

Student Engagement in Long-Term Collaborative EFL Storytelling Activities: An Analysis of Learners with English Proficiency Differences

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ABSTRACT

English proficiency difference among students is a challenging pedagogical issue in EFL classrooms worldwide. Collaborative digital storytelling has been adopted in language learning settings to increase motivation and engagement, especially for young learners. However, it remains unknown whether students of different proficiency levels can equally benefit from this collaborative approach. Thus, this study implemented a 17-month technology-enhanced collaborative storytelling activity and examined young students' pair performance, flow perception, and learning strategies in relation to students' English proficiency level. The students' proficiency level was found to be an influencing factor of their engagement patterns, use of learning strategies, and pair performance. These findings support the low-threshold-high-ceiling principle, suggesting that collaborative activities should ensure students of different proficiency share the same goals, while allowing different types of participation to maximize their engagement. It is hoped that the findings and pedagogical suggestions can address the issue of proficiency differences in EFL classrooms and serve as a reference for future research of EFL collaborative storytelling activities.

Keywords

EFL, Storytelling, Engagement, Collaboration, Proficiency

Introduction

English proficiency is considered a critical competence in today's increasingly globalized society. In many Asian countries, English language education was introduced into primary schools years ago (Chen, 2013). However, owing to students' various access levels to resources, English proficiency differences among students are becoming apparent (Baldauf, Kaplan, Kamwangamalu, & Bryant, 2011), meaning that students come to school with significant differences in their English proficiency. Such a difference has become a critical pedagogical concern (Chang, 2006). English as Foreign Language (EFL) teachers, particularly in elementary education, are facing significant pedagogical challenges to cater to individual students' needs (Nunan, 2003) such as the adoption of various language learning strategies (Uhl Chamot & El-Dinary, 1999) and different proficiency levels (Wang, 2008). It is often observed that when the teacher targets and designs his/her instruction for a certain proficiency level, the more or less proficient students in the class would be neglected and thus become disengaged. In particular, language learning is a long-term process in which learners' motivation and engagement change over time, and engaging learners of various proficiency levels in language activities of extended periods of time is a critical challenge and research focus.

Engagement, as a multi-dimensional factor, has been reported to be associated with students' enjoyment, motivation, confidence, perceived usefulness, performance, and flow perceptions in technology-enhanced language learning (Liu, Wang, & Tai, 2016). Various technologies have been adopted in language learning settings to facilitate the learning of students of different proficiency levels, and to increase engagement to overcome this challenge. Digital storytelling has been reported to effectively foster young EFL learners' interest in learning (Figg & McCartney, 2010). However, it remains unknown whether students of different proficiency levels can equally benefit from digital storytelling. Students' dynamic and changing patterns of engagement during the learning process are also unknown. Thus, in this study, we implemented a long-term technology-enhanced collaborative storytelling activity and examined young students' long-term flow perception, use of learning strategies, and pair performance in relation to their English proficiency level. Data were collected from 30 collaborative storytelling sessions over the 17-month period, so as to identify the changing patterns in student engagement (Herrington, Oliver, & Reeves, 2003; Liu et al., 2016). Student engagement was examined according to the flow theoretical framework (Csikszentmihalyi, 1975) and the Strategy Inventory for Language Learning (Lan, 2005; Oxford, 1990) to better understand the interplay of the students' engagement, use of learning strategies, and pair performance in the learning activity.

Literature review

Digital storytelling

Storytelling is an effective teaching strategy for young EFL learners, and the integration of technologies in storytelling instruction provides students with opportunities to synthesize verbal and imagery representations based on their initial understanding (Lotherington & Jenson, 2011). Digital storytelling (DST) “takes the ancient art of oral storytelling and engages a palette of technical tools to weave personal tales using images, graphics, music, and sound mixed together with the author’s own story voice” (Porter, 2005). The literature has confirmed that DST can improve multiple language skills, including sentence construction ability (Kim, 2014; Tsou, Wang & Tzeng, 2006), writing (Figg & McCartney, 2010; Yang & Wu, 2012; Yoon, 2013), listening comprehension (Yoon, 2013), and oral skills (Tahriri, Tous, & Movahedfar, 2015). In addition to the benefits which traditional storytelling could bring, the multimedia feature of digital storytelling has been reported to be beneficial in terms of capturing attention, fostering interest to learn, and enhancing engagement in learning activities (Di Blas, Garzotto, Paolini, & Sabiescu, 2009; Figg & McCartney, 2010; Sadik, 2008). With the Internet connection, digital storytelling allows students to not only extend their imagination through digital tools, but also to share their stories with a wider audience (Kim, 2014; Liu, Lin, Deng, & Tsai, 2014).

The collaborative approach has been considered an effective alternative for teaching students of various proficiency levels (Nunan, 1998), and has been combined with DST to enable students to work together to develop and organize multimedia materials for storytelling (e.g., Gelmini-Hornsby, Ainsworth, & O’Malley, 2011; Liu, Tao, Chen, Liu, & Chen, 2013). Collaborative DST can help to facilitate a reciprocal learning process in which students play different roles and learn from each other to construct a story together (Liu, Liu, Wang, Chen, & Su, 2012). When synthesizing ideas and creating a shared story, students can foster critical thinking through communication and enhance their creativity (Nordmark & Milrad, 2012; Yang & Wu, 2012). However, with all of these educational potentials that collaborative DST could bring, it is noted that working together does not automatically engage students in productive construction (Gelmini-Hornsby et al., 2011; Kreijns, Kirschner, & Jochems, 2003; Liu & Tsai, 2008). Past research has confirmed positive perceptions of enjoyment and satisfaction when technologies were used to support collaboration (Asoodar et al., 2014; Ducate et al., 2011). However, few studies have attempted to probe engagement from theoretical perspectives or to examine its changing patterns from longitudinal observations. Students with limited language knowledge have been found to have difficulties producing quality language work in collaborative DST activities, and often experience several phases of disengagement over an extended period of time (Liu, Wang, & Tai, 2016). It is thus worthwhile to investigate long-term engagement patterns in collaborative digital storytelling activities.

Long-term engagement

Engagement can be viewed as active participation in the learning process, and contributes to deeper and more meaningful learning. When the learners are involved and interested in meaningful tasks, they learn more effectively, and are more likely to retain the information and transfer it to other contexts (Kearsley & Schneiderman, 1998). Engagement is a multifaceted construct characterized by various dimensions such as challenge, sensory appeal, attention, feedback, curiosity, and interest (O’Brien & Toms, 2008; Trevino & Webster, 1992). Engagement has frequently been associated with flow perceptions (Csikszentmihalyi, 1975), both of which share overlapping constructs. Flow is the state in which people are deeply involved in an activity and enjoy the experience for its own sake rather than for any other reason; it shares a few attributes with engagement, including focused attention, feedback, control, and intrinsic motivation (Csikszentmihalyi, 1975). Flow perceptions have been found to be positively associated with exploratory and participatory activities, and students often demonstrate multiple strategies when in a flow state (Liu, Cheng, & Huang, 2011; Liu, Wang, & Tai, 2016).

Ideally, it is hoped that students could continuously engage in and apply more learning strategies in a flow state for an extended period of time for better and lasting language learning performance. However, discrepancies in the prior language proficiency of students have been found to affect engagement in technology-enhanced activities, and to lead to the use of different language learning strategies. High proficiency learners are more likely to effectively use a combination of multiple strategies, and lower proficiency learners tend to apply one strategy at a time (Uhl Chamot & El-Dinary, 1999; Oxford, 1990). While proficiency level is an influencing factor of student engagement and language learning strategy use in conventional instruction, it is unknown if this is true in technology-enhanced collaborative settings in which dealing with proficiency differences might become an even more challenging pedagogical task.

To fill this gap in the research literature and teaching practice, this study investigated how student pairs of different language proficiency levels engaged in EFL collaborative digital storytelling activities, and examined their engagement patterns, language learning strategies, and storytelling performance specifically. This study attempted to answer the following questions:

- RQ 1: Did students' flow perceptions of the collaborative storytelling activity present specific patterns? If so, was students' prior English proficiency an influencing factor of their flow patterns?
- RQ 2: Did students of different English proficiency use learning strategies differently in the collaborative storytelling activity?
- RQ 3: How did student pairs of different English proficiency levels perform in the collaborative storytelling activity?

Method

This study investigated the interrelationships between students' entry English proficiency, flow perception, and language learning strategies in the context of the collaborative DST (Figure 1). Owing to the complex nature and the variety of variables involved with engagement, a mixed-methods approach (Creswell & Clark, 2011) was adopted for a more comprehensive and holistic understanding of the complex learning context. The mixed methods approach integrates quantitative and qualitative data to supplement the interpretation of different data types (or the limitations of one type of data are balanced by the strengths of another). Analysis of both quantitative and qualitative data has been adopted in similar children's storytelling settings (e.g., Yoon, 2013). Following the sequential explanatory design, follow-up student interviews were conducted after the statistical analysis of survey data in order to explain the initial findings and to further explore the nuances of the learning process.

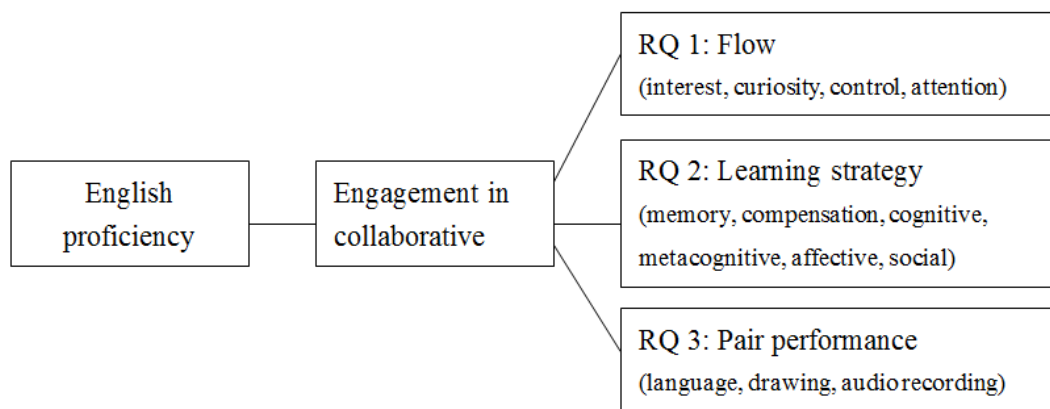


Figure 1. Research framework of the present study

Participants

The participating students of this study were 42 third graders from two classes in an urban elementary school in northern Taiwan. Their ages ranged from 9 to 10 years old. These students were still in the early stages of English language development, and their learning focused on basic vocabulary and sentence patterns. The 42 students were grouped into 21 pairs for a collaborative digital storytelling activity based on their entry English proficiency. Proficiency assessment included the school's standard midterm examination and oral tests for reading fluency and vocabulary knowledge. The materials used in oral reading fluency and vocabulary tests were adopted from the target content (15 stories from Starfall®) of the collaborative storytelling activity. The vocabulary part was a 20-item English - Chinese meaning match test. The oral reading fluency part was 15 sentences (76 words) retrieved from the same material. The number of words that each student could read aloud correctly per minute was counted as an indicator of their oral reading ability.

This study computed the grades of the midterm examination, oral reading fluency, and vocabulary knowledge to represent the students' holistic English proficiency. The students were divided into three different student groups (high-mid-low proficiency) based on the overall computed scores. The majority (22) of the students were rated with a score between $\pm .5$ standard deviation, as mid-proficient students, due to the normal distribution of students' proficiency level. Another 8 students scored $.5$ standard deviation over the mean and so were considered as high-proficient students, while the remaining 12 students who were rated with a grade $.5$ standard

deviation below the mean were considered the low-proficient students. Students were divided into pairs on a random basis with one exception being that high-proficient students were not grouped together.

Procedures

The implementation of the collaborative digital storytelling activity was 17 months (1.5 hours a week). The activity was approved and supported by the homeroom teacher and the school authority. We originally aimed to implement the activity every week, but due to school holidays and school-wide examinations, a few weeks were skipped during the 17-month period. Participating students finally completed a total of 30 sessions in 30 weeks. Proficiency assessment was conducted before the activity implementation. In each activity session, each pair worked to retell a story with drawings and oral narration, and published their story on a Web 2.0 platform. After each activity session, the students answered a flow survey to understand their flow perceptions. Therefore, a sequence of 30 sets of flow survey results was obtained. Upon completion of the 30 sessions of the activity, a strategy inventory for language learning was administered to elicit the students' language learning strategies.

The collaborative digital storytelling activity

The goal of the digital storytelling activity was to create a multimedia picture book by re-telling model stories, using drawings, texts, and audio-recording. Throughout the 17-month period of this study, the pairs of participants were guided to use iPads to collaboratively re-tell stories using their own English sentences and drawing on a weekly basis. In other words, the participating students sat physically together to share one iPad, and they needed to read and practice reading aloud the model stories, draw the scenes in the story (Figure 2), and record their oral reading to create a picture book. We did not implement a strict timeframe but allowed the students to re-tell stories and create picture books at their own pace. Some pairs therefore completed more stories than others.



Figure 2. Students using the storytelling app to create a multimedia story



Figure 3. The online platform, Story & Painting House

Collaborative digital storytelling for young children is a challenging task, so in this study we implemented the activity over the 17 months and allowed the students sufficient time to become familiar with the technology. Moreover, we provided model stories as scaffolding in the early stage of the intervention to help the students develop the skills and knowledge required for the task. An e-book of 15 model stories (Starfall®), including

graphs and texts along with oral narrations, was installed on the iPads as scaffolding in the early stage of the story re-telling. Upon completing a story, the students shared it on an online platform *Story & Painting House* (Figure 3), on which they could publish their self-created multimedia picture books and also view others' work. The students saved their progress every week on the platform, and continued to work on their stories the next time. When completing a story, the student pairs had opportunities to showcase their picture books on stage in front of the class.

Data collection

Based on the research framework (Figure 1), we implemented surveys and interviews to investigate the students' flow perceptions and language learning strategies. Furthermore, we examined the student artifacts (multimedia picture books) to assess each student pair's performance in the activity. These data sources were triangulated with follow-up interviews at multiple times to achieve a more comprehensive understanding of the students' overall engagement in the activity.

Flow survey

To measure individuals' flow perceptions, we adopted Trevino and Webster's (1992) flow model for our survey, asking about the four dimensions of flow perceptions: control, attention, curiosity, and intrinsic interest in four items on a 5-point Likert scale (5 being the highest; 1 being the lowest flow perception). The perceptions of these four dimensions together were combined and analyzed as general flow perceptions. Owing to the young age of the participating students, every survey question was read aloud by the homeroom teacher to ensure their understanding, and then the students checked the fitting statement with pencils on a printed form. In between each question, the teacher would pause and confirm all students' understanding and completion before moving on to the next question. The flow survey was administered immediately after each storytelling activity, making it a total of 30 times. We used the average scores of the students' responses to present their overall flow perception. The Cronbach's reliability (alpha) of the four items used in this study was .75, showing adequate reliability of the survey items.

Strategy Inventory for Language Learning (SILL)

To understand the students' use of learning strategies, we adopted the *Children's Strategy Inventory for Language Learning* (SILL) (Lan, 2005), revised from the original 50-item SILL (Oxford, 1990); both measurements have good established validity and have been widely used to assess language learning strategies. The Children's SILL used in this study consists of 30 items investigating students' application of six learning strategies: cognitive, memory, metacognitive, compensatory, affective, and social strategies. For example, items for cognitive strategies, include "(w)hen I speak in English, I try to imitate English-speaking people, in order to pronounce the words correctly," and "I make an effort to understand the sense of what I read or what I hear without translating word for word." Items for metacognitive strategies include: "I organize my time to study English," and "I analyze the errors I have made and try not to repeat them." The items use a 5-point Likert scale, 1 indicating the lowest level of strategy application and 5 indicating the highest level. The administration of SILL was identical to that of the Flow survey, and was conducted at the end of the 17-month period.

Multimedia picture books and pair performance in the collaborative storytelling activity

In the digital storytelling activity, students produced multimedia picture books by recording their oral reading and drawing on iPads. The picture books produced by the students were analyzed according to the following three components:

- *Language productivity* was the amount of target language output, including (1) the number of stories each pair created, (2) the average number of pages in each story, (3) the number of English sentences in each scene, and (4) the number of audio-recorded lines per story. Some student work contained more pages for each story, and more detailed drawing that matched and enhanced the storyline, while some other works included only sketches of a few lines. These numerical data were directly retrieved from the *Story & Painting House* system log.

- *Drawing presentation* was the pictorial product of the students' multimedia picture books, which was meant to match and enhance the storyline. Two research assistants analyzed and rated the drawing presentation; they provided not only numerical scores but also substantial descriptions of the pictorial and linguistic features of the students' work in the hope of identifying patterns in their drawing presentations. While analyzing the drawings, the two raters listed the major features of the multimedia picture books and assigned scores, from 1 as the lowest to 5 as the highest, based on the extent to which the drawing matched and enhanced the storyline. An acceptable inter-rater agreement was reached ($r = .75, p < .01$) between the two raters' scores.
- *Audio recording* is another component of students' multimedia picture books. The students were not instructed specifically on how to record their oral reading; their recording data could therefore be one way to show their pair collaboration pattern.

Follow-up interviews

In order to gauge students' views and experience in the collaborative storytelling activity, we conducted 26 interviews with a focus on their flow perceptions (RQ1) and use of language learning strategies (RQ2) to better understand their changing flow perceptions and various use of language learning strategies. Example initial interview questions included, "Did you feel bored during the activity, and why?" "How did you figure out and learn the words you didn't know in the model story?" and "How did you and your partner collaborate to create a story?" These initial questions were designed to be as open as possible. It was hoped that the unstructured nature of the conversation would help to probe the students' personal experiences during the activity.

Data analysis

To answer the first research question, ANOVA with repeated measures was applied to analyze students' flow perceptions over the 30 activity sessions. To obtain a comprehensive result, we calculated the average flow perceptions of the first 10 times, the middle 10 times, and the last 10 times to represent the students' flow perceptions during the initial, middle, and ending phases of the activity. We then applied ANOVA with repeated measures to compare the flow patterns during the three activity phases with students' English proficiency (high – mid – low) serving as the between-subjects factor. ANOVA with repeated measures can identify whether there are significant differences in the patterns of flow perceptions among the three student groups.

To answer the second research question, we conducted one-way ANOVA with students' English proficiency (high – mid – low) serving as independent variables for examining the differences in the applications of the six categories of language learning strategies. Furthermore, to answer the third research question regarding students' pair performance, we firstly examined the drawing presentation and the English sentences in the student-created multimedia picture books (artifact), and then conducted a K-means cluster analysis to identify major student pairs which demonstrated similar pair performance based on the two aforementioned aspects. The pair combinations of each cluster were then further interpreted together with the initial descriptive data of the students' work and two raters' observations of their audio recording patterns.

Results

The results include the findings from the analysis of the flow patterns (RQ1), use of learning strategies (RQ2), and pair performance (RQ3) in the collaborative storytelling activity with a focus on the influences of difference proficiency (low-, mid- and high-proficiency) in alignment with the research framework (Figure 1).

Flow patterns

In this study we conducted an ANOVA with students' English proficiency (high – mid – low) serving as independent variables to examine students' flow perception during the initial, middle and ending phases of the collaborative storytelling activity. It should be noted that three of the 42 students did not complete all of the required tests and questionnaires. Therefore, the results involved only the data from the remaining 39 students.

Table 1. ANOVA analysis of the flow perceptions of the three student groups

Proficiency	Phase	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
High (<i>N</i> = 8)	Initial	4.49	.54	4.28**	< .01
	Middle	4.23	.71		
	Ending	4.03	.61		
Mid (<i>N</i> = 22)	Initial	4.06	.73		
	Middle	4.30	.66		
	Ending	4.42	.61		
Low (<i>N</i> = 9)	Initial	4.17	.75		
	Middle	4.18	.84		
	Ending	4.43	.57		

Note. ***p* < .01.

The low-, mid- and high-proficiency students demonstrated significantly different flow patterns ($F = 4.28, p < .01$), showing different change trends in flow perceptions during the three phases of the activity (Table 1). The flow perceptions of the mid- and low-proficiency students rose gradually, while those of the high-proficiency group dropped during the period of this study (Figure 4). Taking a closer look, we can see that both the mid- and low-proficient student groups perceived lower flow perceptions in the initial phase than the high-proficient group. However, their flow perceptions increased significantly during the middle and ending phases. More specifically, the flow perceptions of the low-proficient students slightly increased during the middle phase, and then skyrocketed in the ending phase. On the other hand, the flow perceptions of the mid-proficient students increased dramatically first, and then slowed down but continued to increase gradually in the second half of the study. The most noticeable flow trend we observed is that the flow perceptions of the high-proficiency group decreased steadily throughout the activity.

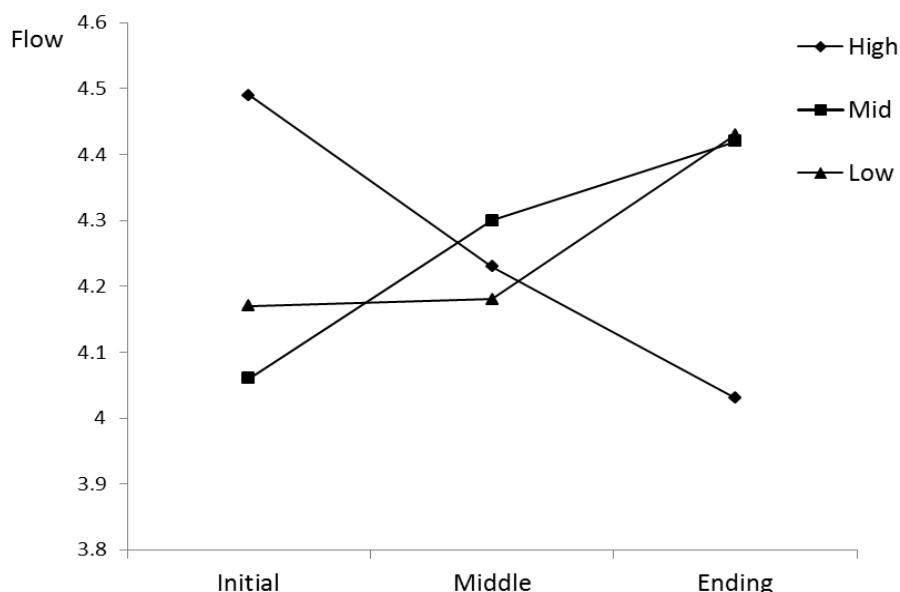


Figure 4. The flow perception patterns of the three student groups (high-mid-low proficiency)

The ANOVA analysis with repeated measures was also applied to each dimension of the students' flow perceptions. The results shown in Table 2 indicate that the three student groups showed significantly different patterns in all four dimensions of flow perceptions: attention ($F = 3.31, p < .05$), curiosity ($F = 3.38, p < .05$), control ($F = 4.42, p < .01$), and interest ($F = 2.89, p < .05$). High-proficiency students' perceptions of attention, curiosity, control, and interest decreased during the three activity phases, while the mid-proficiency students' flow perceptions in all four dimensions gradually increased during these activity phases. However, the low-proficiency students reported another different trend in their control and interest perceptions, which involved a decrease during the middle phase and an increase in the ending phase of the activity. The flow perceptions of the low-proficiency students might have resulted from their lack of the English skills needed to effectively participate in the activity and the lack of interest in the activity until the middle phase. It is noted that the low-proficiency students soon gained higher-level perceptions of control and interest after the middle phase of the activity.

Table 2. Four flow dimensions of the three proficiency groups

Proficiency level	Activity phases	Attention			Curiosity			Control			Interest		
		<i>M</i>	<i>SD</i>	<i>F</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>M</i>	<i>SD</i>	<i>F</i>
High (<i>N</i> = 8)	Initial	4.50	0.48	3.31*	4.55	0.55	3.38*	4.29	0.71	4.42**	4.60	0.59	2.89*
	Middle	4.20	0.81		4.43	0.73		4.01	0.73		4.27	0.74	
	Ending	4.13	0.75		4.10	0.54		3.83	0.76		4.10	0.60	
Mid (<i>N</i> = 22)	Initial	3.93	0.74		4.16	0.74		3.91	0.86		4.23	0.84	
	Middle	4.18	0.68		4.34	0.74		4.27	0.69		4.39	0.67	
	Ending	4.29	0.64		4.47	0.64		4.43	0.61		4.47	0.66	
Low (<i>N</i> = 9)	Initial	4.11	0.73		4.08	0.86		4.17	0.76		4.32	0.78	
	Middle	4.13	0.92		4.18	0.94		4.14	0.84		4.23	0.81	
	Ending	4.36	0.73		4.38	0.63		4.45	0.59		4.50	0.55	

Note. **p* = .05; ***p* = .01.

Student use of language learning strategies

In this study we analyzed the differences among high-, mid-, and low-proficient students in their use of six language learning strategies with one-way ANOVA. The results in Table 3 show that significant differences existed in the use of their memory strategies ($F = 4.29, p = .02$). According to a Scheffe post-hoc test, the mid-proficient students tended to use more memory strategies to make mental connections with new English vocabulary than the high-proficient students. It was also noted that differences were close to the statistical significant level in the use of compensation, metacognitive, and social strategies between the three proficiency groups. Such results indicated that the mid-proficiency students were more likely to be engaged in applying multiple learning strategies in the collaborative storytelling activity than the other two groups.

Table 3. The difference between the high-, mid-, and low- proficient students in their use of language learning strategies

Strategy category	High (<i>N</i> = 8)	Mid (<i>N</i> = 22)	Low (<i>N</i> = 9)	<i>F</i>	<i>p</i>	Post-hoc
Memory	2.69 (.85)	3.80 (.91)	3.33 (1.04)	4.29*	.02	Mid > High
Cognitive	3.00 (.82)	3.29 (.99)	2.80 (.94)	0.94	.40	
Compensation	2.75 (.77)	3.51(1.00)	2.83 (.65)	3.16	.06	
Metacognitive	2.93(1.12)	3.55 (.98)	2.71 (.68)	2.95	.07	
Affective	2.71 (.99)	3.44(1.03)	2.96 (.75)	1.96	.16	
Social	2.63 (.86)	3.38 (.92)	2.67 (1.05)	2.91	.07	
Overall	2.83 (.70)	3.48 (.85)	2.90 (.79)	2.84	.07	

Note. **p* < .05.

Artifact analysis and pair storytelling performance

To understand the students' digital storytelling performance in pairs, we analyzed the picture books in terms of their (1) language productivity, (2) drawing presentations, and (3) audio recordings. As described earlier, data of student language productivity was retrieved from the system log, and the analysis of the students' drawings and audio recordings was conducted by two independent coders.

We analyzed a total of 146 picture books produced by the students during the study period. In terms of drawing presentation, we looked into the expression of the characters, the brushwork, and the relations of the drawing to those in the model stories. It was found that the students demonstrated three distinct styles of drawing presentation: symbolic style (Figure 5), imitative style (Figure 6), and transformative style (Figure 7). Eight pairs demonstrated more of the symbolic style in their self-created picture books, as they used only simplified lines to represent the scenes of the model stories and to retell the model story (Figure 5). Nine student groups exhibited an imitative style, consisting of well-defined characters, detailed and colorful backgrounds, and delicate brushwork (Figure 6). Student works of both symbolic and imitative styles were still mainly based on the model stories in terms of composition, and the setting and design of the characters. The pairs who adopted a transformative style tended to add a twist to their drawing presentation to accompany their stories. For example, a female pair changed the original character in the model story from a boy to a girl in their drawing so as to better present themselves (Figure 7). Based on the extent of how the drawing presentations matched and enhanced the storyline, the student works which adopted transformative and imitative styles were given higher scores (4 – 5), and those using the symbolic style were marked lower (2-3). It has been noted that students'

drawing presentation and language productivity are two different dimensions of their multimedia creation that support and complement each other. Thus, we examined not only the linguistic but also the pictorial aspects of the artifacts so as to present a more holistic view of their pair performance in their collaborative digital storytelling.



Figure 5. Symbolic style



Figure 6. Imitative style



Figure 7. Transformative style

Table 4. Cluster characteristics on pair storytelling performances

Clusters (No. of pairs)	Stories	Pages	Sentences	Recordings	Drawing scores	Pair combination* (No. of pairs)
HLPP (5)	9.6 (.55)	7.5 (.1)	7.5 (.06)	7.5 (.04)	3.25 (.83)	MH(3),LM(1), LH(1)
COP (9)	7.33 (.50)	7.26 (.62)	7.4 (.50)	7.39 (.55)	3.44 (.78)	MM(3),LM(3), MH(2), LH(1),
LPP (5)	6.4 (.55)	5.95 (.78)	5.57 (.52)	5.47 (.58)	2.76 (.95)	LM(2), MM(2), LL(1)
Outlier 1	8	5.38	5.25	5.25	1.94	HL(1)
Outlier 2	10	4.6	4.5	4.5	2.55	ML(1)

Note. *Pair combination: L (low-proficient students), M (mid-proficient students), H (high-proficient students).

After the initial analysis of student artifacts, student pair performance in the collaborative storytelling activity was analyzed using the K-means cluster technique based on their language productivity and drawing presentation. The results identified three main clusters, while two pairs were identified as outliers as they could not be classified into any of the three main clusters. Clusters were named based on their general performance in their language productivity and drawing presentation performance as high language productivity pairs (HLPP), creativity-oriented pairs (COP), and low performing pairs (LPP) (Table 4). The result of the MANOVA shows that there was a statistically significant difference in pair performance between the three clusters ($F = 13.78$, $p < .01$; Wilk's lambda=.02; partial $\eta^2 = .852$) indicating that the between-group means were all reliably distinguished. The activity performances of the three clusters and their relation to the groups' English proficiency are detailed below:

High language productivity pairs (HLPP, $N = 5$): The first cluster was the “high language productivity pairs” because the pairs in this cluster generally had the most significant language productivity (numbers of stories, pages, English sentences, and audio-recordings). In other words, the pairs in this cluster produced more stories than the other pairs, and the number of sentences and pages in their stories were also significantly more than those created by the other pairs. On average, these high performing pairs produced 9.6 stories during the period of this activity, and each story contained 7.5 pages and 7.5 sentences. Their average number of recorded sentences was 7.5 and their drawing score was 3.25.

Creativity-oriented pairs (COP, $N = 9$): The second cluster was the “creativity-oriented pairs,” identified as the majority in our study. Nine student pairs belonged to this cluster. The student pairs in this cluster obtained the highest scores in their creativity-oriented performance, that is, the drawing scores, but showed less language productivity than the HLPP pairs. Their average drawing score was 3.44, which was higher than that of the other two clusters. However, their language productivity was only at the middle level. On average, these middle performing pairs produced 7.33 stories, each of which consisted of 7.26 pages and 7.4 sentences. Their average number of recorded sentences was 7.39. The pair combinations of this cluster were varied. Some of the pair combinations were students of different English proficiencies; some were of the same proficiency.

Low performing pairs (LPP, $N = 5$): The third cluster was “low performing pairs” because the student pairs in this cluster demonstrated neither a high level of language productivity nor creativity-based performance. They produced significantly fewer sentences and stories than the high performing pairs. On average, these low performing pairs produced 6.4 stories in the activity, each consisting of 5.95 pages and 5.57 sentences. Their average number of recorded sentences was 5.47, and their drawing score was 2.76. It is noted that there were no high-proficient students in any of these pairs.

We also conducted an ANOVA analysis of the flow perceptions of the HLPP, COP, and LPP pairs, and the results indicated no significant difference between any of these three pair groups. In other words, students’ flow perceptions were not directly influenced by their pair storytelling performance. The students who produced less satisfactory performance (LPP) did not perceive significantly higher or lower flow perceptions than the HLPP or COP pairs ($F = .22, p = .90$). However, there was a noteworthy relationship between English proficiency and pair storytelling performance, with the three clusters exhibiting the following characteristics:

- Most of the pairs including a high-proficient student demonstrated satisfactory performance. Seven LH (one low- and one high- proficient student) or MH (one mid- and one high-proficient student) pairs were identified as the HLPP (4 pairs) or the COP (3 pairs), but none were classified as LPP.
- The homogeneous pairs consisting of mid- and low-proficient students, that is, the MM and LL pairs, did not achieve promising performance. Three of these pairs were identified as COP while the other three were LPP.
- The pairs consisting of one low- and one mid-proficient student (LM) demonstrated diverse levels of performance. One of these pairs was classified as HLPP, two pairs as COP, and the other two as LPP.

Taking together the findings from the cluster analysis and the student artifacts, it seems that the English proficiency differences significantly influenced the students’ pair performance in the collaborative storytelling activities. This result was also supported by the two raters’ observations of the audio recordings of the picture books, which identified even-engagement and uneven-engagement pairs. In 14 even-engagement pairs, the two students took turns to read lines one by one, or they read aloud all the lines together; in seven uneven-engagement pairs, the recording was mainly done by the higher proficient student only. The imbalanced division of labor observed in the uneven-engagement pairs may also have been a result of the proficiency difference in the pair. Due to the critical role of the high proficient students, student pairs including high-proficient students were more likely to be focused on the language quality of their work. On the contrary, student pairs including no high-proficient students tended to shift their attention from linguistic aspects to creativity-oriented performance, and thus were more likely to produce less satisfactory work in terms of its language productivity.

Follow-up interviews

Based on the statistical analysis, interviews were conducted in the hope of explaining the difference in flow perceptions and the use of learning strategies of the high-proficient and low/mid-proficient students. The interviewees were 26 students including seven high-proficient students, 11 mid-proficient students, and eight low-proficient students. All interviews were recorded and then transcribed into text for analysis. The interview

analysis focused on (1) flow-related dimensions (e.g., interest, confidence, challenge, sense of achievement), and (2) language learning strategies (cognitive, memory, metacognitive, compensatory, affective, and social strategies) so as to provide views from different angles than the surveys. Two researchers first identified all texts related to flow perceptions or language learning strategies, then assigned descriptive codes accordingly. Then, the two researchers discussed and merged the codes into themes and categories. Similar codes were merged into themes; for example, codes relating to “fun” and “enjoyment” were merged into the “interest” theme. The two researchers eventually reached consensus on the categorization. After the merging, a total of 33 themes were included in the results, and the numbers of students who mentioned these themes were also counted. In the coding and categorizing process, students’ proficiency levels were also marked so that the interview data could later be interpreted together with the findings from the surveys and artifact analysis. It should be noted that some data could not be coded into the aforementioned categories, such as greetings and students’ making jokes, and so were not included in the analysis.

Several themes regarding students’ flow perception emerged during the interviews, such as interest, confidence, sense of achievement, and challenge. However, these emerging themes were reported by students of different proficiency levels. Firstly, roughly two thirds of the mid- and low-proficient students expressed high interest (fun and enjoyment) and confidence (less fear and no pressure), suggesting that the storytelling activity was fun, enjoyable, and not intimidating; nor was it as stressful as typical English learning activities. However, only two high-proficient students felt the same. One mid-proficient student said, “I became more confident after multiple practices and presentations.” Furthermore, more high-proficient students reported that the storytelling activity was less fun, boring, and not challenging enough for them. Secondly, regarding the sense of achievement in learning, eight mid- and low-proficient students reported a great sense of achievement. One mid-proficient student “began to enjoy the activity later because he became more familiar with the vocabulary,” and a low-proficient student “felt accomplished because she had learned many new words.” Yet again, no high-proficient student expressed a similar sense of achievement. These interview results confirmed the findings from the flow survey (Table 1) that as mid- and low-proficient students felt interested, confident, and perceived a sense of achievement, their flow perceptions increased (Figure 4).

Interview analysis also identified different use of language learning strategies between the mid/low-proficient students and the high-proficient students. First of all, the significant difference lies in students’ use of memory strategies (Table 3). According to the interviews, high-proficient students tended to apply the phonic rules to memorize new words, and the mid- and low-proficient students often used repeating strategies and consulted the e-books for quick answers. Mid- and low-proficient students suggested that they frequently referred to *Starfall*, the e-book, for the Chinese meaning and learned by “listening to the e-book again and again.” In other words, the mid- and low-proficient students largely relied on the technological features of the e-book, and greatly improved their pronunciation from imitating and repeating after the model recording. In the interviews, eight mid- and low-proficient students reported improvement in pronunciation, while only one high-proficient student mentioned such improvement. Secondly, when mid- and low-proficient students encountered problems in learning English, they usually asked for help from the teachers, parents, and their peers (compensation strategy), which is consistent with the survey findings (Table 3). Lastly, regarding reviewing and planning (metacognitive strategies), some students suggested that they would plan ahead the storyline and review previous work in their picture books; some reported that they would only follow what their partners told them to do. However, use of metacognitive strategies was found across all proficiency levels.

Students’ responses revealed several emerging themes that explain the low flow perception of the high-proficient students. The following interview excerpt is between the interviewer (Interviewer) and a high-proficient student (Student), talking about her collaboration with a low-proficient student.

- Interviewer: How do you work with your partner for the digital storytelling activity?
Student: It’s usually like he drew the scenes, and I taught him how to do it.
Interviewer: Do you have any disagreement on this division of labor?
Student: Yes, we do.
Interviewer: Then how do you handle the disagreement?
Student: We would go to the teacher and let her decide.
Interviewer: Why did you disagree with your partner? About what to draw?
Student: ‘Cause I’m good at it.
Interviewer: Do you prefer working alone to working in pairs?
Student: Yes, I’d rather work by myself.
Interviewer: Do you think your partner is helpful?
Student: Well, he is helpful.

- Interviewer: But you'd rather work alone?
Student: Yep.
Interviewer: Why is that?
Student: 'Cause I just don't like [working with others].

This excerpt displays a typical collaboration pattern between high- and low-proficient students and the imbalanced roles in the student pairs. The higher-proficient students usually played the guiding role to teach their partner English knowledge, and the lower-proficient students received help and contributed to other aspects, such as drawing the scenes for the picture books. Out of the total 26 interviews, 10 students reported similar division of labors, and 11 reported such imbalanced roles. In most pair interactions, while low- and mid-proficient students were able to receive help from high-proficient students, the high-proficient students had to spend time teaching their partners. They took more of a guiding role as they "taught the other student first, and audio recorded the English sentences together when the peer's reading was okay." One of the high-proficient students said, "Sometimes, I had to type the exact sentences word by word for him, and teach him how to read every word." Given this scenario, the high-proficient students preferred to work alone rather than work with lower-proficient students. In all of the interviews, 10 mid- and low-proficient student reported that they had learned something from their partners, but only three high-proficient students said so. The imbalanced division of labor and roles might explain why the mid- and low-proficient students had higher flow perceptions and the high-proficient students had lower flow perceptions (Table 1).

Discussion

The quantitative and qualitative data were interpreted and discussed together in the hope of providing a clearer understanding of the issue of implementing collaborative storytelling activities in EFL classrooms. It has been indicated in the literature that students' flow perception in an open-ended learning activity often changes over time (Herrington et al., 2003; Liu et al., 2016; O'Brien & Toms, 2008). Previous studies have also reported that multimedia-rich digital stories capture students' attention, increase their interest in exploring new ideas, improve language learning motivation, and foster their interest in learning (Di Blas et al., 2009; Figg & McCartney, 2010; Robin, 2008). The results of this study are partially in accordance with the findings of these studies. The mid- and low-proficient students' flow perceptions increased with time as they gradually gained a sense of achievement in the activity. However, we identified significant interactions between the students' English proficiency level and their engagement in the activities. High-proficient students' flow perceptions decreased throughout the activity compared with the low- and mid-proficient students who showed an opposite trend. The decrease in high-proficient students' flow perception was due to the lack of sense of accomplishment, and the extra burden of playing the guiding role in the pair.

The statistical findings have shown that mid-proficient students, but not high-proficient students, excelled in learning strategy use in this study, which was surprisingly inconsistent with previous literature suggesting that advanced students tend to be more engaged and apply more learning strategies (Uhl Chamot & El-Dinary, 1999; Oxford, 1990). A recent study (Ghani, Mahfuz, & Saad, 2014) also found that advanced learners tended to use more language learning strategies. The different trends in their flow perceptions may explain such a result. As the mid-proficient students perceived higher levels of flow during the latter phases, they were more likely to apply higher levels of learning strategies (Liu et al., 2011; Trevino & Webster, 1992). On the contrary, high-proficiency learners would not apply as many language learning strategies when the challenge level of the task did not closely match their abilities during the later phases of the activity. Therefore, the relevant instruction needs to be dynamically tuned during the learning activity to continuously engage students in flow states from a lower level to a higher level of challenge (Kiili, 2005).

Previous studies have investigated how pair combinations may impact interaction. It was found that when novice students were paired with more capable individuals on a learning task they improved significantly, whilst equal ability pairs did not (Azmitia, 1988; Liu & Tsai, 2008; Rogoff, 1990). In this study, we analyzed how different pair combinations could affect English storytelling performance. This result is in accordance with the finding of previous studies, suggesting that pairs with one student of well-established ability may have favorable performance. This may be because of the centralized knowledge exchange pattern (Liu & Tsai, 2008), as in this study, the high-proficiency students took a guiding role by teaching the other student. Such a centralized interaction pattern led to high-performing pairs because the high-proficiency students were in charge of the progress of the activity. However, such an interaction pattern also caused low-level flow perception among the high-proficiency students as they had to spend extra efforts on teaching and guiding their peers in the activity, rather than completing the challenging learning tasks at their own pace. It was also found that the pairs

consisting of no high-proficiency student did not achieve high level performance in the collaborative storytelling activity. Such a result might be caused by the ability impediment often occurring when no high-achieving student is involved in the collaborative learning groups. Because of the ability impediment, few in-depth meaningful interactions could happen in the collaborative pairs, eventually leading to less satisfactory learning outcomes (Liu & Tsai, 2008). Pedagogical arrangement is necessary to address the needs of the students of different proficiency levels. The finding of a previous study by Rogoff (1990) may provide a solution to address this issue. Rogoff's study suggested that training a peer to the same level of performance before the collaborative task led to peer dyads performing better than peer dyads in which neither partner had been trained. Therefore, training peers of lower-proficient students to have sufficient skills before the collaborative storytelling activity may also be an effective way to reduce the burden and keep high-proficiency students continuously engaged in the activity. For instance, the teachers may enforce a collaborative script asking students to practice new words of a model story before they take part in the collaborative storytelling activity. In this way, the high-proficiency students' burden can be reduced.

The collaborative storytelling activity in this present study seemed to limit high-proficient students' engagement, especially when they were paired with lower-proficient peers. However, it is inevitable to pair or group students of different proficiency levels together for collaborative tasks. Thus, we suggest that, in order to address the pedagogical issues of proficiency differences in one single class, students of different proficiency levels should be guided to play different roles in collaborative activities so as to suit their learning needs and language levels. For example, high-proficient students could be decision-makers when it comes to which English phrases and words to use; lower-proficient students could take part in planning storylines and drawing story scenes. It is suggested that the instructional design of such activities follow the low-threshold-high-ceiling principle (Liu, Cheng, & Huang, 2011; Myers, Hudson, & Pausch, 2000), enabling novice students to participate without difficulties and allowing them to work on increasingly complex products. Meanwhile, the activity design allows a high level of freedom for high-proficient students to contribute and practice more advanced skills, so that they do not lose interest or become disengaged. This low-threshold-high-ceiling design could keep all learners working towards the same shared goal while still allowing different types of participation and accommodating various needs of students of all proficiency levels and enhancing their flow perception at the same time.

Conclusions

According to the findings of this study, students' engagement, in terms of their flow pattern, strategy use, and pair performance, all changed and varied in accordance with their proficiency levels (Figure 1). Firstly, mid- and low-proficient students' flow perceptions increased with time as they gradually gained a sense of achievement, while the high-proficient students' flow perceptions decreased throughout the activity. Secondly, the mid-proficient students were more likely to extensively use diverse categories of strategies in the storytelling activity, especially more than those in the high-proficient group. Thirdly, pair performance largely depended on whether the pair included a high-proficient student who was likely to lead the learning process. Based on these findings, it is suggested that future pedagogical implementations adopt the low-threshold-high-ceiling design so as to address the learning needs of students of different proficiency levels. While activity designs grant easy entry for suffering students and sufficient challenges for high-achievers, they provide opportunities to display different language learning strategies, and help to promote learning from peers in both the linguistic and creative aspects. Along with these educational benefits, students' engagement and performance might be improved altogether.

It should be noted that this long-term study was mainly based on weekly observation of students' engagement. The challenge was that such a long-term study required whole classes and the teachers to work with the researchers on a weekly basis for 17 months on top of their regular school schedules. For richer description and deeper analysis of the learning process, we collected and analyzed both quantitative and qualitative data, along with student artifacts to triangulate our findings from the limited sample. Future work could include iterative implementation of the low-threshold-high-ceiling instructional design in different learning contexts with a larger sample size to examine the generalizability and to refine the effective instructional design of collaborative EFL storytelling activities for different age groups.

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