

Flipped classroom in ESP teaching and learning: An Activity Theory perspective

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Abstract

The flipped classroom as an instructional approach has gained increasing attention in English language teaching and learning, including English for Specific Purposes (ESP). Effective flipped instruction in ESP settings requires a proper technological pedagogical content knowledge (TPCK) for teachers as well as a deep understanding of attributes of ESP learners. This article examined a cohort of Chinese university students' experiences of learning News English (an ESP-oriented course) through pre-class micro-lesson videos as part of a flipped classroom. The data included task sheets accompanying the micro-lesson videos prepared by the teachers as well as interviews with the students about their learning experiences, think-aloud sessions and learning diaries. Adopting an Activity Theory perspective, we were able to identify notable differences between the teacher-designed pre-class activity system and the activity system actually experienced by the students. The study also demonstrated the complicating effect of students' critical thinking disposition on the dynamics of their micro-lesson learning. The findings are discussed in relation to ESP teacher development, in particular regarding the development of TPCK for effective design and delivery of flipped instruction in ESP settings.

Keywords: Activity Theory, flipped classroom, critical thinking disposition, ESP teacher development, technological pedagogical content knowledge.

Resumen

Aula invertida en la enseñanza y el aprendizaje de Inglés para Fines Específicos: una perspectiva desde la teoría de la actividad

El aula invertida como enfoque de instrucción está ganando cada vez más atención en la enseñanza y el aprendizaje del inglés, incluyendo el Inglés para Fines Específicos (*English for Specific Purposes*. ESP). Para una efectiva instrucción

invertida en un contexto de ESP se requieren conocimientos técnicos pedagógicos del contenido para profesores y una comprensión avanzada de las características de los alumnos de ESP. Este artículo examina la experiencia de un grupo de universitarios chinos que aprenden inglés informativo (en un curso orientado a ESP) a través de vídeos de microlecciones previas a la clase como parte de un aula invertida. Los datos incluyen ejercicios que acompañan a los videos de microlecciones preparados por los profesores, entrevistas con los estudiantes acerca de su aprendizaje, sesiones de pensamiento en voz alta y diarios de aprendizaje. Desde una perspectiva de la Teoría de la Actividad, hemos podido identificar diferencias considerables entre las actividades diseñadas por los profesores previas a la clase y las actividades experimentadas por los estudiantes. El estudio también demuestra las dificultades del pensamiento crítico por parte de los estudiantes durante su aprendizaje con las microlecciones. Los resultados se discuten a la luz del desarrollo de los profesores de ESP, haciendo hincapié en el desarrollo de sus competencias de conocimientos técnicos pedagógicos del contenido para el diseño y la instrucción invertida efectiva en contextos de ESP.

Palabras clave: Teoría de la Actividad, aula invertida, disposición de pensamiento crítico, desarrollo docente en ESP, conocimientos técnicos pedagógicos del contenido.

1. Introduction

The flipped classroom commonly involves a breakdown of teaching and learning into two phases, that is, an out-of-class phase and an in-class phase (Persky & McLaughlin, 2017). In the out-of-class phase, teachers provide content typically via videos on online platforms for students who learn the content in their own time prior to or post the in-class phase. The in-class phase is focused on collaborative group or pair work. This innovative approach in education has been applied across disciplines and stages of education to positive effects (e.g., Das et al., 2019; Gouia & Gunn, 2016; Persky & McLaughlin, 2017). It has also gained popularity in English as a foreign language (EFL) teaching. A recent literature search in the databases EBSCO, ProQuest and Scopus with the search words “flipped classroom” and “English as foreign language” in “Abstract” returned 20, 26 and 19 results respectively. These studies suggest that flipped classroom is effective in the teaching and learning of listening, speaking, reading and writing macro-skills (e.g., Abdullah et al., 2020; Al-Naabi, 2020; Chang & Lin, 2019; Hung, 2017; Öztürk & Çakiroğlu, 2021).

The potential of the flipped classroom in English for Specific Purposes (ESP) teaching and learning, especially in non-English speaking countries, is a worthy but under-researched topic as our database search only yielded less than 30 studies on flipped ESP classrooms. As ESP concerns the nexus between subject knowledge and the English language (Paltridge & Starfield, 2013; Zhang & Wang, 2011), having students learn the relevant subject knowledge in the out-of-class phase can save teachers from having to explain such content in detail and enable them to use in-class time for focal language learning and practice. Given that the flipped classroom puts the onus of learning on the ESP teacher and students, its success relies on teachers possessing a proper knowledge of the content, pedagogy and technology involved in their teaching setting. While the concept technological pedagogical content knowledge (TPCK) (Mishra & Koehler, 2006) provides an integrative way of looking into the three components of teacher knowledge, its application in ESP settings has been little documented (e.g., Basturkmen, 2015, 2021). A recent study of teaching Business English to undergraduate students in the Gulf Region (Nickerson, 2018) demonstrates the power of treating content, pedagogy and technology in an integrative way in ESP education. Learner factors are also indispensable for research in ESP teaching and learning. Although research has attended to individual learning styles, dispositions, personal goals and identities (e.g., Belcher & Lukkarila, 2011; Dudley-Evans & St John, 1998; Hutchinson & Waters, 1987; Zhang, 2017), there is still a need to investigate learner attributes including the critical thinking disposition, in particular its role in flipped ESP classrooms, as the critical thinking disposition has been found to differentiate learner behaviour and learning outcomes (Liu et al., 2016; Stupnisky et al., 2008).

This article explores ESP teachers' TPCK and the impact of students' critical thinking disposition in flipped ESP classrooms by examining the teaching and learning of News English in a flipped classroom at a Chinese university. In the News English course, students were taught about news in English and practised English language skills (News English Course Team, 2021). We focused on the teaching and learning in the out-class phase through micro-lessons (i.e., pre-recorded short lecture-style videos dealing with key concepts or features of English news prepared by teachers and assigned to students to learn prior to class). We found Activity Theory (Engeström, 1999) highly relevant to the purpose of our study. Flipped learning is complex, as the three moderators (instructional design, educational context

and techniques for assessment of learning outcomes) all account for student achievements (Shahnama et al., 2021). Through the lens of Activity Theory, we expect to provide a systemic description of the dynamic processes of designing and learning in the flipped News English course. Our insights will assist ESP teachers to develop a critical awareness of TPCK by factoring in the affordances and constraints of technology, learner attributes and subject matter in designing and implementing flipped ESP classrooms.

2. Literature review

2.1. The flipped classroom through micro-lessons and News English teaching and learning

Flipped instruction has received considerable research attention. For example, Crompton et al. (2017) developed a flipped classroom framework including pre- and post-class activity design and classroom organisation. Öztürk and Çakıroğlu's (2021) model for the flipped classroom featured student self-regulated learning strategies to keep them active in class. Hung (2017) included clickers in question-and-answer activities to gamify classroom dynamics. Abdullah et al. (2020) found that flipped classroom considerably reduced student anxiety in English speaking performance. Hsiao et al. (2021) showed that undergraduate students on an English for tourism course experienced deeper learning and higher self-efficacy in the flipped classroom than in the traditional classroom.

Studies of the pre-class aspect of flipped instruction are of particular relevance to our article. While videos are preferred by most teachers and students as out-of-class learning material (Herreid & Schiller, 2013; Long et al., 2016), their impact on student learning is unclear. According to Das et al. (2019), pre-class videos had a positive influence on student learning. Delozier and Rhodes (2017) and Long et al. (2016), however, found that video lectures themselves did not affect learning among university students from different disciplines and class levels. Yilmaz and Baydas (2017) showed that using metacognitive strategies can predict 80% of students' learning performance, testifying to the importance of metacognitive strategies in pre-class asynchronous activities in flipped instruction. These observations resonate with research in the field of EFL teaching and learning using flipped classroom (e.g., Chen et al., 2017; Ghufroon & Nurdianingsih, 2020; Karimi & Hamzavi, 2017; Liu et al., 2019; Mehring, 2016; Wu et al., 2017). There is therefore the

need to carefully consider the material provided to students in the out-of-class phase and account for learner factors when researching flipped instruction. Liang and Yu's (2018) study of blended learning in a News English course provides some useful clues. Their integrated approach involving online teaching and learning through micro-lessons and face-to-face classes was well received by their students. What is missing in their study, though, is information on how the students experienced the dynamics of learning through the mediation of micro-lessons in their News English course.

2.2. Activity Theory and TPACK for flipped classroom

Activity Theory is built on Vygotsky's pioneering work that foregrounds the social nature of human behaviour (Engeström, 1999; Leont'ev, 1981). Human behaviour or social practice may be analysed at three levels: Activity, action or operation (Leont'ev, 1981). Any activity is jointly performed by social actors to achieve social ends through socio-historically developed tools. Behaviour that is automatically performed as a means to the end is called an operation. Where conscious efforts are involved in goal-directed behaviour, it is analysed as an action. In the more recent model of Activity Theory or third-generation Activity Theory (Engeström, 1999, 2001), the complexity of activity is represented as Activity System encompassing six inter-related elements: The Subject, who performs the activity; the Object, which is the purpose of the activity responsible for the Outcomes of the activity; the Tool, which is used to facilitate or enable the activity; the Rules, which allow or prohibit certain actions or operations; the Community, which the Subject is involved in; and the Division of Labour among the Subject and the Community in eventuating the activity. Activity Theory has been applied in analysing technology-mediated learning processes (e.g., Benson et al., 2008; Lee et al., 2021). For example, Lee et al.'s (2021) study of university students learning chemistry through mobile technology from the perspective of Activity Theory was able to take account of the interactions among students, technological devices and emerging learning processes. As the six elements in the Activity System capture the participants, their actions as well as the various layers of the sociocultural environment associated with the relevant activity, they are highly pertinent to a systemic exploration of teaching and learning in flipped classrooms.

The insights from the Activity System perspective will be useful for understanding the TPACK that ESP teachers would need to handle the

complexity in flipped instruction. According to Mishra and Koehler (2006), TPCK requires five dimensions of understanding and knowledge, including ways of representing concepts through technologies, instructional techniques for constructively using technologies to teach content, the use of technologies to facilitate the learning of difficult concepts, students' prior learning and beliefs and approaches, and the use of technologies to consolidate or extend knowledge and approaches to learning. Therefore, TPCK captures the integration of subject content, pedagogy and technology which is essential to effective ESP teaching and learning (Bloch, 2013; Sevilla-Pavón & Haba Osca, 2017).

2.3. Learner factors in ESP and critical thinking dispositions

While learner factors in terms of subjective needs, learning styles and identity are widely acknowledged in ESP research (e.g., Belcher & Lukkarila, 2011; Dudley-Evans & St John, 1998; Zhang, 2017), the critical thinking disposition has been under-researched. The critical thinking disposition is a concept developed by Facione (1990) for describing one's affective disposition or mental attributes such as being inquisitive and keen on reasoning and seeking for reliable information. A student's critical thinking disposition can be measured through the California Critical Thinking Disposition Inventory (CCTDI), which can distinguish students with a positive critical thinking disposition from students with a negative critical thinking disposition (Facione & Facione, 1992). For example, positive critical thinking disposition students tend to have strong intellectual curiosity and are well organised, orderly, focused and diligent in inquiry, while negative critical thinking disposition students are likely to have no interest in seeking the truth and flinch when encountering difficulties or uncertainty. The CCTDI has been adapted to the Chinese context by Wen et al. (2011) and used in a number of studies, including studies on the impact of critical thinking disposition on learning in flipped classrooms (Liu, 2016). Micro-lessons as a technology-mediated pedagogical tool may appeal differently to students of positive and negative critical thinking dispositions, hence the relevance of factoring in this learner attribute in the study of flipped instruction in the News English course.

3. Material and methods

3.1. Data

The data for the study were collected from the teachers and students taking a News English course at one of China’s top universities in the north-western region of the country (Top West University as pseudonym). The course included five micro-lessons dealing with the topics of news and newspapers, grammatical features of news headlines, lexical features of news headlines, news lead and the structure of news reports respectively. Students were instructed to study these micro-lessons before attending the subsequent two-hour face-to-face classes. The data for this article were collected from the 2019 News English course. The teachers were requested to provide their teaching materials, which include hard copies of their course syllabus, task checklist for learning the micro-lessons and lesson plans for face-to-face teaching in addition to video recordings of their micro-lessons. At the beginning of the course, all the 222 News English students taught by the first two authors took the Critical Thinking Disposition Test (Wen et al., 2011). The top 15 students who had achieved the highest scores qualifying them on the positive criterion (Wen, 2012) and the bottom 15 students with the lowest scores satisfying the irresolution criterion were invited, and all agreed, to participate in this study and will be referred to as HCTD students and LCTD students respectively. These students were asked to keep and submit journals recording their experiences of learning the micro-lessons, undertake a think-aloud session for the second micro-lesson (grammatical features of news headlines), and participate in semi-structured interviews upon completion of the course. There was no required format for the journals and the students recorded their experiences in their own time. Three of each student’s journals that best represent their experience of learning the micro-lessons were selected for inclusion in the data set. The research was conducted under the approval of their Faculty. The data set is summarised in Table 1.

Data sources	Data types		
Teacher participants	Video recordings of 5 micro-lessons	Course syllabus, task checklists for micro-lesson learning	Lesson plans for face-to-face teaching
Student participants	1 think-aloud protocol of learning the micro-lesson on grammatical features of English news headlines	3 journals recording learning of the micro-lessons	Post-course individual interview on learning the micro-lessons

Table 1. Data set.

3.2. Data processing

The Activity System (Engeström, 1999, 2001) consists of the Subject (teacher, student) teaching or learning News English (Object) to achieve the learning outcomes of the course (Outcome). The teaching and learning are mediated by the course syllabus, textbook, micro-lessons and task sheets (Mediating Tools), and are undertaken by following rules including the time frame for completing the learning tasks (Rules). The student, their peers, the teachers and the university support staff together form the Community, where each stakeholder takes on different roles in the teaching and learning process (Division of Labour). The link between the Object and the Outcome is a process of lived experiences (Learning Process) which can be analysed as operations and actions. This conceptualisation of the micro-lesson for the News English course provided the initial scheme for coding the data set.

Several measures were taken to ensure a high interrater reliability in the coding and analysis of the data. The teacher data were initially coded by the corresponding author as a teacher-designed Activity System including the six system elements. The initial coding and analysis were shared with the first two authors who were experienced members of the News English teaching team. While these two authors asked for clarifications of certain coding or categorisation in the initial coding and analysis, they agreed that the analysis generally reflected their experiences of teaching the News English course, including the micro-lessons. Any different coding and analysis were discussed among the three authors until they eventually agreed on the coding and analysis. The student data were processed in a similar fashion. The corresponding author selected the think-aloud protocol, interview transcript and journals of one student for initial coding and analysis, which resulted in a provisional coding scheme. This coding scheme was shared with the other two authors, who then trialled the coding scheme in analysing the data of three HCTD students and three LCTD students by using NVivo 12. Subsequently, the three authors discussed and finalised the coding scheme by removing or consolidating codes and categories. By using this coding scheme, the first two authors coded all the student data independently, reaching a consistency rate of 76%. These two authors discussed all their discrepant coding and analysis of the data by referring to the coding scheme and in the case of several tricky pieces of data, inviting a third opinion from the corresponding author. Through this collaborative process, they reached a consensus on coding and analysis. The findings of the study are reported in Section 4 (see Tables 5, 6, 7, 8 and 9 for detail).

A distinction was made between action and operation in the data coding and analysis. An action is an instance of purposeful behaviour that requires conscious efforts while an operation is reported (by the student or teacher) or interpreted (by the authors) as an automatic act. Table 2 presents some examples of coding actions and operations. The actions and operations proved helpful in discussing the teacher-designed and the student-experienced Activity Systems.

Codes	Criteria for coding	Data
Operation	Act being automatic or requiring no clear conscious effort	H3: Pause for a while. (from Think-aloud) H5: Pause when necessary. (from Student journal)
Action	Act being purposeful and requiring clear effort	L54: I took out the news I had read before and re-read the headline. (from Student journal) L57: replay when I couldn't understand or when I had questions. (from Interview) H6: I need to pause here to look at the headline again. (from Think-aloud)

Note: H=HTCD student, L= LCTD student, 3/5/54/57/6 indicating individual students (same henceforward).

Table 2. Coding actions and operations.

4. Findings

One major finding from the analysis is that the Chinese university students experienced the micro-lessons as a notably different Activity System from their teacher’s original design (see Tables 3, 4, 5 and 6). Another major finding relates to the HCTD and LCTD students’ experiences of the teacher-designed Activity System. The HTCD students approximated to the teacher-designed Activity System to a greater extent than the LCTD students. These findings are detailed in this section and discussed in the next with reference to ESP teachers’ TPCK and the importance of learner factors in flipped instruction.

4.1. Major differences between teacher-designed and student-experienced Activity Systems

The analysis of the data from the News English teachers, including the course syllabus, task checklists for micro-lessons and lesson plans for face-to-face teaching, made visible the six elements of the Activity System designed by the teachers. The second micro-lesson on grammatical features

of news headlines is selected to illustrate the teacher-designed Activity System.

The seven-minute micro-lesson was delivered in such a way that each grammatical feature was first introduced through an example news headline and then explicitly stated by the teacher, before the next grammatical feature was introduced in the same sequence as for the first grammatical feature. There were two stated Outcomes in the task checklist provided to the students for learning this micro-lesson: 1) learning the five grammatical features of English news headlines, including the use of the present tense for past events, past participle form for passive voice, infinitive form (i.e., to do) for future events, omission of functional words and use of punctuation marks (e.g., colons functioning as reporting verbs); 2) mastering the grammatical features as preparation for practice in the subsequent face-to-face class. Other important Outcomes to achieve are summarised in Table 3.

Phases	Outcomes (implied)
<p>观看前:通过纸质或网络媒体·在不同的版面或栏目找 10 个英语新闻标题(请注意不要集中在某一特定版面·如所选标题都是体育或娱乐新闻)·写在练习本上并尝试判断标题的意思。</p> <p>[Pre-viewing the micro-lesson: Select 10 news headlines from print or digital media and record them in your notebook, trying to understand what they mean. Note that you should avoid sourcing from the same column such as sports news or entertainment.]</p>	Sourcing and comprehending information
<p>视频学习中:边听边记笔记;在每个标题实例之后可暂停一下·考虑标题的意思及正常的语法结构·之后将自己的判断和视频中随后提供的答案做比较。</p> <p>[During viewing the micro-lesson: Listen and take notes; pause after each example headline, getting to the meaning of the headline and its structure as if in a normal sentence and comparing your understanding with the answer subsequently provided by the teacher.]</p>	Noting knowledge points, guessing and validating information
<p>观看结束后请回答:1.新闻标题有哪些主要语法特点? 2.如何把有语法“问题”的新闻标题还原成语法正确的形式? 3.依据这些语法特点·观看本微课前找到的新闻标题是否都理解正确?</p> <p>观看后完成作业:请在学习平台新闻英语课程网站作业栏目完成练习“微课学习 2-新闻标题语法”以巩固学习内容。</p> <p>另外·将记录有 10 个新闻标题的练习本带到课堂·以备课堂练习时用。(请根据各自老师安排)</p> <p>请写出 1-2 个学习困惑:(请根据自己上课班级老师要求进行)建议可通过班级群提交·提交格式:学号+问题)</p> <p>[Post-viewing: Answer the following three questions: 1. What are the main grammatical features of news headlines? 2. How to put the grammatically 'incorrect' headlines into normal/grammatically correct sentences? 3. Based on the grammatical features, did you understand the 10 news headlines correctly?</p> <p>Completing homework: Log in the News English website and complete the 'Micro-lesson 2 - grammatical features of news headlines' activities to consolidate your learning.</p> <p>Remember to bring to the class your 10 news headlines for in-class practice (subject to your class teacher).</p> <p>Please post 1-2 questions to the class qq forum in the format of ID + questions (subject to your class teacher.)</p>	Applying knowledge, evaluating learning and posing questions

Table 3. Outcomes (implied) of learning.

It can be clearly seen from Table 3 that the micro-lesson was not merely designed for the explicitly stated Outcomes of learning the set of grammatical features of news headlines and preparing for the face-to-face sessions. It was also intended for the students to practise a range of study and cognitive skills such as sourcing information, making guesses, validating information and making queries. There was a set of Rules imposed through the task checklist, including the tasks to complete and a clear timeframe set for task completion for each of the three prescribed learning phases (see Pre-, During and Post-viewing phases in Table 3). The Division of Labour was between the teacher and the students in addressing the Object, that is, the teacher preparing the micro-lesson and the student engaging with it with autonomy and diligence, in order to achieve the stipulated and implied Outcomes. The task sheet also specified a set of actions and operations for the Learning Process. Table 4 provides a summary of several salient actions and operations.

Actions recommended by the teacher	Operations recommended by the teacher
Preparing for micro lesson and flipped class by selecting 10 news headlines	Pausing to make time for applying knowledge and self-assessment
Learning grammatical features of news headlines	Listening and taking notes
Applying newly gained knowledge in understanding news headlines	
Posting queries and puzzles to class forum	

Table 4. Actions and operations in teacher-designed activity system.

This teacher-designed Activity System was experienced by the students in several interesting ways regarding the Outcomes and actions versus operations. Table 5 summarises the top six Outcomes reported by the students. The students were largely positive about the micro-lesson as part of their learning of the News English course with 158 positive in contrast with 74 negative comments (i.e., references, following the NVivo convention). The Outcomes perceived and pursued by the students overlapped with several of those Outcomes in the teacher-designed Activity System, for example, taking the micro-lesson both to learn knowledge of news and features of English in use (62 references) and to facilitate their face-to-face sessions (37 references).

Outcomes	References
Positive experience of micro-lesson learning	158
Negative experience of micro-lesson learning	74
Learning knowledge points	62
Critical reflection on the material, the teacher and self	42
Micro-lesson as resource for enhancing memory and mastering knowledge points	38
Supplement classroom learning	37

Table 5. Outcomes in student-experienced Activity System.

However, the student-experienced Activity System also included the Outcome of language learning. Table 6 summarises two frequent actions performed by the students, which were, nonetheless, designed as operations. For example, viewing the video of the micro-lesson was not singled out as something requiring conscious effort – assumed to be operations in the task sheet/video of the micro-lesson (see Table 4). It turned out to require painstaking efforts from the students, as they paused or replayed the video multiple times (i.e., 53% of the pauses and 45% of the replays) to solve vocabulary problems or understand issues. For the students, the micro-lesson was a source of language input that required conscious and purposeful learning. Learning and practising language (e.g., vocabulary and listening comprehension) is, arguably, an Outcome not designed into the teacher-designed Activity System but experienced by the students as important.

Actions	Percentage of relevant references against the total
Pausing for vocabulary and understanding	53%
Replaying for vocabulary and understanding	45%

Table 6. Actions for tackling vocabulary problems and comprehension.

Regarding the Division of Labour, the theme (i.e., following the micro-lesson and the teacher’s guidance) is relevant. Below are several typical comments by both HCTD and LCTD students on their role and the teacher’s role in the micro-lesson learning:

H9: “When teacher assigned the task I just wanted to see what he required us to do.”

H12: “Do what the teacher asked us to do.”

L11: “I followed the teacher and just listened to what the teacher said.”

These comments indicate a follower role for the students with reliance on the teacher. This role claim contrasts with what is proposed by the teacher, that is, for students to be autonomous in learning the micro-lesson. There is thus substantial disparity in the distributed cognition in the teacher-designed versus the student-experienced Activity System.

Few students posted any queries or puzzles to the class QQ forum as indicated in the task sheets (see Table 3). This means that the student-experienced Activity System has the student acting as an individual learner rather than as part of a Community despite the stipulation in the teacher-designed Activity System.

In summary, the Activity System designed by the News English teachers provided the students with a schematic approach to learning about English news. The potential of the Activity System was tapped to a considerable extent in the sense that the students took on several key Outcomes specified or implied in the teachers’ task sheets. One distinct Outcome in the student-experienced Activity System is the learning of grammar and vocabulary in the micro-lesson in its own right. Unlike the Community and Division of Labour stated in the teacher-designed Activity System, the student-experienced Activity System displays an individual rather than communal learning environment and student learning in a passive rather than an active, autonomous and agentic style.

4.2. Students of different critical thinking dispositions engaging with micro-lessons

The HCTD and the LCTD students displayed several distinct ways of using the Mediating Tools, aligning themselves with the Outcomes of the activity of learning the micro-lessons, and observing the Rules of the Activity System designed for them. For example, as shown in Table 7, the HCTD cohort aligns more readily with the Outcomes designed for micro-lesson learning than the LCTD cohort, that is, learning knowledge points (85% versus 15% of the

references for the HCTD and LCTD students respectively) and getting prepared for classroom learning (68% of the references for the HCTD students versus 32% for the LCTD students). An independent samples *t*-test run through SPSS 25.0 indicates that the differences between the two cohorts are also statistically significant regarding the Outcomes except for negative experience of micro-lesson learning and critical reflection on the material, the teacher and self (see Table 8 for the Mean, Standard Deviation, *t* scores and *p* value).

Top 6 themes of Outcome	Percentage of references-HCTD	Percentage of references-LCTD
Positive experience of micro-lesson learning	48%	52%
Negative experience of micro-lesson learning	55%	45%
Learning knowledge points	85%	15%
Critical reflection on the material, the teacher and self	19%	81%
Micro-lesson as resource for enhancing memory and mastering knowledge points	61%	39%
Supplement classroom learning	68%	32%

Table 7. Outcomes for the HCTD and LCTD students.

	Mean (SD)		t	p value
	HCTD (N = 15)	LCTD (N = 15)		
Supplement classroom learning	1.67 (2.09)	0.86 (0.95)	-3.084	0.01*
Positive experience of micro-lesson learning	5.07 (3.61)	5.57 (3.57)	-4.352	0.00**
Micro-lesson as resource for enhancing memory and mastering knowledge points	1.53 (1.36)	0.93 (1.07)	3.976	0.00**
Learning knowledge points	3.53 (2.07)	0.64 (1.08)	-4.303	0.00**
Critical reflection on the material, the teacher and self	0.53 (0.92)	1.43 (1.79)	0.295	0.77
Negative experience of micro-lesson learning	3.47 (3.31)	2.00 (2.94)	-2.04	0.05

Table 8. Independent samples *t*-test results.

The HCTD students’ alignment with the teacher-designed Activity System is also evident as they did not seem to get bogged down by language issues. When there was an unfamiliar vocabulary item, they did not pause or replay

the video to resolve the language issue as much as their LCTD peers, but would rather pursue an overall understanding of the micro-lesson. Table 9 is a comparison of the listening behaviour between the two cohorts. The HCTD students complied, more than the LCTD students, with the Outcome of studying the micro-lesson, that is, to understand the grammatical features of the news headlines rather than the specific vocabulary item or phrase in the headlines. As a result, the Activity System as designed and delivered by the News English teachers seems to be taken up better by the HCTD students than the LCTD students.

Actions	Specifics of actions	HTCD		LCTD	
		Number of references	Percent -age	Number of references	Percent -age
Pausing	Understanding or checking vocabulary	28	40%	45	50.6%
	Taking notes	17	24.3%	33	37.1%
	Thinking	25	35.7%	11	12.4%
Replaying	Understanding or checking vocabulary	10	23.3%	23	51.1%
	Catching up	11	25.6%	13	28.9%
	Forgetting or ignoring	0	0%	5	11.1%
	Confirming or reviewing	11	25.6%	4	8.9%
	Thinking or different understanding	11	25.6%	0	0%

Table 9. Pausing and replaying by HTCD and LCTD students.

The think-aloud transcripts of one HCTD student and one LCTD student are provided below to give a glimpse of their different experiences and also to demonstrate their distinct strategies for engaging with the micro-lesson. Only the sections from the beginning of their think-aloud up to the first grammatical feature of news headlines (i.e., past tense form indicating passive voice) are presented. The “...” indicates segments edited out. Bold, underlining and italic fonts are added for easy reference in the interpretation to follow.

Excerpt from H6

今天...学习的任务是新闻标题有哪些主要的语法特点, 如何把有语法问题的新闻标题还原成语法正确的形式...暂停一下, 因为有点跟不上他这个说的话...obstacle不认识, 需要查一下。Obstacle是障碍的意思。A man robbed a, 我暂停一下回答一下他这个问题, 他问我,

可以知道这个故事中发生了什么通过这个标题...一个男人绑架了他的受害者，或者是一个男人被其他人绑架...先要探讨一下它的语法特点...所以我觉得这个是应该是说的是这个男人被绑架了。在这个周五的晚上。对，它说的这个猜测是正确的...过去的这个时态经常被认为是被动语态。被动语态它可能是...省略了他那个be动词，然后就是看上去像是一般过去式，然后实际上是被动语态...

[**Today...the learning task is news headlines**, their major grammatical features, how to restore ungrammatical news headlines to grammatical forms... Pause here, because I cannot follow the teacher's speaking...obstacle I don't know the word, check it up. Obstacle means barrier. A man robbed a, I pause for a while to answer his [the teacher delivering the micro-lesson] question, he asks me, from the headline, what can you tell happened in the news... a man kidnapped his victim, or was this man kidnapped by someone else...*first need to examine the grammar of the sentence...so I feel this should be the man was kidnapped.* On this Friday night. Yes, *my guess was correct...* the past tense often is viewed as the passive voice. Passive voice, perhaps this verb ... be was omitted, then it looks like it was a past tense, but actually the passive voice]

Excerpt from L51

看一下这个学习任务单...（停顿）一个男人...抢劫了受害者。一个男的被其他受害者抢劫了，这个是一般新闻上很容易看到的那种有误区了...我感觉很多词汇不熟，我得背英语词汇了...就是讲男的抢劫的问题，他是抢劫还是被抢劫，感觉一般这种新闻标题的话好像...特别是有的一些用标题吸引别人眼球，然后就是故意误导一下，然后就显得好像很夸张的样子。我看一下，他是说一个男人被抢劫了，我要在这停一下，我想把它给记下来，它是一个被动式，语法特点有一个被动式...The past tense usually indicates passive voice...

[**Take a look at the task sheet...** (pause) a man...robbed a victim. A man was robbed by other victims, this is in general easy to notice in news, a confusion... I seem not to know many of the words, I need to rote learn them...this is about a man, did he rob or was he robbed, *I feel in general this kind of news headline seems...in particular some news headlines are used to attract the eyeball, then er intentionally mislead, then appear exaggerated.* I have a look, he [the teacher delivering the micro-lesson] said a man was robbed, *I need to pause here, I want to note it down,* it is passive voice, the grammar feature is passive voice...the past tense usually indicates passive voice...]

Both students reported following the task checklist in their micro-lesson learning (see highlighting in bold). They paused to check their understanding of the material. When they encountered a key but unfamiliar word, the HCTD student checked it up while the LCTD student planned to rote learn it later (see underlining). The most interesting point is the two students' strategy for decoding the target sentence (i.e., "a man robbed under gunpoint"). The HCTD student made grammar-informed guesses to be confirmed later in the micro-lesson while the LCTD student resorted to their individual experience of reading news headlines to make sense of the sentence and took the correct answer as notes (see highlighting in italic). Both students respectively spent 30 minutes and 25 minutes studying the seven-minute micro-lesson although the time recommended by the teacher was 20 minutes maximum.

5. Discussion and conclusions

This investigation of the dynamics of the micro-lesson learning experiences of the News English students at a Chinese university provides an example of applying the Activity Theory (Engeström, 1999, 2001) to ESP teaching and learning research. Although the study was based on data collected from students and teachers involved in a single ESP-oriented course which would make it improper to make general statements, the major findings about discrepancies between teacher micro-lesson design and student uptake and the distinct learning behaviour of the HCTD and LCTD students shed valuable light on the TPCK for flipped instruction in ESP settings.

Micro-lessons have the potential to package information (in this case, knowledge of English news and language features) as relatively self-contained units of knowledge for advanced viewing and learning. The constraint of this asynchronous approach is that the information needs to be comprehensible for students to unpack. In the second micro-lesson which focuses on learning grammatical features in news headlines, the speed of delivery, the organisation of the information and the language used in the example news headlines, all posed challenges to a number of the students. They had to spend time re-listening to certain information and checking vocabulary before they were able to achieve the Outcomes of understanding the knowledge points and language features. Zhang et al. (2022) researched the use of technology to enhance collaborative learning and called for training second and foreign language teachers and students on technologies.

Our study indicates specific aspects of such training for teachers operating flipped instruction by using micro-lessons. Following Mishra and Koehler (2006), ESP teachers need to be trained on the representation of the content (e.g., language features of English news) through the technology (micro-lesson videos) and the pedagogy to ensure that the pre-class phase is undertaken by students effectively. Specifically, the stumbling blocks for students can be removed when preparing the micro-lesson, for example through what Derewianka and Jones (2016) call designed-in scaffolding (e.g., difficulties anticipated and addressed in the lesson plan). Such scaffolding can be implemented through pre-teaching some of the difficult vocabulary or sentences or carefully selecting sample news headlines to prevent unnecessary interferences (e.g., difficult vocabulary) with the achievement of the designed-in Outcomes. This could increase the efficiency of the micro-lesson learning as the actual time for learning the 7-minute video by the students (i.e., up to 30 minutes) far exceeded the teachers' recommendation of 20 minutes.

The finding that students' critical thinking disposition impacts on their micro-lesson learning accentuates the need to factor learner attributes in technology-mediated ESP teaching and learning. The HCTD students tend to align more readily than their LCTD peers with the learner role set in the micro-lesson, that is, to learn on their own, prioritise the learning of knowledge points and prepare for the subsequent face-to-face lessons. Meanwhile, regardless of their critical thinking disposition, the study participants did not always display autonomous and communal learning in the out-class phase as anticipated by their teachers. Rather, they were inclined to follow their teachers' lead and study the micro-lessons as individuals. One might invoke the stereotype of Confucian-background learners being passive in their learning styles (e.g., Cortazzi & Jin, 1996, 2013) to account for the follower practices of the Chinese students. However, as Harmer (2015) argues, the Division of Labour, or sharing of learning responsibility, should never be taken for granted in flipped classrooms. To enable students to exercise and enhance autonomy and agency, the micro-lesson needs to have opportunities built into the teaching/learning sequence in such a way that being autonomous is both required and also actually rewarding. This is important because of the key purpose of the micro-lesson for preparing students for in-class collaborative practice. Students who are underprepared due to misunderstandings of the expectations of micro-lesson learning or are inefficient in their learning are likely to be disadvantaged in the teacher-

designed Activity System. Given that both HTCD and LTCD students used the task checklist to guide their learning of the micro-lessons, this important Mediating Tool can be rephrased in a way that students do not mistake the Tool for procedural requirements for Outcomes. When learner factors, including critical thinking disposition, are proactively considered in teaching design and implementation, ESP teachers will help their students achieve learning outcomes better (Nickerson, 2018).

Effective ESP teaching and learning through flipped classrooms requires sound TPCK of ESP teachers. Our study may be a small step towards understanding this teacher knowledge. For future iterations of the News English course, this TPCK may be applied in addressing the tensions or contradictions between the teacher designed-Activity System and student-experienced Activity System through systemic teaching design (Mishra, 2021). For example, the content (knowledge of news in English and language features) may be represented and delivered in a way that is more accessible and engaging for students through designed-in scaffolding and monitoring features. Further research may integrate more relevant Activity Systems (Engeström, 1999, 2001), in particular the Activity System of in-class teaching and learning, and collect data from both ESP teachers and their students when they navigate different but interconnected Activity Systems. Given that the critical thinking disposition is a highly relevant learner factor, its specific dimensions and impact on learning in flipped classrooms should be considered. Further research might extend understandings of teaching and learning, which will help refine ESP teachers' TPCK to maximally facilitate student learning through flipped classrooms.

Article history:

Received 01 April 2022

Received in revised form 10 August 2022

Accepted 10 August 2022

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