Fostering Learner Autonomy in Foreign Language Classroom: A Digital Storytelling Project

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Abstract: This study explores the potential of a digital storytelling (DST) project to foster learner autonomy with the view that learner autonomy is not equivalent to independent learning and/or self-directed learning, but comprises both individual and collaborative elements, which can be exercised in a well-designed technological learning environment. The study incorporates both quantitative and qualitative research methods. The data were gathered from a class of university students learning English as a foreign language in Thailand (17 participants) via three instruments: questionnaires, semi-structured interviews and students' reflections. The findings reveal that a DST project in a technological learning environment has great potential to afford students opportunities to exercise their capacity as autonomous language learners. The study concludes that any technological utilization, not necessarily just DST, aiming to promote learner autonomy needs to be carefully designed, using appropriate theoretical frameworks, and that the roles of cognitive and collaborative learning should be equally valued. Suggestions are made for further research, especially on the real contributions of DST to students' language improvement and motivation.

Keywords: Learner Autonomy, Digital Storytelling, Technological learning environment

Introduction

Within language education, interest in learner autonomy has been growing and there have been discussions over approaches to foster learner autonomy

in recent years (Benson, 2003; Little, 2001; White, 2003). Although there are several means to promote learner autonomy, computer-assisted language learning (CALL) is increasingly noted as a potent and dynamic way to develop learner autonomy (Benson, 2004, O'Rourke & Schwienhorst, 2003) and to this end various types of technology have been utilized, such as MOO (Schwienhorst, 2003), Blogs (Lee, 2011), Virtual World (Collentine, 2011) and Digital Storytelling (DST) (Halfner & Miller, 2011). Of particular interest to me is DST, which appears not only to offer great potential in fostering learner autonomy, but also in enhancing learning motivation (Halfner-&- Miller,-2011;-Sadik,-2008;-Yang-&-Wu,-2012;-Yoon,-2013). As Ushioda (2006) suggests, motivation is linked to learner autonomy; therefore, it may somehow support the exercising of learner autonomy when implementing technology.

However, although DST is thought to have potential to foster learner autonomy, only one empirical study actually supports the claim (Halfner & Miller, 2011). Therefore, the potential of DST to promote learner autonomy needs to be investigated further in order to strengthen empirically the potential of DST to foster autonomous learning and to better establish DST as a promising technology for developing learner autonomy. Therefore, the objective of paper is to investigate the extent to which DST project in a well-designed learning environment can promote learner autonomy.

Literature Review

Learner autonomy in a CALL environment

For a long time, technology has been assumed to be useful in promoting learner autonomy, in that it provides learners with access to resources, tools and environments for learning outside the classroom (Benson, 2001; Motteram, 1997). However, it is necessary to exert caution rather than blindly attributing causality between technology and learner autonomy; as Reinders and White (2011) put it, Autonomy is one of the goals that technology can

help learners and educators to achieve, but technology itself can also be used to achieve other educational goals as well.

From the above idea it can be assumed that technology does not, in and of itself, constitute a methodology; therefore, it cannot, in and of itself, determine learner autonomy. Taking such a view to developing an approach to technology while promoting learner autonomy, it is paramount to understand the interrelation between technology and pedagogy. Therefore, it is essential to draw upon an optimal pedagogy, a theoretical perspective, as well as to consider the affordances of a particular technology for autonomous language learning.

As Schwienhorst (2003) posits, autonomy in CALL involves learners being critical in their self-evaluation and reflexive in their learning process, which in turn puts them in control of and responsible for their learning. Further, he discusses what he believes to be the greatest components of learner autonomy: 1) its capacity for individual and cognitive reflection and awareness, 2) its ability to situate the learner in a socially- interactive environment and 3) the opportunity for learners to experiment with "authentic target language materials" (Schwienhorst, 2008).

Schwienhorst (2003) carefully outlines three approaches to foster learner autonomy in a CALL environment: individual-cognitive approach, social-interactive approach and experimental-participatory approach. The individual-cognitive approach has frequently been related to language and linguistic awareness. Despite the variety in the definitions of terms, it appears sensible to refer to language awareness as an inherent capacity and to linguistic awareness as something developed through formal schooling.

The social-interactive approach is based on the notion of the "zone of proximal development" (Vygotsky, 1978, p.86), which emphasizes the

distance between what learners can do by themselves and their potential development when they are helped by others who are more competent. In SLA, then, Vygotsky's notion stresses the need for a collaborative learning environment where learners are encouraged to interact with and support each other. Such an environment is also supported by guidance from teachers. For the experimental-participatory approach, learners should be put in an environment where they can experiment with authentic target language materials (Schwienhorst, 2008). In his view, learners will do experiments only if they are equipped with easy- to-use tools and authentic materials. Also, such tools and materials need to be designed and carefully chosen based on a pedagogical framework that allows learners to exercise their autonomy.

On balance, from this perspective, learners should be given control over their learning, encouraged to reflect on their learning and supported by a well-structured learning environment, peers and teachers if we want their capacity for autonomous learning to be developed.

Design Principles Promoting Learner Autonomy in CALL

I adopt two of Schewienhorst's approaches, mentioned above, as the design principles for this study: individual-cognitive and social-interactive. In practice, in the individual-cognitive approach, the act of writing can facilitate a reflective process. In the social-interactive approach, interactions with peers through project-based tasks and feedback from teachers promote learner autonomy. In a DST project, writing self- generated dialogues and weekly reflections support an individual-cognitive approach. In addition, working collaboratively on a group project and giving feedback and receiving it from teachers and peers foster learner autonomy based on the social- interactive approach.

Learner autonomy and DST

Only a few empirical studies have been done on DST and learner autonomy. Those studies have demonstrated that DST has the potential to foster learner autonomy. In a study on the effectiveness of DST on middle school-aged students, Sadik (2008) indicates that learners were encouraged to systematize and express their ideas and knowledge individually and meaningfully. This study indicates that DST has the potential to promote learner autonomy from a cognitive point of view.

The only study addressing a direct relationship between DST and learner autonomy is by Hafner and Miller (2011) who investigated the potential of a digital video project to foster learner autonomy among university students in Hong Kong. They used a student-centred project-based approach in a technological learning environment as their pedagogical principle. They reported that the digital video project promoted independent learning both in terms of practicing English and searching for information on the Internet. They also reported that working collaboratively with peers encouraged them to monitor each other's learning and to learn from each other in terms of language and content of the video. The study concluded that their digital video project in a technological learning environment provided students with opportunities to take control of their learning and to exercise their capacity as autonomous learners (Halfner & Miller, 2011, p. 81). Their study has considerably inspired this present study of the utilization of a technological learning environment

Both studies address different aspects of the promotion of learner autonomy: cognitive (Sadik, 2008) and social (Hafner-&-Miller, 2011); however, as discussed above, the cognitive and social aspects of learner autonomy are inextricably linked, therefore, the design principles of this study will address both aspects in order to paint a clearer picture of the potential for using DST to foster learner autonomy.

As can be seen from the literature, a new notion that learner autonomy is not merely an independent process has been highlighted and the role of social interaction has come to light. In research on DST and learner autonomy, it appears to me that the focus has been either on the role of the cognitive (Sadik, 2008) or the social (Halfner & Miller, 2011). Thus I am arguing that when designing technology aiming to promote learner autonomy, both cognitive and social elements need to be valued. This study adopts Schwienhorst's (2003) approach to promoting learner autonomy as the design principle and aims to address both cognitive and social aspects of learner autonomy. To examine the potential of the design to foster autonomy, this study is guided by one research question;

Research Question: *To what extent does a digital storytelling project show potential to promote learner autonomy?*

Research Design and Method

Participants

The participants are from a class of university students learning English as a foreign language at a middle-sized university in Thailand. The class consists of 17 students. All of them are enrolled on an English course called "English for communication skills I", a compulsory course for all non-English major students at the university. From a demographic perspective, fifteen were female and two were male. All of them have a computer at home and use it at least once a month. Their English levels range from beginner to intermediate (self-report). Also, their reasons for learning English are varied, but mostly it is for their future career (see Table 1 for details). The data were collected using a *Demographic questionnaire* consisting of 9 items. The items can be divided into these categories: name, age, gender, years of learning English, computer knowledge, frequency of computer use, computer ownership, English proficiency and reasons for learning English.

Table 1 Background information on study participants (1)

Participants	Age	F	%	Gender	F	%	Years of learning English	F	%
	18	2	11.76	Male	2	11.76	0-5	0	0.00
	19	13	76.47	Female	15	88.24	6-10	2	11.76
	20	2	11.76				11-15	13	76.47
							15-20	2	11.76

Table 1.1 Background information on study participants (2)

Computer knowledge	F	%	Frequency of computer use	F	%	Computer Ownership	F	%
Poor	0	0.00	Every day	8	47.06	Yes	17	100.00
Fair	8	47.06	Every other day	5	29.41	No	0	0.00
Good	7	41.18	Once a week	1	5.88			
Very good	2	11.76	Once a month	3	17.65			
Excellent	0	0.00	Never	0	0.00			

Table 1.2. Background information on study participants (3)

English proficiency level (self-reported)	F	%	Reasons for learning English	F	%
Beginner	2	11.76	Interested in English	3	17.65
Elementary	7	41.18	Interested in culture	1	5.88
Pre-intermediate	6	35.29	Have friends who speak English	0	0.00
Intermediate	2	11.76	Compulsory course	3	17.65
Upper intermediate	0	0.00	For future career	9	52.94
Advanced	0	0.00	For travelling	1	5.88

Notes: F = frequency

3.2 The Zimmertwins

The online platform used in this study is called the Zimmertwins. It is a website primarily designed for children to share their creative stories through animated movies. The functions afforded by the website allowed the researcher to create a virtual classroom for students participating in the project. The website provided the students with an easy-to-use movie making tool. The multimodal features offered by the website include visual images, self-generated texts, sounds, movements, feelings and expressions. Plus, three

characters, a twin brother and sister and a cat, are provided. It should be noted that DST tasks in this platform only allow users to produce speech in written formats i.e. they cannot record their voice into the programme, instead they have to create dialogues between characters using texts.

The movies created by students were stored and could be viewed only by the teacher, the researcher and other students in the virtual classroom. Also, the movies could be commented on by the teacher and other students. Additionally, the website provided space for students to write a blog and was utilized by the students to write their weekly reflections. Importantly, the videos created could not be shared in other online spaces. This provided privacy and exclusiveness for the students in this project.

Figure 1: Movie-making tool

Figure 2: Movements available to students

Design of the Technological Learning Environment

This study is influenced by Halfner and Miller's (2011) study and adopts the term technological learning environment for the purposes of this study. Broadly speaking, the term refers to the use of technological tools and resources to support the learning process. In this study, the design incorporates a range of resources and technological tools, including: (a) a movie-making website called the Zimmer Twins which provides students with an easy-to-use tool to create their videos and space to make comments and receive feedback on their videos; (b) a class blog on the Zimmer Twins website for students to write their weekly reflections; (c) details of resource websites and video tutorials, created by the researcher or available online were provided; (d) a Facebook group was created to provide space for students to discuss technical or organizational issues with the course

instructor and the researcher. The technological learning environment is illustrated in Figure 3, below:

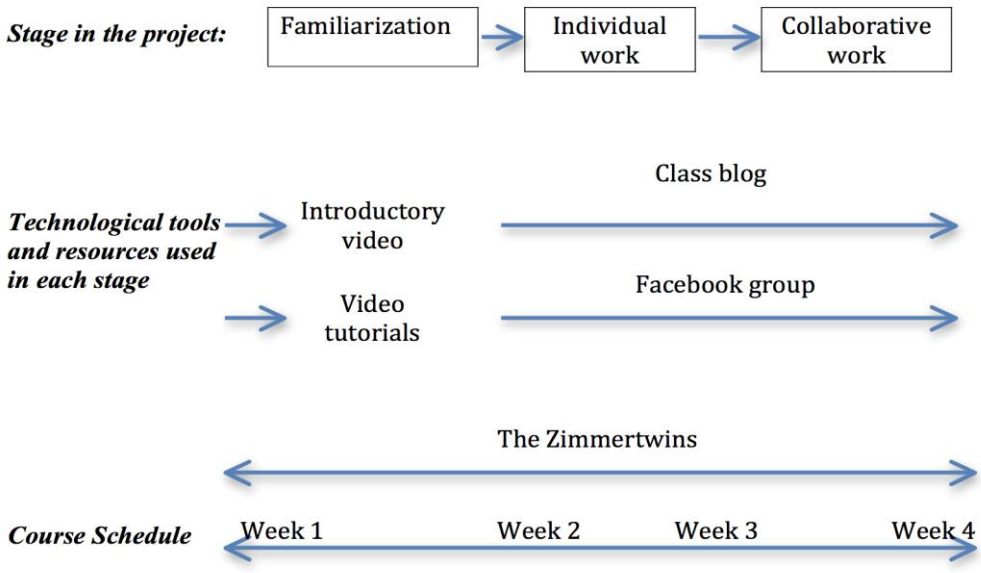

Figure 3: Illustration of the technological learning environment

In the familiarization stage, students learned how to use the website from an introductory video and video tutorials, created by the researcher or available online. In the second stage, students worked individually on a given topic and a free topic. In the last stage, students worked collaboratively with their peers. Both stages were supported technologically by a Facebook group for students to ask questions regarding technical and organizational issues. Also, students started writing their weekly reflections in the class blog in the second stage and carried on doing that until the last week of the project.

Implementation of the DST project

The course was designed for non-English major students at the university to develop their English communication skills. The DST project was integrated as part of the course syllabus and implemented for the first four weeks of the course (see Fig. 4). In the introduction class, students were introduced to the project by the course instructor. Also, an introductory video, explaining what

the project is about and briefly introducing the Zimmer Twins website, was presented in the classroom. Then, they were asked to familiarize themselves with the website at the end of the class and over the week before the next class. In addition, they were informed that a video tutorial created by the researcher was available on YouTube. In the second week, students were assigned to complete a storytelling video individually on a given topic. The topic was related to what students had learned in the class that week.

In the third week, students were assigned to create a personal storytelling video individually on any topic. In the last week, students were assigned to work in a group of three to complete a storytelling video. In every video, students were encouraged to use vocabulary and grammar they had learned in class. Also, the course instructor and researcher gave feedback on the students' videos every week and students were encouraged to comment on their peers' videos. Besides, students reflected on their learning process every week through weekly reflections.

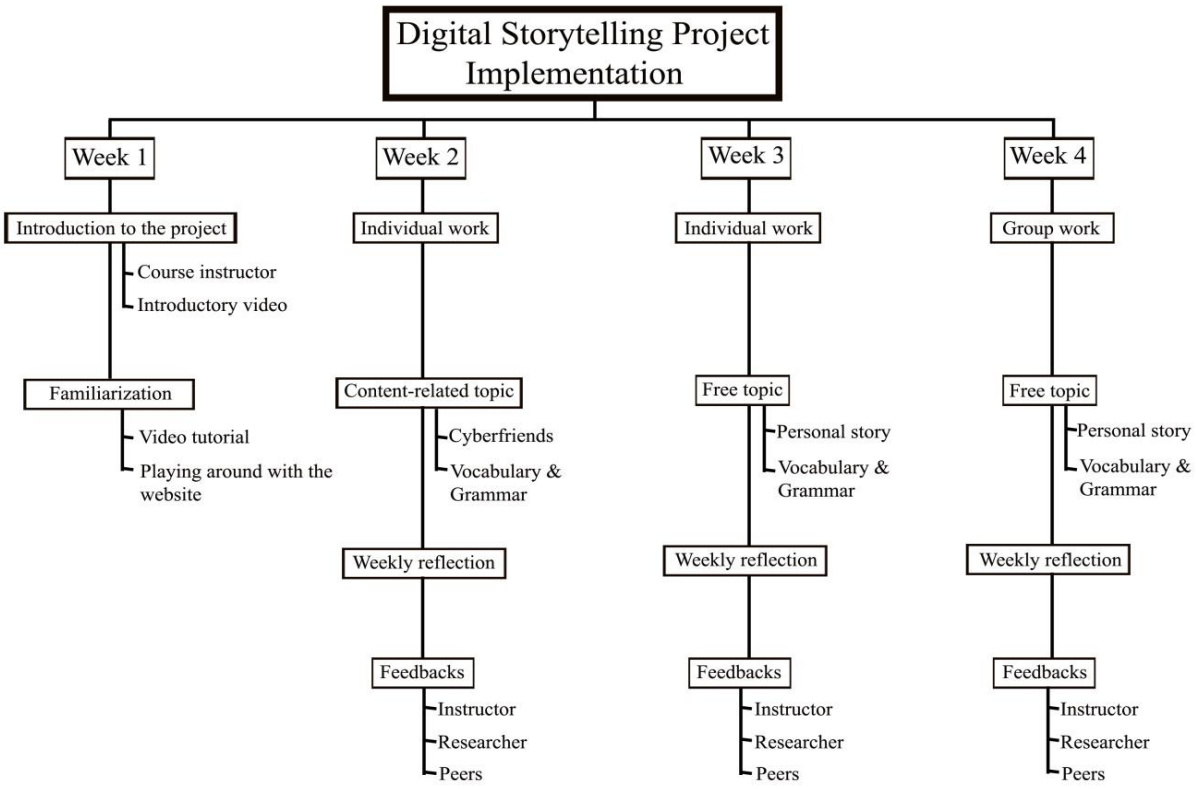

Figure 4: Implementation of the digital storytelling project

Instruments

Two sets of data, quantitative and qualitative, were collected through two instruments: questionnaires and interviews. An *autonomy questionnaire* was developed for this study. The *autonomy questionnaire* consists of 7 five-point Likert scale items concerning learner autonomy. The items can be separated into two categories: individual- cognitive and social-interactive. All of the items were developed by the researcher. The scale has two functions in this study; first, it is used to measure student's perceptions of learner autonomy in their learning process. Second, it functions as an evaluative tool for the design principles in this study.

Individual semi-structured interviews were conducted face-to- face and online via two platforms: Skype, a voice-over-Internet-protocol (VOIP) application and Facebook chat, an instant messaging service on Facebook. Participants in this study were asked to reflect on their learning process once a week through a class blog on the Zimmertwins website. The weekly reflections function as learner diaries for students to reflect and evaluate their outcomes. Methodically, it allowed me to confirm the data obtained with the data from the interviews to see whether they are matched. This is because interview data only came from interview samples; therefore, reflections provide a way to triangulate the data from all participants.

Data Collection and Analysis

The *Autonomy questionnaires* were distributed at the end of the project. All of them were distributed online using the Google Docs online survey tool. Then, one third of the participants (N=7) were selected randomly for interviews with the researcher (3 via Skype and 4 via Facebook chat). Throughout the project, participants wrote their reflections and they were used to support the data from two other sources.

The data obtained from the questionnaires were analysed using the Statistical Package for Social Sciences 20.0 (SPSS), and fundamental descriptive statistics, including frequency, mean scores and standard deviations, were calculated. The scores for the five-point Likert-scale items are interpreted as follows: 1.00 is strongly disagree, 2.0 is disagree, 3.0 is neutral/don't know, 4.0 is agree and 5.0 is strongly agree. The data from the open-ended questions, interviews and reflection logs are used to support the quantitative data.

Results

Evaluation of the Design Principles

This section presents an evaluation of the design principles of the present study. The focus of this section is, therefore, on evaluating whether the design is successful based on students' perceptions.

Table 2 Student perceptions of learner autonomy (Individual cognitive)

		SD	D	N	A	SA	Mean	STD
Q1	F	0	0	3	10	4	4.06	.659
	Percentage	0.00	0.00	17.65	58.82	23.53		
Q2	F	0	0	2	9	6	4.24	.664
	Percentage	0.00	0.00	11.76	52.94	35.29		
Q3	F	0	0	1	6	10	4.53	.624
	Percentage	0.00	0.00	5.88	35.29	58.82		

Notes: F = frequency, SD = strongly disagree, D = disagree, N = neither agree nor disagree, A = agree, SA = strongly agree, STD = standard deviation.

Q1: Writing weekly reflections enabled me to monitor my learning progress.

Q2: Writing dialogues in my videos made me more aware of my language use.

Q3: Watching other students' videos helped me gain different perspectives on how to create my video.

Individual-Cognitive

Three items in the learner autonomy questionnaire were included to evaluate whether the students perceived themselves as exercising their capacity for reflection and awareness. The mean scores in Table 2 show that the students were reflective on their learning and were more aware of their language use in the DST project. Almost all the students (94%) agreed that they gained a new outlook from watching their friends' videos. Also, most of the students reported that they were more aware of their language use through writing dialogues and were able to monitor their learning through writing weekly reflections (88% and 82%, respectively).

In the qualitative data, the students reported that they were more aware of their language use during the project and were being reflexive on their learning. In terms of language awareness, the students reported that their awareness was raised through the process of writing, especially writing dialogues for the characters; as one participant wrote:

> *…I get more conversation skill because before I write a word or a sentence that they say, I have to write and arrange*

Besides, the students appeared to be more reflexive on their learning. That is, they were able to monitor their learning process, know their mistakes, see how they were progressing and find a suitable approach and method for their learning. Nevertheless, some of the students did not find writing reflections very useful as they did not write them in a timely manner. By and large, the design principles seemed to be successful in fostering learner autonomy from an individual-cognitive perspective in that they raised students' language awareness and encouraged them to be reflexive on their learning.

Table 3 Student perceptions about learner autonomy (social)

		SD	D	N	A	SA	Mean	STD
Q4	F	0	0	4	8	5	4.06	.748
	Percentage	0.00	0.00	23.53	47.06	29.41		
Q5	F	0	0	0	9	8	4.47	.514
	Percentage	0.00	0.00	0.00	52.94	47.06		
Q6	F	0	0	4	9	4	4.00	.707
	Percentage	0.00	0.00	23.53	52.94	23.53		
Q7	F	0	0	0	7	10	4.59	.507
	Percentage	0.00	0.00	0.00	41.18	58.82		

Notes: F = frequency, SD = strongly disagree, D = disagree, N = neither agree nor disagree, A = agree, SA = strongly agree, STD = standard deviation.

Q4:I found peer comments interesting and informative.
Q5: I used feedback from my teacher to improve my next video.
Q6: I gained English knowledge and communication skills through working with my peers.
Q7: Feedback from my teacher helped me to become more aware of my language use.

Social-Interactive

Four questionnaire items were designed to evaluate whether the DST project was able to situate students in a socially interactive environment in which they could interact and learn from their peers and teachers. Overall, the results in Table 3 suggest that the design of the project allowed the students to interact collaboratively and socially with their peers and teachers and that the teacher's feedback was seen as being extremely useful. Impressively, all of the participants (100%) agreed that the feedback from the teacher helped raise their language awareness and that they used that feedback to improve their production. Additionally, a substantial proportion of the students (76%) reported finding their friends' comments useful and gaining knowledge from working collaboratively with their friends.

The qualitative data from the interviews and questionnaires indicate how the design paved the way for the students to be situated in a socially-interactive

environment. Teacher feedback was reported to be most successful. Most of the students commented that the feedback helped them to be more aware when they use language and to improve their videos, in terms of both language and content. One participant commented:

> *Well, I have always had problems with grammar so the feedback really helped me especially when I use English in other contexts, feedback from the teacher came automatically into my mind.* [Interview, Student 4]

Furthermore, students benefited from working collaboratively with their peers in many ways. Some of them commented that they learned from their friends who were better at English when doing the group work, and their perspectives were broadened through discussing and sharing ideas with other group members. Besides, having worked individually beforehand was found to be helpful when they were working in their groups. To conclude, the design principles appeared to be successful from a social-interactive view of learner autonomy, in that they put the students into a well-structured learning environment in which social interaction with peers and teachers took place and was facilitated by feedback and group work.

Potential of the DST Project for Learner Autonomy

There are some themes emerging from the data that seem to foster some form of learner autonomy. The themes are categorized and presented in this section.

Independent Learning

In the process of creating their videos, two types of independent learning were reported by the students: independently learning how to create a video, and independently practising English and doing research related to language issues. The students reported that the project encouraged them to learn how

to create videos by themselves. They commented that they learned how to create videos both from the video tutorials and from their friends' videos.

In addition to technology learning, students reported practising their language and doing research on language issues independently. They commented that the project encouraged them to practise their English, e.g. when they were writing a plot or dialogue for the characters, they practised their English. Besides, most of them commented that they were engaged in doing independent research on English as part of their process of creating their videos. One student wrote:

> *…this encouraged students to do research on vocabulary, phrases and sentences in order to complete the videos.* [Questionnaire, Student 3]

Also, it appeared that the students were independently engaged in a variety of resources both online and offline. One student said:

> *"I used three things: my own brain, textbook and the Internet. For example, if I don't know a word, I will check it on the Internet. Also, sometimes I wrote the dialogues in Thai and used Google to find the word or phrases I didn't know… .* [Interview, Student 9]

Peer Teaching

Working in a group allowed a social context for learning to formulate. This gave opportunities for peer teaching to take place, mostly the teaching of English, but some indirect teaching of technology was also evidenced. Some of the students said that their group members sometimes helped them with language issues:

> *Sometimes, I learned grammar and vocabulary from other group members who were better in English. For example, I have the plot in mind but I don't know which vocabulary to use, other members can help on this.* [Interview, Student 6]

No direct peer teaching of technology was evidenced; rather, it took place indirectly. Linked to the above section, the students learned independently how to create videos from their peers' videos. This may be seen as a form of indirect peer teaching. More importantly, peer teaching was not only restricted to peers in the same group, but also socially constructed via other students' comments on their videos once they were published on the website.

Reflection on learning

Strongly linked to the design principles of the project, the class blog provided an opportunity for the students to reflect on their learning. Most of the students reported that they were able to reflect, although in general terms, on the content and their English in their videos. This process was supported through weekly reflections, teacher's feedback and peers' comments on their videos. To exemplify this, one student said:

> *The feedback helped me to be more aware of my mistakes and know what I should improve; for example, I got a lot of comments regarding tense so I used those comments to improve my next videos and tried not to make those mistakes again.* [Interview, Student 7]

The technological learning environment afforded the students space to evaluate their own products (class blog), receive feedback from the teacher and give to and receive comments from their peers (comment box in their videos). This environment allowed the students to exercise their capacity of individual reflection, which otherwise would not likely have been exercised in other contexts, such as giving and receiving feedback in the classroom after a presentation.

Discussion

Potential of a DST project to promote learner autonomy

The students' practices and perceptions demonstrate that the DST project afforded opportunities for autonomous language learning to take place. The students perceived the DST project to be fun, novel, interesting and challenging. Also, they commented that they were encouraged to take control and responsibility for various elements of their learning: individually reflecting on and monitoring their learning process through writing weekly reflections, independently learning how to create videos, independently doing research on language issues, giving comments on their peers' videos, receiving feedback from the teacher and teaching one another in collaborative work in terms of English and technology. These practices and perceptions illustrate that DST projects have promising potential to afford opportunities for students to exercise their capacities as autonomous language learners.

In the DST project, the learner autonomy exercised can be ascribed to three attributions: project design, role of the teacher, affordances of the technology. Firstly, the project design encouraged students to write reflections after completing every video. This allowed them to be reflexive and to monitor their learning process, which are elements that are considered to help foster learner autonomy (Little, 1995, 1997). In addition, the collaborative groupwork provided opportunities for a social context to forums which enabled students to share their knowledge and teach one another about language issues and technology. Such a collaborative aspect is also thought to help foster learner autonomy (Little, 2008; Benson, 2011; Halfner & Miller, 2011). Besides, working individually on the first two videos encouraged students to learn how to create their videos and do research on language issues by themselves.

Secondly, the teacher's involvement in the project as facilitator and language counsellor helped the students to understand their mistakes, which in turn

raised their language awareness. Coupled with the project design mentioned above, this allowed the students to reflect critically and individually on their language learning. However, these exercises in learner autonomy would not have been possible without the affordances of the technology. The website offers functions so that students can view and edit their work, which allows them to realize their mistakes when writing dialogue for the characters and to evaluate their videos' content, a class blog for students to write their reflections and space to make comments, which is not only useful for teacher feedback but also for students to comment on their friends' videos.

The aforementioned results prove the success of the design principles adopted in this study, in terms of both cognition and social interaction. As for the cognitive aspect, the students were more aware of their language use and were able to reflect, albeit in general terms, on their learning. As for the social aspect, the collaborative learning environment enabled and encouraged them to interact with and support each other. It also allowed the teacher to act as a language counsellor and give written feedback on their language use. This helped them to be more aware of their language. The success empirically reinforces Schwienhorst's proposal (2008) that such components support learner autonomy. It further supports the links between individual-cognitive and social-interactive approaches to promoting learner autonomy and that both are mediated through writing (Schwienhorst, 2003).

By and large, the potential of the DST project to foster learner autonomy consolidates the results from previous studies, that DST has the potential to promote learner autonomy (Halfner & Miller, 2011; Sadik, 2008). In particular, the results from this study lend support to the notions that learner autonomy can be promoted in a well-structured collaborative learning environment (Halfner & Miller, 2011), that teachers are still very much involved in students' learning (Schwienhorst, 2003) and that learners should be encouraged to reflect on their learning (Little, 1995). More importantly, the

results support an argument that the roles of both cognitive (reflection on learning) and social (collaboration and interaction) should be valued when designing CALL projects or activities that aim to promote learner autonomy. If one is absent, students may not be able to exercise their capacity for autonomous language learning effectively.

Limitations

Although the findings of this study have shed light on the potential of the affordances and challenges of using DST to foster learner autonomy, the findings may not be generalizable as this is a small-scale study. A larger-scale study is definitely recommended. However, I am reluctant to suggest a very large-scale study, several classrooms or courses at a time for example, because I think this kind of technological implementation works best at the classroom level. Therefore, I would recommend keeping it to the classroom level but with a larger sample.

Pedagogical Implications and Conclusion

The findings offer language teachers and educators a useful tool for language learning and to promote learner autonomy. Yet DST, as a concept, is flexible in itself and can be used to facilitate other pedagogical goals as well. It therefore depends on how a teacher uses the affordances of DST and designs activities to serve their pedagogical purposes. As I mentioned earlier, technology in itself does not determine learner autonomy; therefore, if teachers are interested in using DST to promote learner autonomy, they need to make sure that it is well-designed and based on an appropriate theoretical framework and they need to make thorough contributions to it. This applies to the use of other types of technology aiming to promote learner autonomy as well.

In conclusion, as a case study in one classroom in one institution, this is essentially an exploratory study. I have no intention to suggest that the

results presented here are uniform as the way that different students in different contexts approach DST varies. Instead, my attention is to underline the design of the project here, in order to make suggestions for future practice. Also, the affordances of different types of technology need to be taken into account when making decisions on using them to foster learner autonomy. Last but not least, we cannot take for granted that all students in the twenty-first century are "digital natives" and will be able to learn effectively from any digital resource. Therefore, they need to be equipped and supported with ample resources so that they can learn effectively with the technology to hand.

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