



International Journal of Learning Technology

ISSN online: 1741-8119 - ISSN print: 1477-8386

<https://www.inderscience.com/ijlt>

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DOI: [10.1504/IJLT.2023.10056587](https://doi.org/10.1504/IJLT.2023.10056587)

Article History:

Received:	05 March 2022
Last revised:	06 July 2022
Accepted:	18 July 2022
Published online:	06 June 2023

Implications of student satisfaction with flipped classroom design in a Taiwan university

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Abstract: The flipped classroom has gained widespread popularity as a form of blended learning. In this form, students engage in active learning in the classroom while completing their readings at home. The article presents the results of a longitudinal mixed-methods study on student satisfaction in a flipped classroom undergraduate course at a Taiwanese university. The purpose of this study was to examine student satisfaction over the course of seven years, and to explore implications that contribute to contemporary discourse for educators engaged with and committed to the flipped classroom model. A total of 390 freshmen took part in an 18-week flipped Foundation of Education course conducted in English. Student perceptions were generally positive, though a significant minority had some negative views. Accordingly, the design may not be appropriate for all learners. It is recommended that all components of the course be balanced using the TPACK model.

Keywords: flipped classroom design; Taiwan; EMI; TPACK.

Reference to this paper should be made as follows: Roberts, A. and Ching, G.S. (2023) 'Implications of student satisfaction with flipped classroom design in a Taiwan university', *Int. J. Learning Technology*, Vol. 18, No. 1, pp.28–43.

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This paper is a revised and expanded version of a paper entitled 'TPACK within a flipped learning course design: reflections from 5 years of implementation' presented at 2020/2021 Learning Technology for Education Challenges International Conference, Online, 19–22 July 2021.

1 Introduction

The urgency for higher education institutions to develop and expand student learning with evidence-based and needs-based data, has never been greater. As a call to action this is further deepened by the effects of COVID-19 and Generation Z student bodies – both of which demand contemporary online technology infused learning. Yet, contemporary notions of pedagogy extend far beyond integration of online tools for student use. A primary component of effective teaching and thus satisfaction with learning begins with student engagement as a critical link (Barkley, 2010; Coates, 2006). Contemporary approaches to technology infused teaching have become front and centre for university instructors and students across the globe. Educators are transforming the standard university level pedagogical approach – lecturing – with a toolbox of strategies, technology, and creativity that connects with and captures student satisfaction in ways inconceivable even a decade ago (Senske, 2017).

There is a growing area of research that focuses on adapting a flipped learning pedagogical approach as a way to improve student engagement and outcomes (Cheng et al., 2020). The flipped learning approach allows for greater learner autonomy and enhances the learning experience (Burak et al., 2017; McCabe et al., 2017). More importantly, the flipped learning approach is a form of blended learning instruction that enables students to become actively involved and engaged in class, allowing them to achieve greater learning success (Jeong et al., 2018).

While there is an extensive body of research surrounding the flipped design in the Taiwan higher education context, ample research focusing on student satisfaction is limited. An objective of this article is to report findings from a longitudinal mixed-methods study of student satisfaction with a required undergraduate foundation course taught in English using a flipped learning approach. This study had a dual purpose, to explore student satisfaction of the flipped classroom design over a seven-year period and craft implications that contribute to contemporary discourse for educators engaged with and committed to the flipped design. Beginning research questions included:

- 1 What are the effects of flipped classroom design on undergraduate students' course satisfaction?
- 2 What are the effects of flipped classroom instructional design interventions such as videos, class discussions, or course topics?

To begin, the theoretical framework of the study is defined using the technological pedagogical content knowledge (TPACK) model. Next, a description of the research leads into an outline of the methodological framework. Discussion of findings and recommendations inform contemporary discourses of the flipped design in higher education and the interplay among various forces associated with global, regional, national and local settings.

2 Flipped learning design

The *flipped classroom design* – is defined as a form of blended learning wherein students complete readings and videos at home and engage in active learning in classroom spaces. Overarching elements of the flipped design include efficient use of resources (Senske, 2017) and four essential pillars (Talbert, 2017; Baker, 2000; Lage et al., 2000) summarised as:

- 1 Student learning is channelled through various methods or platforms. Introduction of course content and other materials begin outside of the classroom.
- 2 Teacher-centred instruction is replaced with active student-centred learning.
- 3 Student engagement and learning is self-paced and unstructured.
- 4 The instructor role is defined as a facilitator who provides ongoing student feedback.

The flipped design also signifies use of technologies to experiment with digital initiatives across a course or curriculum.

The trend in flipped design is a worldwide phenomenon in higher education. The case of the Taiwan higher education system provides an illustration. Across this East Asia island nation, the flipped design is applauded and widely accepted as a technology-based alternative to traditional lecture-based instruction. Taiwan scholars suggest that flipped classroom designs have positive effects on teaching and learning (Ching, 2021; Hwang et al., 2019). Since its emergence in the 1990s, workshops, conferences, and online discussions surrounding the flipped design have drawn tens of thousands of practitioners in the Taiwan higher education system together (Chen, 2017; Lin and Ching, 2016).

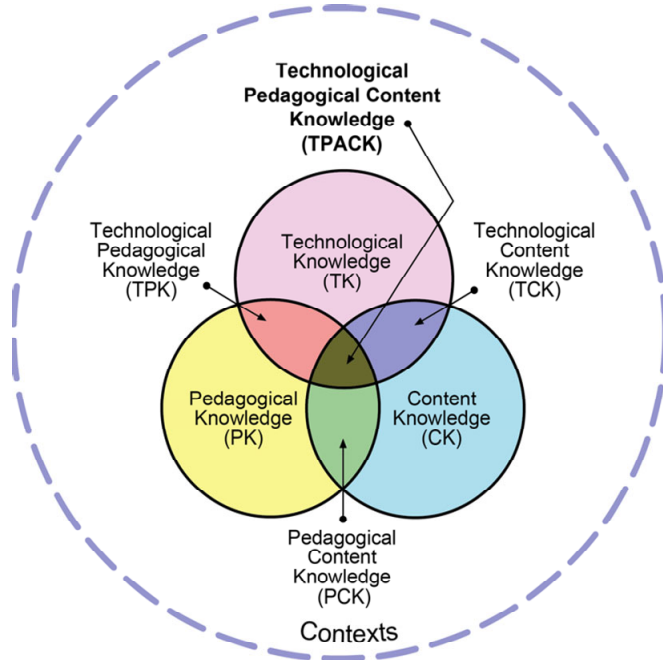
Studies in the Taiwan context and beyond, acknowledge the impact that the flipped pedagogical design has on courses (Mok, 2014). Some note that the degree to which students comprehend the link between completion of readings and videos at home and in-class activities within flipped learning is related to their academic performance (Hu and Hsu, 2018). Other scholars suggest that flipped course design helps students reduce anxiety about learning (Hsu, 2017). A series of studies in South Korea report that the culmination of pre-class, in-class, and post-class activities of the flipped design promote student satisfaction, self-motivated learning, information literacy, and critical thinking dispositions (Park et al., 2021) as well as improved writing skills (Chang, 2016).

3 Application of the TPACK model as a theoretical framework

In this study, the TPACK model was used as a theoretical framework to examine student satisfaction of the flipped course design. The TPACK model emphasises that teaching is

highly contextual and dependent on the ability to modify and create curricula using a framework of three overlapping components: content, pedagogy, and technology for specific student audiences, in this case, Taiwan university Generation Z students registered in a required English medium teacher education course. The TPACK framework is a model to guide educators toward the nature of knowledge needed for technology integration in individual courses and programs. The original intent of the model was to pair emerging technologies with professional development to support educators toward teaching with technology.

Figure 1 Technological pedagogical content knowledge (see online version for colours)



Source: From Mishra and Koehler (2006)

Figure 1 highlights the TPACK framework as three interrelated and overlapping components: content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK) (Mishra and Koehler, 2006). Technological knowledge (TK) represents established ways of knowing about and interacting with technology, tools, and resources, inclusive of understanding information technology broadly enough to apply it productively to benefit both professional and personal spheres. TK is dynamic because of the continuous technological advancements; educators must be able to recognise when technology can assist or impede the achievement of a goal and continually adapt to changes (Koehler and Mishra, 2009). PK represents educators’ in-depth understanding of instructional processes and methods of teaching and learning as outlined by institutional purposes, values and aims. This knowledge is highly contextual and differs from the PK commonly accepted among university instructors (Mishra and Koehler, 2006). Lastly, CK includes the subject matter knowledge or content of individual courses within defined programs of study. CK includes expertise of concepts, theories, ideas, and organisational

frameworks, as well as established teaching practices and approaches (Koehler and Mishra, 2009).

When the three components of knowledge are considered holistically, TPACK is conceptualised, highlighting overarching connections and interactions. Technological content knowledge (TCK) pertains to knowledge of how technology and content are connected, such as how a specific technological tool may impact the teaching of specific content. Technological pedagogical knowledge (TPK) relates technology and pedagogy – or how various technologies may be applied during specific aspects of the teaching and learning process. The overlap of these components represents the intersection of knowledge and potential for effective teaching with technology.

Many studies have benefited from the carefully designed TPACK approach. For instance, Poultsakis et al. (2021) noted that teacher training is critical to a successful classroom experience. This includes teacher training for the effective combination of technology, content and pedagogy (Kalogiannakis and Papadakis, 2007). Furthermore, even with the use of learning management systems, pedagogical design is equally important (Papadakis et al., 2018a, 2018b). In essence, the TPACK framework recognises that content, pedagogy, technology, and the contexts of the classroom play an influential role both individually and simultaneously. In order to achieve success in teaching, technology plays a crucial role in creating a dynamic equilibrium between all the components involved in the teaching process.

4 Method and research design

This study employed a mixed-methods longitudinal research design to investigate university student satisfaction of the flipped classroom design over a seven-year period (Cohen et al., 2007). Moreover, this study is designed as descriptive research, since the objective is to collect and describe the students' perceptions of flipped classroom design in the ensuing years (Creswell, 2009).

Datasets included a quantitative survey, qualitative interviews and written reflections. Participants included 390 Taiwan undergraduate freshmen students enrolled in an 18-week semester Foundation of Education flipped course that used English as the language of instruction. The course was a requirement for a College of Education Program in a private comprehensive university in northern Taiwan. Data were collected over a seven-year period, 2015 to 2021, each spring semester as outlined in Table 1.

The purpose of the study and strategies for data collection and analysis were explained to participants at the beginning of each spring semester. In addition, the researchers noted that they collected the data within an accepted educational environment and as part of normative educational practices which allowed the data to be applied as a learning tool. For the flipped course design, ten topics were chosen: the meaning of education, future skills, importance of grades, multiple intelligences, hierarchy of needs, social learning theory, the role of teachers today, responsibilities of students, diversity within school settings and study abroad. Assigned readings and topic related videos (carefully selected web resources and YouTube videos), and guiding questions were given to participants one week in advance of the scheduled class. Participants were required to complete assigned readings and videos with attention to the guiding questions. They were encouraged to take notes or record responses to the guiding questions in preparation of classroom discussions.

Table 1 Number of participants per school year

<i>Year</i>	<i>Number of participants</i>
2015	46
2016	56
2017	60
2018	53
2019	62
2020	56
2021	57
<i>Total</i>	390

A few moments were given to each participant during the class sessions to recall what the topic at hand was. In-class activities were designed to provide opportunities for cooperative learning and critical thinking. In-class activities such as: mind mapping, poster making, World Café discussions, brainstorming sessions, activities for self-discovery, team-building, movie criticism, and group report writing were used to promote interactions between classmates and the instructor.

A survey questionnaire assigned by the school was administered to all participants, and qualitative one-on-one interviews were conducted with randomly selected participants to examine how they felt about the flipped classroom design. Analysing the interview data, similar themes were grouped together according to the TPACK model. A coding scheme was employed to assign pseudonyms to interview participants. Identifiers for the students were masked by the information obtained in such a way that they could not be identified directly or indirectly. In order to collect additional qualitative data, all participants submitted written course reflections at the conclusion of each semester. Participants were instructed to submit a minimum of one paragraph and a maximum of one page.

Data analysis included calculating the average and percentage of the course satisfaction and learning perception. It should be noted that the survey data were designed and collected by the university, raw data were not available. Therefore, limited statistical analysis was performed. Individual semi-structured interviews were analysed, categorised, and repeated themes were noted using the instructor's reflection logs (Miles and Huberman, 1994). In addition, Voyant tools were used to analyse student course reflections for trends and relationships (Sinclair and Rockwell, 2021). A visual representation of the data was deliberately chosen to understand interpretations (Spaska et al., 2021; Spellacy et al., 2021). The words most commonly used by students were displayed as tag clouds in descending order of frequency (indicated by text size) (Cleary et al., 2017). Additionally, bubble lines and word trends were used to visualise the frequency and distribution of the most popular keywords (Given and Willson, 2018). Finally, close neighbourhood links between the main keywords are displayed to visually represent relationships (Inversini, 2017; Hendrigan, 2019).

5 Results and discussion

5.1 Participants' attitudes towards the flipped learning design over a seven-year span

The results of the survey data were divided into two parts: attitudes towards the course and satisfaction with the course. Table 2 shows the results of participants' attitudes towards the course over a seven-year period. This part of the survey was completed at the end of the course; participants were asked to reflect on the entire 18-week semester. For example, the attitude *actively participates in classroom activities* at an average of 70.54%; this means that historically, students are actively participating in classroom activities 70% of the time, or approximately 13 of the 18 weeks. This result is promising as the students can be considered very interested in the classroom activities.

Table 2 Students' attitudes towards the course for the past seven years

<i>Attitudes</i>	2015	2016	2017	2018	2019	2020	2021	<i>Ave.</i>
Comes to class prepared	25.40	14.81	20.69	27.27	13.46	8.16	16.67	18.07
Comes to class on time	71.43	74.07	72.41	68.18	65.38	57.14	68.75	68.19
Listen attentively during class	74.60	64.81	55.17	68.18	63.46	46.94	58.33	61.64
Actively joins classroom activities	87.30	75.93	68.97	75.00	73.08	51.02	62.50	70.54
Accomplish assigned task on time	57.14	64.81	55.10	45.45	59.62	75.51	47.92	57.94

Table 2 also shows that 68.19%, or 12 out of 18 weeks, of participants showed up to class on time, 61.64%, or 11 out of 18 weeks, listened carefully during class, and 57.94%, or 10 out of 18 weeks, the assigned task on time to complete the 18 weeks. These results are very positive and show that the participants are really motivated during the class activities. In terms of attitude, coming to class well prepared, students reported that they were not adequately prepared for class 18.07% or 3 of the 18 weeks. This means students were not able to read the pre-class readings or watch the assigned videos. The same is true for assigned readings. An overarching theme of participant interviews was that the language of instruction (English) used in the assigned readings or topic videos created a barrier for completion:

- “While I do have the time to watch the videos, the problem is that each time I encounter a new vocabulary word, I have to stop the video ...” SY2016 #2
- “There were many important points in the reading, including some new words that I had to look up in the dictionary... The problem is that sometimes the readings are too long, and there are many new words ...” SY2017 #5
- I appreciate that I can use subtitles and automatic translation when watching the video, however, sometimes I think the translation is incorrect ... anyway, I will wait and ask my classmates during class since they know a lot about the video ...” SY2019 #4

These scenarios suggest that participants do not have difficulty accessing the pre-class tasks or finding time to complete them, but rather are having trouble with English as the language of instruction. To remedy this situation, students were often given ample time prior to the start of class to ask questions about the assigned readings. In some cases, they

were given extra time to watch some significant portions of the videos again, but this defeats the purpose of flipped learning. As a result, the assigned readings, and videos each semester are determined by the English language proficiency of the students in each class.

5.2 Students' satisfaction towards the flipped learning design over a seven-year span

Table 3 shows participants' perceived satisfaction and agreement with the flipped learning design. Results indicate that participants rated quite high satisfaction and agreement during the 2021 semester, wherein the COVID-19 pandemic was at its peak in Taiwan. In general, students are quite satisfied with all of the average ratings around 3.89 (within a five-point Likert type scale, 5 being the highest). Also note that within the years, students rated the *selection of the course topics* as among the highest item, while also commending the design of the activities:

- "... the activities are very fun and interesting; topics are easy to relate ..."
SY2015 #2
- "What I like the most are the activities ... the group discussions and the way we present our ideas ..." SY2018 #1

Table 3 Students' satisfaction and agreement towards the course for the past seven years

<i>Satisfaction and agreement</i>	2015	2016	2017	2018	2019	2020	2021	Ave.
Enhance learner's interest	3.94	3.81	3.95	3.93	3.87	3.49	4.06	3.86
Teacher's teaching methods	4.10	3.85	3.91	3.95	3.85	3.53	4.10	3.90
Selection of the course topics	4.16	3.96	3.90	4.00	3.88	3.59	4.08	3.94
Promotes learning	4.08	3.76	3.90	3.95	3.75	3.59	4.02	3.86
Design of the classroom activities	4.03	3.74	3.84	3.98	3.87	3.49	4.00	3.85
Overall flipped learning design	4.10	3.83	3.86	3.98	3.85	3.55	4.13	3.90

5.3 Using TPACK as a basis of analysis

The result of the qualitative analysis shows that the students' interest in the lesson topics varied widely, with some students typically mentioning specific topics with which they were familiar or with which they could identify more easily, for instance: *are grades important, study abroad* and *future skills*:

- "It is the topic of studying abroad that I find to be the most interesting part of the lessons. Considering that I am planning to participate in our school's exchange program, I was wondering if you could tell me more about it..." SY2018 #2
- "I really enjoyed our discussion about the skills needed to achieve success ... I think that I learned a lot from the conversation..." SY2016 #2

Additionally, participants indicated that alongside the themed lessons, they learned how to collaborate (and learn) with others and had the opportunity to practice critical thinking:

- “What I learn from this course is that collaborating with others is an important skill... the topics are interesting, but what is most important are the activities ...” SY2016 #1
- “It is due to our group discussions that we are able to think outside the box, go beyond what is written in the lesson. I also think the guide questions provide valuable information. ...” SY2019 #2

5.3.1 *Pedagogical knowledge*

Participants were asked to share how they felt about the teaching and learning process. The majority of the participants mentioned that the different group activities make learning easier, while they are also able to organise what they have learned using posters and mind maps (concept maps):

- “My favorite aspect of learning with these activities is that I can discuss the lesson with my classmates and hear their opinions about the lesson as well ...” SY2016 #2
- “As for me, I enjoy participating in group activities, where students generate ideas, share ideas, and make plans for how to proceed with an assigned task. Making posters is something I enjoy ...” SY2017 #3

5.3.2 *Technological knowledge (TK) and TCK*

Participants were asked how they felt about the assigned readings and videos. In general, participants commented that YouTube videos were useful. This is because there is a subtitle feature which makes learning (understanding) the material easier. Nonetheless, many participants ask whether the assigned readings can be made available in Chinese:

- “I can watch the videos at any time and again, since they are easily accessible ...” SY2018 #2
- “Although I have the ability to use the subtitle function, I still have to pause the video to translate ... it is good that the assigned readings and the videos are related. This makes it easier to understand the subject matter of the lesson. ...” SY2015 #2

5.3.3 *Technological pedagogical content knowledge*

During the flipped learning course, participants were asked to suggest changes to the overall design of the course. Based on the results, most participants were quite satisfied with the course design:

- “This course is fun; its activities also inspire me ... I am able to engage with my classmates in a positive way as a result of this course ...” SY2015 #2

In addition, participants noted that the overall design of the course was *able to promote and motivate learning*.

Figure 3 Graphical representation of the frequency of occurrence for the main keywords (see online version for colours)

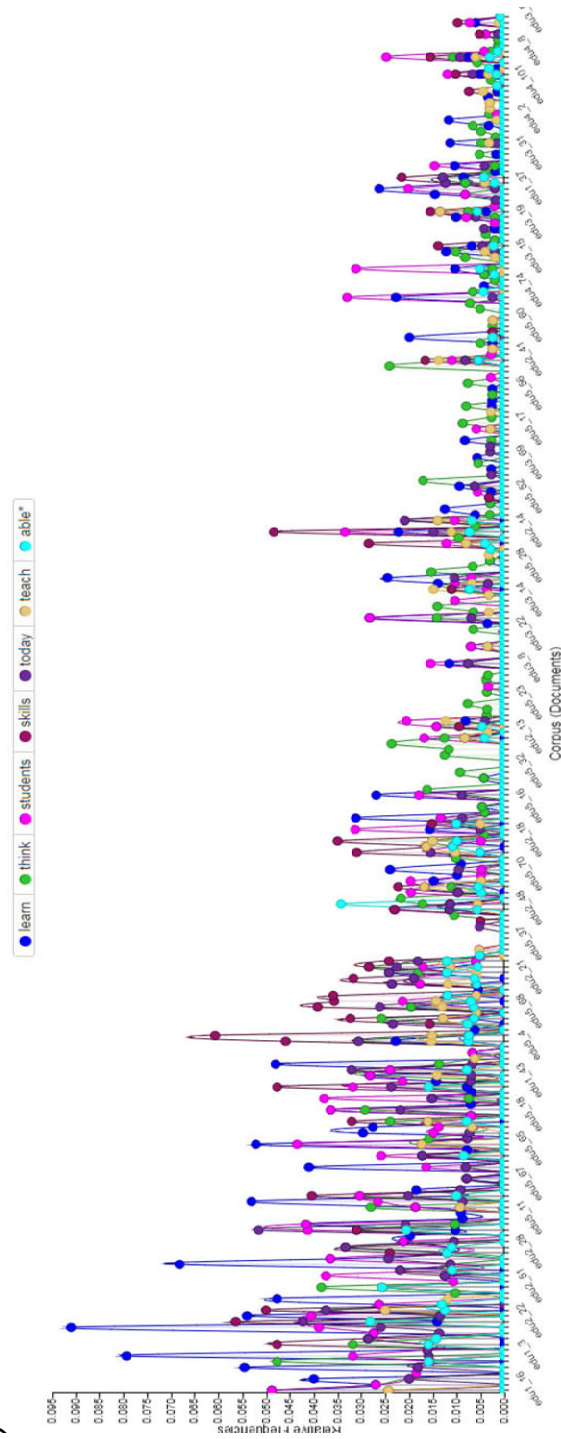
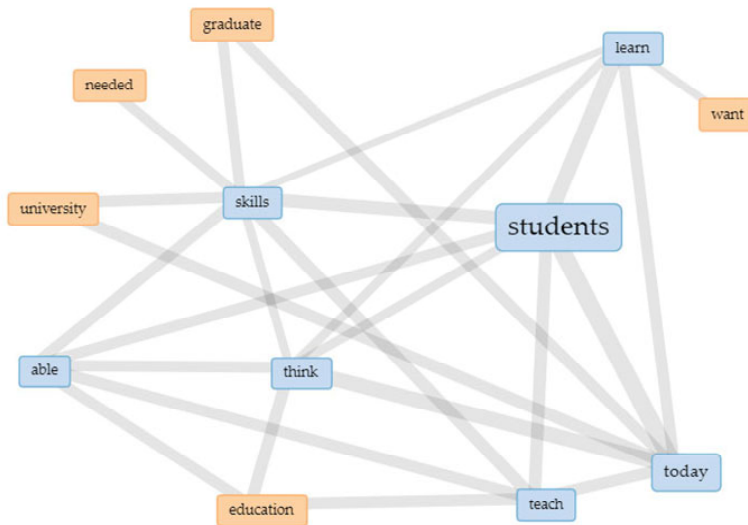


Figure 4 Interrelationships and extended links among the core keywords (see online version for colours)



6 Implications and conclusions

The first research question examines the effects of flipped classroom learning on undergraduate students' course satisfaction. This study provides several implications for understanding student satisfaction with the flipped design. Results suggest positive student satisfaction of their required course with a flipped design. Participant perceptions of the flipped design were generally encouraging over the span of seven years but with a significant minority having some negative views. However, despite the fact that perceptions of flipped learning differ from year to year, the fast-changing nature of students' learning styles may be responsible for this fluctuating perceptions (Ivana, 2018; Szymkowiak et al., 2021; Thomas et al., 2019). This indicates that the flipped design may not be applicable to all learners and may fluctuate in response to current events on local, national, or global levels.

For example, it has been established that the COVID-19 pandemic disrupted student satisfaction and motivation for learning on various levels beginning early 2020. Evidence of this is noted in Table 2. The seven-year average for *comes to class prepared* was 18.7% but during the early months of the pandemic (semester 2020), it was 8.16%, less than half of the seven-year average. In contrast in Table 2 attitude, *accomplish assigned task on time* was, over a seven-year period, significantly higher during the 2020 semester. In this case, it appears that students were staying away from class and inevitably had more time to complete tasks in an online format. Given this trend, the instructor should lean into these changes with increased emphasis of the online course components. A recommendation for instructors using the flipped design is to continually rethink practice as a dynamic process and to recognise that there are no standard templates for success.

The second research question, *what are the effects of flipped classroom instructional design interventions such as videos, class discussions, or course topics*, calls attention to

the risk that flipped classroom curriculum approaches may wane without pedagogical understanding of how to effectively translate the flipped design into practice. For example, participants reported that they were less likely to engage or complete pre-class reading and videos because of a lack of foundation for English vocabulary words embedded in the readings and videos. These participants needed instruction to acquire new word knowledge and develop strategies to increase the depth of that knowledge over time. The flipped design provides the potential to promote language, meaning students' active role in the learning process to increase autonomy while reading and watching videos independently. In this case, instructors should have knowledge of the flipped design, side by side understanding for the needs of Taiwan EFL students in English vocabulary.

Instructors must first recognise the obstacles, and then develop teaching practices to address those obstacles. The TPACK model provides a framework to explore options. The end point being that there needs to be a balance between preparatory activities and engagement in classroom settings. A lack of engagement with the reading and video preparatory activities could result in variability of student preparedness, adding another level to the learning challenges of freshmen students.

The findings also provide insights for policymakers or higher education institutions. Implications suggest that the TPACK framework provides guidance to investigate instruction that intertwines technology, pedagogy, and CK to optimise and transform flipped classroom teaching and learning. Understanding the practicalities of how to transform or design the flipped design with specific topics or units of study in an existing course, or as the foundation for an entire course is a viable starting point. Ultimately, the burden falls on the educators and administrators to recognise the challenge to formalise structures and activities that promote a deep level of learning, satisfaction, and engagement with the flipped design.

This study is not without limitations. The sample was based on university students in a humanities course and therefore does not represent the entire population of university students in other areas of humanities nor the social and natural sciences. In addition, the survey questionnaire was designed and administered by the university, raw data was not provided to the researcher for privacy reasons. Therefore, the statistical methods used were quite limited. Future studies are suggested to obtain more samples that are representative of the natural and social sciences. Moreover, further research is needed with cohorts utilising flipped approaches compared with traditional teaching methods.

6.1 Conclusions

This study contributes to the scholarship of learning and teaching and engages discourses surrounding educational delivery approaches. The overarching implication is that flipped classrooms are worth implementing. Highlights of the recommendations showcase the various intersections between the content, pedagogy, and technology used within a flipped classroom design. Using the TPACK as a framework for analysis, various exemplars of good practice were provided. In sum, careful attention should be paid, to the design of the flipped classroom to support teaching-learning processes, the students as the core of the system, and the instructors who cultivate critical and independent thought in their students, as well as build the capacity for lifelong learning and thus preparation for future endeavours.

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