aimed to examine the affordances resulting from flipped learning incorporating LINE, based on evaluation of how EFL learners of different proficiency levels perceived the chosen technology. This study did not address most of the external variables proposed in other models, such as subjective norm, image, job relevance, result demonstrability, experience, and voluntariness in TAM2, or social influence, facilitating conditions, gender, and age in UTAUT.

Second, TAM offers a straightforward perspective that enables researchers or language instructors to develop appropriate methods for relevant technology design, system evaluation, and prediction of user responses to new technologies (Li, Yu, Liu, & Yao, 2003). Drawbacks of the UTAUT model, for example, suggest that previous studies have mostly focused on large organizations, workplaces, or highlighted the role of age, gender, and experience.
Previous findings have reported inconsistencies in the explanatory powers and the effects of the UTAUT variables (e.g., Al-Gahtani, Hubona, & Wang, 2007; Bandyopadhay & Fraccastoro, 2007; Im, Hong, & Kang, 2011; Knutson, 2005; Li & Kishore, 2006; Nassuara, 2012; Wang & Shih, 2009). Therefore, the original TAM, with its validity extended to the multimedia and e-learning context, was the chosen technology model that provided a basis by which researchers, instructors, or even individuals could trace how external variables influenced belief, attitude, and intention to use.

3. Methods

3.1. Participants

The participants in the current study were 42 English-major sophomores enrolled in required English Oral Training classes at a four-year university in central Taiwan, mostly female and between the ages of 20 and 21. With around eight years of English education throughout high school, the participants were at the upper-intermediate level in terms of their English proficiency, suggesting the competence to make inquiries, describe and express opinions on diverse topics, hold conversations on daily topics, and share personal perspectives in social interactions without much difficulty. The participants experienced eight weeks of flipped instruction, where LINE was integrated in the oral course.

3.2. Instructional design

This instructional goal of this study was to improve the English ability of students, particularly their idiomatic usage, and to make a positive influence on their behavior, i.e. use of the learning tools provided. All participants experienced both flipped and conventional instructional treatments in accordance with the Within-Subjects research methodology (Creswell, 2013). The researchers were reluctant to deprive students in a control group from experiencing both instructional styles. Therefore, the study did not employ a formal experimental design with separate control and experiment groups. Instead, it was a quasi-experimental design, intended to explore student reactions to different treatments.

The GOOD CHATS (3rd ed.) textbook was purposefully chosen as the main material to meet the instructional outcome goals. As an English conversation textbook designed for advanced students, it covers frequently-used English idiomatic expressions and turns of phrase useful for effective oral interaction, specifically featuring (1) reading passages with idioms, phrases, and collocations useful for the unit topic, and (2) guided dialogues to enable participatory communication and interaction. Each unit topic included a reading passage, four comprehension questions, 30–40 useful idiomatic expressions, and a Chat-for-Two guided dialogue requiring the learners to collaboratively complete the conversation.

In the conventional treatment, the instructor elaborated on the learning contents during class meetings. While the participants also experienced collaborative activities similar to those practiced in the flipped instruction, significantly less time was available for advanced learning activities due to the need to use class time for explaining the idioms and reading passages.

During the flipped treatment, the students were first randomly paired and formed LINE groups with their partners. The instructor made the instructional videos covering useful idiomatic expressions in the chosen units. After viewing such videos and reading texts, the students wrote personal stories in English using the idiomatic expressions included in the videos. They later collaborated with their partners in English over the guided Chat-for-Two dialogues. They then uploaded audio recordings of the stories and guided dialogues to their LINE groups. Their partners provided feedback in English. To give students feedback, observe online interaction, and monitor the overall progress, the researchers also joined the students’ LINE groups. Fig. 3 demonstrates the procedures of the flipped instruction.

3.3. Research design

Multiple data sources were collected to investigate the effectiveness of the flipped treatment, to examine the construct relationships of TAM, and to explore the participants’ perceptions about the given learning experience, including (1) pre- and post-tests of English oral proficiency, (2) TAM questionnaire, and (3) focus-group interviews. Fig. 4 shows how the issues explored and instruments adopted aligned. Fig. 5 shows the entire instructional and data collection process.

3.4. Quantitative data analysis

In order to allow examination of the participants’ overall oral fluency, in answer to research question one, the participants completed pre- and post-tests, covering definitions and sentence making with idioms, oral reading, and comprehension questions selected from the textbook. Respective pre-tests and post-tests for the conventional instruction and the flipped instruction were identical in content. The participants were first asked to define each chosen idiom and to use it in a sentence. They then responded orally by reading one paragraph aloud and answering one comprehension question for each of the chosen units. The Oral Idiomatic Proficiency Rubric (Chen Hsieh et al., 2016) was employed for idiom definition and sentence making, and the IELTS Assessment Criteria: Speaking was adopted for oral reading and comprehension questions. Mean scores of all the tests and Paired-Samples t-Tests were adopted to investigate the participants’ oral proficiency outcomes in the two different forms of instructions (i.e., flipped versus conventional).

In answer to research questions two and three concerning the participants’ attitude and behavioral intention to use LINE in a flipped oral training course, the researchers used a Chinese translation of the original version of TAM, based on Huang, Huang, and Lin (2012). The questionnaire consisted of five constructs, including system characteristics, perceived ease of use, perceived usefulness, attitude toward use, and behavioral intention. Table 1 shows the final questions answered by the participants, who rated their level of agreement with each statement using a five-point scale. The questionnaire was administered in the native language of the students, Chinese, to ensure maximum understanding of nuances of meaning by the participants.

Fig. 6 shows the research model of this study, based on the study of Huang et al. (2012). The model consisted of seven hypotheses.

H1. System characteristics positively affect perceived usefulness.
H2. System characteristics positively affect perceived ease of use.
H3. Perceived ease of use positively affects perceived usefulness.
H4. Perceived usefulness positively affects attitude toward use.
H5. Perceived ease of use positively affects attitude toward use.
H6. Perceived usefulness positively affects behavioral intention.
H7. Attitude toward use positively affects behavioral intention.

The partial least squares approach (PLS) was used to analyze the data derived from the TAM questionnaire. Specifically, the PLS is one of multivariate analysis methods, in which it is more powerful...
Pre-class learning

- Students view level-appropriate instructional videos on idiom introduction and post personal short stories (both text and audio version) in LINE groups
- The instructor provides feedback on LINE

First 100-minute class meeting

- Misconception clarification
- Students present short stories orally
- Collaborative learning activities

Between-class tasks

- Students view the reading text
- Students collaboratively complete the guided dialogue and post the text as well as audio version on LINE
- The instructor provides feedback on LINE

Second 100-minute class meeting

- The instructor briefly goes through the reading text and checks students’ comprehension
- The instructor engages students in discussion of comprehension questions
- Students express their opinions in groups
- Students orally present the guided dialogues

Fig. 3. Procedures of the flipped treatment.

Fig. 4. Issues and instruments involved in the current study.

### EFL oral instruction

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st week</td>
<td>Pre-test 1</td>
<td>100 mins</td>
</tr>
<tr>
<td>2nd - 9th week</td>
<td>Conventional instruction</td>
<td>100 mins/week</td>
</tr>
<tr>
<td>10th week</td>
<td>Post-test 1</td>
<td>100 mins</td>
</tr>
<tr>
<td>11th week</td>
<td>Pre-test 2</td>
<td>100 mins</td>
</tr>
<tr>
<td>12th - 19th week</td>
<td>Flipped instruction</td>
<td>100 mins/week</td>
</tr>
<tr>
<td>20th week</td>
<td>Post-test 2</td>
<td>100 mins</td>
</tr>
<tr>
<td>21st week</td>
<td>TAM questionnaire</td>
<td>50 mins</td>
</tr>
<tr>
<td>22nd week</td>
<td>Focus-group interviews</td>
<td>50 mins</td>
</tr>
</tbody>
</table>

Fig. 5. Data collection procedure in the current study.

3.5. Qualitative data analysis

Focus-group interviews with protocols developed by the researchers were adopted to answer research question four concerning the participants’ overall perceptions of using LINE in the flipped instructional environment. The interviews, administered in Chinese, focused mainly on the perceptions of (1) the flipped instructional design as a whole (e.g., improvement in oral ability, boring, interesting, challenging, easy ...), and (2) the learning exercises (e.g., story writing and guided dialogue practice on LINE). The researchers analyzed the interview data for recurring themes, translating selected answers into English to be quoted in this paper.

4. Results and discussion

This study collected data from multiple sources, including the comparison between the pre- and post-tests for each treatment, the TAM questionnaire, and the focus-group interviews. The data revealed that the flipped oral instruction not only engaged the students more in the learning tasks but also enhanced the participants’ overall oral proficiency, compared to conventional instruction. While most of the hypotheses derived from Huang et al. (2012)
were confirmed when all of the participants were analyzed as a whole, a further probe into the differences between high achievers and low achievers yielded subtle variations between the groups. The participants, in their responses to the focus-group interviews, also expressed concern about the challenges they encountered. The findings are presented in accordance with the research questions.

**RQ1. How did the flipped instruction differ from the conventional instruction with respect to the participants’ English oral proficiency?**

Based on comparison of the pre- and the post-tests in the conventional and the flipped instructional treatments, descriptive statistics revealed that the average scores on the post-tests in both treatments were higher than those of the pre-tests, and that the average score of the flipped treatment (M = 72.76) was much higher than that of the conventional treatment (M = 56.14), as illustrated in Table 2.

The results of the Paired-Samples t-Test (see Table 3) also indicated that in both treatments, the participants scored significantly higher on the post-tests (p < 0.001) than on the pre-test. Moreover, the post-test of the flipped treatment was significantly higher than that of the conventional treatment. Consequently, although both treatments effectively enhanced the participants’ overall oral abilities, the flipped methodology particularly contributed to better learning outcomes than conventional instruction at a significant level (p < 0.001). Such results align with the findings of previous studies supporting the positive effect of flipped methodology on learning outcomes (Chen Hsieh et al., 2016; Davies, Dean, & Ball, 2013; Fulton, 2012; Sahin et al., 2015). Unlike the conventional treatment, in which class time was monopolized by the need to elaborate on the lower-order learning contents (the idioms and the reading passages), the flipped approach provided the participants with ample opportunities for higher-order conversational applications in engaging and collaborative learning contexts.

**RQ2. Which factor could best predict the participants’ behavioral intention of using LINE in a flipped oral training instruction? Were there any differences between high achievers and low achievers?**

The participants’ responses to the TAM questionnaire were analyzed to examine the construct relationship of TAM and the extent to which the participants accepted the use of LINE for flipped oral training. Relevant findings from the measurement model and the structural model are illustrated respectively.

### 4.1. Measurement model

The measurement model was estimated by using item loadings, convergent validity, reliability of measures, and discriminant validity. Specifically, each item was examined by using its loading which must exceed a standard minimum level of 0.6 (Stevens, 2002). The convergent validity was examined by using average variance extracted (AVE) which must exceed a standard minimum level of 0.5 (Hair, Black, Babin, Anderson, & Tatham, 2006). The reliability of measures was examined by using composite reliability and Cronbach’s alpha, in which the minimum value of the former is 0.7, and the minimum value of the latter is 0.6 (Hair et al., 2006). The discriminant validity was examined by also using the AVE, in which the square root of the AVE of each construct should be much larger than the correlation coefficients between this construct and the other constructs (Fornell & Larcker, 1981). Tables 4–6 indicate that the results delivered by the measurement model were significant and acceptable, since all the values met the required standards.

### 4.2. Structural model

The structural model was estimated by using path coefficients and R² values, in which the former was used to assess the statistical significance of the hypotheses, and the latter was used to assess the model’s ability to the variance in the dependent variables (Chin & Newsted, 1999). Fig. 7 shows the results of the seven path coefficients among the constructs of the research model, in which H2, H3, and H6 were rejected, while the others were confirmed, as illustrated in Table 7. Moreover, Fig. 6 also shows that the model explained 24% of the variation in perceived usefulness, 33% of the

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**Table 1**
The TAM questionnaire, English translation.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>System characteristics</td>
<td>(SC1) Using LINE provided English learning activities in a realistic environment.</td>
</tr>
<tr>
<td>(SC2) Using LINE provided a stimulating English learning environment.</td>
<td></td>
</tr>
<tr>
<td>(SC3) I was able to use LINE effectively to interact with the instructors and my peers to learn English.</td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>(PEU1) Learning to use LINE for my class activities was easy.</td>
</tr>
<tr>
<td>(PEU2) Using LINE did not require too much time.</td>
<td></td>
</tr>
<tr>
<td>(PEU3) Interacting with my instructors and peers via LINE was convenient/not stressful.</td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>(PU1) Learning through LINE improved my English ability.</td>
</tr>
<tr>
<td>(PU2) Learning through LINE enhanced my desire to use English idioms.</td>
<td></td>
</tr>
<tr>
<td>(PU3) Learning through LINE provided a beneficial outcome to this class.</td>
<td></td>
</tr>
<tr>
<td>Attitude toward use</td>
<td>(ATU1) I liked using LINE to learn English.</td>
</tr>
<tr>
<td>(ATU2) I feel that using LINE to learn English is a good idea.</td>
<td></td>
</tr>
<tr>
<td>(ATU3) I looked forward to using LINE in this class.</td>
<td></td>
</tr>
<tr>
<td>Behavioral intention</td>
<td>(B11) If I have access to LINE, I will continue to write in English, in addition to my own language.</td>
</tr>
<tr>
<td>(B12) If I have access to LINE, I will continue to use it to improve my English vocabulary.</td>
<td></td>
</tr>
<tr>
<td>(B13) If I have access to LINE, I will be happy to use the idioms I have learned.</td>
<td></td>
</tr>
</tbody>
</table>

---

**Fig. 6.** The research model.

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**Table 2**
Descriptive statistics of the pre-test and the post-test.

<table>
<thead>
<tr>
<th>Test</th>
<th>Treatment</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>Conventional</td>
<td>42</td>
<td>32.88</td>
<td>4.34</td>
</tr>
<tr>
<td></td>
<td>Flipped</td>
<td>42</td>
<td>38.48</td>
<td>4.21</td>
</tr>
<tr>
<td>Post-test</td>
<td>Conventional</td>
<td>42</td>
<td>56.14</td>
<td>10.91</td>
</tr>
<tr>
<td></td>
<td>Flipped</td>
<td>42</td>
<td>72.76</td>
<td>10.92</td>
</tr>
</tbody>
</table>
variation in attitude toward use, and 48% of the variation in behavioral intention.

Most of the participants agreed that LINE provided them with a stimulating English and realistic English learning environment. Such recognition contributed to their acceptance of LINE's usefulness in enhancing beneficial outcomes and learning motivation. This echoes the findings from previous studies that e-learning systems (in this study, the smartphone app LINE) provided the users with functionality, integrating various types of media formats and with anytime/anywhere access to course content and learning activities (Hassanzadeh, Kanaani, & Elahi, 2012; Kim, Trimi, Park, & Rhee, 2012; Pituch & Lee, 2006; Selim, 2003). What's equally important to the effectiveness of digital learning is the provision for interactivity. LINE in this study enabled the participants to interact with the instructors and their peers. Such interaction aligns with the statement by Palloff and Pratt (1999) that the “key to the learning process are the interactions among students themselves, the interactions between faculty and students, and the collaboration in learning that results from these interactions” (p. 5).

The smartphone app LINE influenced perceived ease of use due to its straightforward and user-friendly functions, designed for interpersonal communication, as evidenced by its high popularity with over 600 million users (Eun-ji, 2015). However, the low mean score of PEU1 “Using LINE did not require too much time” (see Table 8) suggested that in this study, LINE was considered a learning medium through which the participants were required to post verbal as well as written versions of their stories, peer feedback, and collaborative guided dialogues. With nearly a third of the participants ranking this item with “disagree” and “strongly disagree”, it is obvious that some of the learners in this study, the idea of using LINE as learning tool posed certain challenges because the tasks required a substantial amount of time to complete.

With regard to the relationship between perceived ease of use and perceived usefulness that examines an individual’s mental judgment about a particular system, previous research has demonstrated a positive and meaningful interrelationship among the two factors (Chen & Tseng, 2012; Park, 2009). However, such positive interrelationship was not found in the current study. A potential reason for lack of correlation lies in the fact that the participants in this study were already highly familiar with LINE and using it in their daily lives. When a certain type of technology has been utilized very frequently, its ease of use does not significantly affect how users perceive its usefulness, thus yielding a lack of existence of a positive user-performance relationship.

The structural model of this study also revealed that both perceived ease of use and perceived usefulness were significant in affecting the participants’ attitude about using LINE, aligning with the findings in Ke, Sun, and Yang (2012), Moon and Kim (2001), Read, Robertson, and McQuilken (2011), and Venkatesh (2000). With its advantages of being easy to use and being useful in

---

**Table 3**
Paired-Samples t-Test of the pre-test and the post-test.

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error Mean</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flipped: Post to Pre</td>
<td>34.29</td>
<td>8.53</td>
<td>1.32</td>
<td>31.63</td>
<td>36.94</td>
<td>26.04***</td>
</tr>
<tr>
<td>Conventional: Post to Pre</td>
<td>23.27</td>
<td>8.41</td>
<td>1.30</td>
<td>20.64</td>
<td>25.88</td>
<td>17.93***</td>
</tr>
<tr>
<td>Post (flipped) to Post (conventional)</td>
<td>16.62</td>
<td>0.62</td>
<td>0.09</td>
<td>16.42</td>
<td>16.81</td>
<td>172.93***</td>
</tr>
</tbody>
</table>

***p < 0.001.

**Table 4**
The item loadings of the measurement model.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Loading</th>
<th>Standard error</th>
<th>T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System characteristics</td>
<td>SP1</td>
<td>0.63</td>
<td>0.27</td>
<td>2.34</td>
</tr>
<tr>
<td></td>
<td>SP2</td>
<td>0.82</td>
<td>0.25</td>
<td>3.32</td>
</tr>
<tr>
<td></td>
<td>SP3</td>
<td>0.82</td>
<td>0.17</td>
<td>4.75</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>PEU1</td>
<td>0.80</td>
<td>0.13</td>
<td>6.10</td>
</tr>
<tr>
<td></td>
<td>PEU2</td>
<td>0.91</td>
<td>0.04</td>
<td>21.12</td>
</tr>
<tr>
<td></td>
<td>PEU3</td>
<td>0.87</td>
<td>0.07</td>
<td>12.54</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>PU1</td>
<td>0.84</td>
<td>0.10</td>
<td>8.33</td>
</tr>
<tr>
<td></td>
<td>PU2</td>
<td>0.85</td>
<td>0.09</td>
<td>9.38</td>
</tr>
<tr>
<td></td>
<td>PU3</td>
<td>0.83</td>
<td>0.09</td>
<td>9.53</td>
</tr>
<tr>
<td>Attitude toward use</td>
<td>AT1</td>
<td>0.87</td>
<td>0.07</td>
<td>12.39</td>
</tr>
<tr>
<td></td>
<td>AT2</td>
<td>0.91</td>
<td>0.03</td>
<td>33.90</td>
</tr>
<tr>
<td></td>
<td>AT3</td>
<td>0.93</td>
<td>0.02</td>
<td>42.67</td>
</tr>
<tr>
<td>Behavioral intention</td>
<td>BI1</td>
<td>0.85</td>
<td>0.09</td>
<td>9.37</td>
</tr>
<tr>
<td></td>
<td>BI2</td>
<td>0.93</td>
<td>0.06</td>
<td>15.03</td>
</tr>
<tr>
<td></td>
<td>BI3</td>
<td>0.79</td>
<td>0.08</td>
<td>10.15</td>
</tr>
</tbody>
</table>

**Table 5**
The convergent validity and reliability of measures of the measurement model.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Convergent validity</th>
<th>Reliability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AVE</td>
<td>Composite reliability</td>
<td>Cronbach’s alpha</td>
</tr>
<tr>
<td>System characteristics</td>
<td>0.58</td>
<td>0.80</td>
<td>0.66</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>0.75</td>
<td>0.90</td>
<td>0.83</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>0.71</td>
<td>0.88</td>
<td>0.79</td>
</tr>
<tr>
<td>Attitude toward use</td>
<td>0.82</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>Behavioral intention</td>
<td>0.73</td>
<td>0.89</td>
<td>0.82</td>
</tr>
</tbody>
</table>
contributing to beneficial outcomes perceived by the participants, they held positive attitudes about the integration of LINE in the flipped oral instruction.

While previous studies have shown a positive relationship between perceived usefulness and behavioral intention to use (Chen & Tseng, 2012; Cheng, Wang, Moormann, Olaniran, & Cheng, 2012; Liu, Li, & Carlsson, 2010; Sumak, Hericko, & Punik, 2011), perceived usefulness in this study did not significantly affect behavioral intention. One possible clue is that LINE was a convenient communication tool that all of the participants of this study frequently used on a daily basis. Therefore, such factor is not directly related to their behavioral intention to use mobile apps for learning, echoing the results by Park, Nam, and Cha (2011) that university students (the so-called M-generation) have convenient access to mobile devices to get necessary information.

The final trend observed in the structural model is the positive relationship between attitude toward use and behavioral intention to use. The participants held positive attitude about the use of LINE in the flipped instruction, their mental acceptance of such technology led to potential use of the given technology in future English learning, evidenced by their responses to the three items included in behavioral intention. It is rewarding that while the previous analysis on perceived ease of use yielded challenges the participants might encounter in posting required tasks in LINE, the participants, in response to behavioral intention, expressed their willingness to use the idioms in LINE interactions (M = 3.86).

Overall, the results of this study suggested a positive and strong relation between attitude and behavioral intention to use, in accord with the findings from previous studies such as Jahangir and Begum (2008), Park (2009), Read et al. (2011), and Wu and Marek (2016).

In order to have a deeper understanding of factors predicting the actual behavioral intention to use LINE among users of different proficiency levels, a further analysis was carried out to validate the structural models for the high-achieving and low-achieving students. The participants were divided based on their average score on the oral proficiency test in the conventional treatment. In this study, 20 students scoring higher than the given mean score were assigned to the high-achieving group, while the other 22 were assigned to the low-achieving category. Figs. 8 and 9 respectively demonstrate the results of the structural model for the two groups of students.

For high-achieving students (Fig. 8), system characteristics positively affected perceived usefulness; however neither predicted the other constructs. Among those remaining constructs, perceived ease of use positively affected attitude toward use, and attitude toward use positively affected behavioral intention to use LINE. System characteristics and perceived ease of use did not predict the remaining constructs.

These findings were different from some literature stating that...
lower achievers tend to place more emphasis on ease of use than higher achievers (Shen, Luo, & Sun, 2015). Yet, such results are in line with research indicating that proficiency level held little power to predict an individual’s perception about technology-based learning (Marks, Sibley, & Arbaugh, 2005; Parnell & Carracher, 2003). Wu and Marek (2016) used LINE and, although they did not separate participants into proficiency groups, found that perception of effectiveness of the instructional technology/curriculum design was a key predictor of future willingness to communicate in an international context.

One potential explanation for these findings is that low-proficiency students may simply be less motivated to learn. Such students tend to seek the best grade for the least effort, suggesting that they may favor the learning activities that they perceive to be most useful, i.e. most likely to boost their final grade. For such students, the user-friendliness and characteristics of the system may be less important than the potential to keep them from failing the class.

High-achieving students may have more confidence and self-efficacy, making their personal learning goals incremental improvement of their English ability through repeated use, as opposed to major advances needed to achieve minimum passing grades. Therefore, system characteristics and usefulness were not as important to them, making ease of use the better predictor of attitude and behavior.

**RQ3.** How did the students perceive the LINE-assisted flipped oral learning?

The participants’ overall perceptions about the flipped instruction and specifically the integration of LINE in the oral training course were collected via focus-group interviews with protocols developed by the researchers. The interview data were analyzed for recurring themes, focusing mainly on (1) their motivation, (2) the effectiveness of the flipped instructional design, and (3) the use of LINE to perform learning tasks.

### 4.3. Motivation

Most of the students in this study thought that flipped instruction was a beneficial alternative for English learning, in comparison with the conventional instruction that required a substantial amount of time for in-class lecturing, and enhanced their oral performance. One student responded that such instruction relieved her tension and helped her gain confidence in communicating with peers in English, because “I can listen to my own recording and take my partner’s recording for reference. I can practice as much as I want.” Another student noted that, “I think flipped learning boosts my motivation because it is new to me. Repeated preview of the contents at home in advance helps me to express myself better in class, because I know more in hand compared with traditional teaching styles.” Some students mentioned that they were more motivated during flipped learning, because they were able to use what they have learned beforehand in class discussions.

### 4.4. Effectiveness of the flipped instructional design

In most cases, the students thought that, compared with the conventional instruction, the flipped instruction enhanced their oral proficiency. One student described satisfaction with the overall flipped instructional design because it provided him with many chances to get engaged in activities requiring the application of the four skills in English. Some students highlighted the effectiveness of flipped learning (particularly the significance of ubiquitous learning) by saying that, “With my smartphone and the communication app, I can learn English at any place, any time.” One student expressed her personal thought by saying that, “It takes me more time to finish the tasks after attending the class. But it is very rewarding because the learning tasks help me prepare for deeper in-class learning.” However, a few students found the flipped instruction to be challenging, one saying that “I have experienced uncertainty throughout the course instruction. The activities used in class are very challenging.”

### 4.5. LINE for performing learning tasks

With regard to the use of LINE for performing learning tasks, the students’ responses varied. Some students stated that they preferred the ubiquitous learning inherent in the flipped instruction, noting “I can easily learn something at any place, any time.” A few students liked that they were given ample opportunities to practice English and redo assigned tasks, until they were satisfied with their final products. They also found the convenience and benefits of using LINE to give feedback, saying that “Giving feedback to my partner is very easy because it’s the way I do every day—talking to the phone. I’ve also found the feedback from the instructor and my partner very useful,” because the feedback was on “pronunciation as well as content.” Nevertheless, some students noted that they disliked the use of LINE for learning activities, expressing their position that LINE is an app for daily interpersonal communication rather than a tool for serious learning. One student also added that, “It’s okay to do the audio tasks. But it’s just not that easy to perform a written assignment.”

### 5. Conclusions

Because mobile learning seeks to provide students and teachers with equal participations for greater success (Shipee & Keengwee, 2014), the students’ perceptions of mobile learning are of immense significance in education (Ozdamli & Uzunboylu, 2015). This study employed TAM to investigate user perceptions of mobile learning and to analyze the quality factors affecting the behavioral intention of students to use LINE for English learning along with the effects of perceived ease of use and perceived usefulness. The most
notable findings of the this study revealed the learners’ improve-
ment in overall oral proficiency during flipped instruction, indi-
cated the learners’ positive perceptions about the flipped
instructional design, and confirmed the determinant role of atti-
dude about the use of LINE in English oral proficiency, thereby
predicting the behavioral intention of the learners to accept the
integration of LINE in flipped language learning.
Based on the findings and discussion of this study, the re-
searchers offer the following recommendations for practice:

1. Mobile-assisted flipped instruction with the use of smartphone
app LINE is an appropriate instructional design that can be
applied effectively in an EFL learning context. This instructional
approach successfully motivated the learners to become engaged
in learning activities, thus facilitating English teaching and
enhancing learning outcomes.

2. Because the study showed the direct impact of perceived ease of
use and perceived usefulness on attitudes concerning the use of
LINE and subsequent behavioral intention, more attention
should be directed to increasing the positive perceptions of
learners about the chosen technologies with particular focus on
ease of use and usefulness.

3. It is vital, regardless of student proficiency levels, to enhance the
students’ positive attitude with respect to the integration and
application of technologies which are commonly-used in the
field of language learning. Such technologies which are closely
related to their daily lives can act as an optimal incentive for
active and continuous learning.

6. Limitations of the study and suggestions for future research

The present study not only provided empirical evidence for the
acceptance of, and perceptions about, the use of LINE among EFL
learners of different proficiency levels, but also shed light on the
scenario of mobile-based flipped learning. Nonetheless, the current
study also has some limitations. Future researchers interested in
this topic should take note.

1. The sample size was limited to 42 sophomore English-majors
taking English Oral Training classes in central Taiwan. Findings
from a small sample size might not yield generalizability. Future
studies could interpret results from the perspective of the
“affordances” that a chosen treatment might have for learning
outcomes and perceptions. To enhance generalizability, more
participants could be recruited.

2. The current study focused on technological acceptance among
learners of different proficiency levels and targeted system
characteristics as the major external variable. Other variables
such as gender, age, experience, or the academic majors of
participants could also be examined to obtain an enhanced
understanding of multiple factors affecting the attitudes of
language learner and behavioral intention to use latest technol-
ologies in innovative instruction.

The researchers hope that the findings, conclusions, and rec-
ommendations of this study of attitude and behavioral intention to
use LINE in a flipped instructional setting pave the way for further
research and for effective integration as well as implementation of
innovative instructional designs in EFL learning contexts.

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