Tapping into students’ digital literacy and designing negotiated learning to promote learner autonomy

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1. Introduction

Students of today are digital natives. They are fluent in the digital language of computers and the Web (Prensky, 2005). Digital natives often engage themselves in the use of information and communication technology (ICT) tools and in accessing, creating, and sharing text and videos on the Web in their leisure life (Junco, 2012). The ability of digital natives to embrace ICT suggests that they possess a certain level of digital literacy (Ng, 2012). While the term literacy has traditionally referred to the ability to read and write, it more generally suggests competence or knowledge in a specific area. Because of the development of computers and the Internet, the knowledge and skills used in the digital world have been addressed and named digital literacy. Digital (ICT) literacy has been defined as the use of digital technology, communication tools, and networks to access, manage, integrate, evaluate, and create information to function in a knowledge society (ICT Literacy Panel, 2002). Appel (2012) defined digital literacy as the ability to find and analyze information by using computers and the Web. Hatlevik and Christophersen (2013) used the term digital competence to describe the acquisition and processing of digital information and the ability to produce digital information. Clearly, digital literacy is a broad concept encompassing different aspects, and its development follows a continuum from the acquisition of instrumental skills to that of productive and strategic competence and cognitive skills (Calvani, Fini, Ranieri, & Picci, 2012).

In terms of the ways in which digital literacy is acquired, adolescents, in particular, engage in a broad range of computerized activities, including doing homework, searching and gathering information on the Internet, using social media networks to communicate with friends, watching videos on YouTube, or playing first-person shooter video games (Appel, 2012). In general, the digital literacy these youngsters possess refers to the skills and knowledge in using computer and Internet technology and navigating in a hypermedia environment. For both computers and the Internet, research has shown that the amount of experience and current usage are associated with greater skills and knowledge (van Deursen, van Dijk, & Peters, 2011). Related ICT tools might be a word processor, Web search engine, social media networks, video editing software, or e-mail (John & Sutherland, 2005). Diverse ICT tools exist for various purposes. For some tools, especially for those intended for entertainment purposes, students are often more skilled and adept at using them than their teachers, such as when the tools
are used to edit videos and upload them to Facebook or Youtube (Gu, Zhu, & Guo, 2013).

This type of digital literacy is acquired by digital natives without any request from their parents or school. They are motivated by their need for personal entertainment and social life. That is, students autonomously learn the instrumental skills and knowledge of computers and the Internet outside formal education (Eynon & Malmberg, 2011; Junco, 2012; Ng, 2012). In addition, because students are raised in such a networked digital environment, their patterns of thinking and communication, notions of learning, needs for control, and even their personal and social values have also been shaped by this environment (Gu et al., 2013). In recent years, there has been an increasing interest in the ways that young people are using the Internet and other new technologies in their everyday lives and how such use may enhance informal and formal learning opportunities (Eynon & Malmberg, 2011; Lim, Zhao, Tondeur, Chai, & Tsai, 2013). Given the digital natives’ autonomy in developing this kind of digital literacy, the attitude aspect of autonomy and skill aspect of digital literacy should be explored for their educational potential as more and more ICT tools are available to them.

For an ICT-related course taught at a college, institute, or university, teaching is usually topic-based. This kind of instruction involves theoretical introduction and explanation concerning mostly the structure of the domain field in regards to further learning. The reason for this type of teaching is that the goal of school education is to provide students with coherent logic for generalizability, and to build up their knowledge for generic situations (Bereiter, 1997). However, students in general lack motivation for this type of learning because they perceive the abstract subject content as unrelated to their personal lives. Moreover, most students have already acquired their digital literacy for the practical application of ICT tools in their leisure life. The ICT-related course content and students’ digital literacy seem to be at opposite ends of the continuum of authenticity and generalizability proposed by Chen and Hung (2002). Authenticity refers to the use of ICT tools, which becomes students’ digital literacy. Generalizability, on the other hand, refers to the technical knowledge and theories concerning ICT tools, which are the focus of the school courses.

To ensure better learning, students should be supported along this continuum so that they can gain richer and deeper understanding of the subject content. Thereafter, the learning and the process can be personally meaningful as well as academically accountable. It is necessary to bridge what teachers intend to deliver and what students are interested in. Negotiated learning seems to give clear recognition to this and can serve as a feasible instructional design because students can discuss with teachers and peers about the goals, content and methods of learning. During the negotiation process, teachers, with better understanding of students’ background knowledge and their learning goals, may find the way to scaffold them along the continuum. Meanwhile, students may appreciate and find interest in the course content suggested by teachers with the realization of its relationship with their digital literacy.

During the negotiated learning process, students need to make decisions about their own learning and perceive themselves as being in control, which is an essential aspect of learners’ autonomy. Meanwhile, teachers should support students’ autonomous engagement, to allow their progressive knowledge development (Dam, 1990). This study investigates methods that enable students to develop their autonomy in school learning. In light of the autonomous attitude and the acquired skills during students’ digital literacy development, this study proposes applying the pedagogy of negotiated learning to tap into this literacy to foster learning autonomy in ICT-related school courses.

2. Negotiated learning

The concept of negotiated learning stems from the idea that students must be supported in making choices and selection decisions with reference to curricular objectives, contents of the subject matter, in and out classroom activities, methodology, resources, materials, and means of assessment (Yuksel, 2010). To do so, students should be involved in the decision-making process of curriculum development. The teacher and the learners work together to make decisions on much of the curriculum design, making it a ‘dynamic’ and ‘negotiated’ syllabus rather than a ‘static’ and ‘imposed’ one (Rajaee Nia, Abbaspour, & Zare, 2013). As students are more involved in shaping the syllabus, they will have a stronger motivation and commitment to the course (Nation & Mcalister, 2010). Studies found that negotiated learning would preserve and promote autonomy among learners by granting them a role in decision-making processes and asking them to take on greater responsibility for their own learning (Ma & Gao, 2010; Rajaee Nia et al, 2013).

In negotiated learning, students are required to have the confidence and ability to take personal control over the demands of the learning task. In prior literature, negotiated learning has been mainly addressed in two subject contexts, foreign language learning (Felix, 2002; Lo, Tsang, & Wong, 2000) and physical education (Ennis, 1995; Wright, Macdonald, & Burrows, 2004). Related studies showed that students should have some experiences and/or knowledge about the subject, and have certain learning goals to negotiate. Topic-related experience and knowledge as well as preexisting learning goals are asserted to support and enable students to negotiate the curriculum with teachers and peers.

Moreover, in negotiated learning, not the entire curriculum is to be jointly decided by both students and teacher; some parts or aspects are to be decided upon by the teacher. For example, as the teacher is responsible for leading students toward the overarching learning goal of a course, he needs to arrange the curriculum according to the topics selected by students. Meanwhile, the topics proposed by students help teacher understand students’ expectations and existing knowledge of the course, and teacher may illustrate how those topics are related to the course or provide better alternatives. It also needs to be stressed that negotiated syllabi focus on the skills and processes involved in learning and the learning experiences themselves rather than on the end products of these processes (Ma & Gao, 2010). That is, negotiated syllabi are concerned with how the subject content is learned and how this learning is integrated with learners’ experiences.

3. Learner autonomy

Learner autonomy is the ability to assume responsibility for one’s own affairs, and the ability to act in situation where the learner is totally responsible for all the decisions concerned with his learning and the implementations of the decisions (Boud, 1988; Joshi, 2011). Joshi (2011) defines an autonomous person as one who has the capacity to make and carry out the choices which govern his or her actions independently. Autonomous learners perceive themselves as being in control, they are intrinsically motivated and have confidence in themselves, and they have a capacity for active and independent learning (Arnold, 2006).

Learner autonomy is exercised at least in the following four ways: situations in which learners study entirely on their own; a set of skills which can be learned and applied in the self-directed learning; the exercise of learners’ responsibility for their own learning; and the right of learners to determine the direction of their own learning (Benson & Voller, 1997; Joshi, 2011). In higher education, autonomy has been associated with freedom, choice, decision-making and with the idea that students should assume responsibility for their own learning. This is especially important today with competitiveness depending much on innovation and creativity which, in turn, values the ability to manage one’s own learning, alongside specialist and technical knowledge (Wright et al., 2004). As learners have greater access to proliferating information channels and sources, for example, the Web, they should be endowed with greater learning autonomy.
4. Proposed negotiated learning for ICT-related courses

This study proposes having students go through a negotiated learning process to study the digital literacy-related subject domain and help them develop autonomy. In negotiated learning, students interact with the teacher and peers in deciding and selecting learning resources and materials. Such interaction process involves students’ autonomy, which is related to their ability and willingness to function in concert with others, and to make efficient and appropriate use of each other’s resources so as to optimize the learning process (Confessore & Park, 2004; Dam, 1990; Ng, Confessore, Yusoff, Aziz, & Lajis, 2011). Meanwhile, students’ ability in making efficient use of digital resources is related to their digital literacy, which would contribute to success in the process of negotiated learning.

In addition, with ICT advancements, there are diverse tools for various applications. Having used these tools in their leisure life, the digital-native students may have various background knowledge or expectations for an ICT-related course content. Students’ knowledge and expectations may differ from what their teachers understand and assume, and negotiated learning is introduced to help teachers and students understand each other better and reach commonly agreed learning topics. With the learning topics being jointly decided, students’ autonomy for the learning is expected to be enhanced.

In this study, students’ digital literacy describes their experience and knowledge of the operation of ICT tools, which is mainly peer-driven and learned through tinkering (Ng, 2012). If incidental learning occurs during recreational computer use, students’ digital literacy is often declarative (Appel, 2012). Students may not have the background technical knowledge of the tool’s operations. For example, students may be adept in using multimedia tools to edit photographs, but they may not have the knowledge regarding the related image-processing algorithms for smoothing or sharpening, which are taught in university computer engineering courses. For an ICT-related course, the teaching goals include the ability to generalize knowledge and experience acquired, such as these smoothing or sharpening algorithms, for use in other domains. Digital literacy must support students along the authenticity-generalizability continuum (Chen & Hung, 2002); thus, some procedures must be followed for them to advance their ICT knowledge. For example, providing technical information and explaining theories that enable students to link the ICT tool operation with their knowledge and experience are necessary. Therefore, some parts of the course are negotiated, and other parts are prescribed by instructors.

Furthermore, students can negotiate the content they want to learn. For an ICT-related course, these digital-native students have their basic ICT knowledge and experience to negotiate the content with their teacher and peers. It is important to have students’ past experience involved in the negotiation. The digital natives have already learned the use of different tools. Every student has different needs, and no specific tool or topic can satisfy all different needs. Using learners’ real-life needs and activities as learning experiences provides motivation through immediacy and relevancy (Krahneke, 1987). The learning can begin with students’ discussion of their interests, capabilities, and possible explorations of ICT tools. After the discussion, tools or topics ranked with higher interest will be selected.

Teachers should relate students’ selected tools and skills to the aforementioned techniques and theories, which help students move toward generalizability. The integration of life experience provides a cognitive basis for learning (Rajaee Nia et al., 2013). Students’ experience of tool operation may help them understand what has been taught and demonstrated, as well as motivate them to think about the techniques and theories behind the digital technologies they use everyday.

For example, students use multimedia tools to edit digital photographs and to upload and share these images with friends on social networks. For editing a photograph, the “smoothing” operation involves replacing the value of each image pixel with the mean or median value of the 8 pixels that surround it (Silverman & Rosen, 2010). This study proposes connecting students with how the authentic operation of smoothing an image is achieved by using the generalizable mathematical operation that uses the mean or the median of neighboring pixels. Silverman and Rosen (2010) found that a learning activity that presents school mathematics content in the context of popular culture applications, such as digital image processing, supports students’ development of a personal connection with mathematics and allows them to see the connections between school mathematics and their personal trajectories. This study argues that students may appreciate the possibility that their knowledge of ICT tools can be improved in school learning if they use the course content recommended by teachers.

The decisions after negotiation need to be carried out in the learning activities. Students negotiate to decide what types of activities their group would like to have for exploring the ICT tools they have selected. These include group discussion, Web exploration, and information sharing among group members. Moreover, the way they interact with each other may not be limited to classroom activities. Nowadays, students spend much time using social media networks to share digital information with peers. Meanwhile, the Web has the richest resources in the world. Barry (2012) asserted that, through the communication environments which students understand, regularly participate in, and engage within their everyday lives, their engagement in meaningful learning experiences can be achieved. Thus, this study suggests using the activity format of group work and having students adopt the social media networks they are familiar with to collaborate with peers and utilize the Web resources in their learning pursuit.

Although students are encouraged to negotiate some assessment activities, same as the diverse tools or topics students may be interested in and chosen to be their content of learning, the teacher can use group presentation as one of the assessment activities. Presentation leaves open format for students to present what they acquire and reserve the opportunity for the whole class to discuss. Another reason is that the ICT course content is open and explorative owing to continuous advance of technology and applications and various new-to-the-market tools. Presentation provides an assessment method without constraints on the topics available to students.

Presentation can serve two functions. One concerns the cognitive aspect of the subject content knowledge, such as the techniques students acquire or the theories they learn and apply to using the tools in better ways. The other is related to the meta-cognitive aspect of the process of negotiated learning and students’ reflection about their learning strategies and how to perform better in the digital world of learning. Such reflection is expected to inspire students’ awareness of their willingness and capability of autonomously learning the course content in the proposed learning context. For clarifying the proposed learning design, a description is shown in Table. 1.

5. Activity design

Participants were 36 students, three seniors and 33 juniors, enrolled in an engineering course of multimedia technology at a vocational institute. They formed 13 groups on their own, with mostly three members per group and one being the group leader. In compliance with the overarching goal of the course, students were briefed, with reference to textbooks, on the possible topics in the course. The topics covered introductory to advanced knowledge of all major aspects of the subject content. Students could negotiate with their group mates and the teacher to select a technique or theory of multimedia technology to learn about, or use multimedia tools of their own choices to make a multimedia product. For subject content learning, students were required to explore some specific techniques and theories of tool operations that they were familiar with or interested in. The students who decided to make a multimedia product had to learn multimedia design theories, apply them, and use self-selected multimedia tools to introduce the topics. After reaching a consensus, the group leader reported their
choice and explained why the topic was selected. The subsequent discussion among the group members would then focus on how the topic can be effectively learned.

The objective of this class project is to inform students about and teach them the multimedia technologies beyond the tools’ operational skills. In the first part of the course, the teacher demonstrated examples to help students recognize the logical relationship between operations and theories of multimedia tools, for example, the aforementioned smoothing operation and the mathematical median of surrounding pixels. This part of course activity is to help students understand how theories and techniques are developed and applied in the multimedia tools they choose. For the second part of the course, students were asked to collaboratively explore the topics they choose. Students were encouraged to utilize the Web resources to find the information they need, and adopt versatile communication tools, such as Facebook, to collaborate with group mates. During class time, the teacher had discussions with each group to monitor their progress and provide suggestions bi-weekly.

At the end of the semester, one presentation was arranged for each student group. The presentation required the students to present the multimedia product they had made or the multimedia technique they had acquired. In addition, the students were required to report their own experience and reflections of the learning activities according to their group discussions. A report guide was provided to explore the students’ viewpoints on the proposed negotiated learning, the difficulties they faced during the use of multimedia tools and Web resources, how they resolved the problems, and the role of social media networks in the aforementioned issues.

6. Data collection

Qualitative and quantitative data were collected to provide cross-reference and insight into the proposed process of negotiated learning in relation to students’ digital literacy. More specifically, the data were analyzed to examine how students responded to the proposed learning activity and how their learning interacted with their autonomy.

Regarding qualitative data, all the students’ presentations were videotaped and then transcribed verbatim. Two researchers completed the categorizing task by working independently on line by line. Differences in coding were continually compared, discussed, and resolved. For the analysis results which required further clarification, the group members were invited to provide comments on what they had expressed in the taped videos. The results could shed light on the students’ learning processes of exploring Web materials and using multimedia tools and materials to prepare the presentation.

As to quantitative analysis, two questionnaires were administered in this study, and were validated by two lecturers with expertise in ICT education. The first questionnaire was conducted in the first week of the course to probe into the demographics and characteristics of the student participants. Questions that explore the demographic profile of participants include how much time students spend on the Web and social networks, types of devices and social media tools used, as well as major and secondary purposes of Web browsing. Open-ended questions were provided to explore students’ characteristics such as their experience and attitude toward negotiated learning and any prior knowledge about the subject content of multimedia technology and related issues. The questionnaires were developed with reference to the study of Ma and Gao (2010), which examined students’ attitudes, experiences, needs and wants about a course.

The second questionnaire probed into learner autonomy and was developed with reference to Learner Autonomy Profile (LAP) (Confessore & Park, 2004; Ng et al., 2011; Yen & Liu, 2009). The original version consists of 164 items, while the short version developed by Confessore and Park (2004) comprises 66 items selected from the original. In line with the objectives of this study, only questions related to the proposed learning design for developing students’ autonomy were selected. From the 66 items, 9 items (item nos. 5, 7, 8, 12, 13, 23, 28, 33 and 42 in the Appendix of Yen and Liu, 2009) were adopted with the wordings modified. The questionnaire was administered pre- and post-activity, respectively. The pre-activity survey was also held in the first week as the course began, and the post-activity questionnaire was administered in the last week when the course ended. A paired-sample t-test was employed to determine whether there was any significant difference before and after their participation in the proposed learning activity.

7. Results

Table 2 lists the demographic results obtained from the first questionnaire survey. As can be seen, all participating students have access to the Internet at home, which is also their primary Web access for social networking (66%). Most students spend 2 to 4 h on the Web (56%), while 31% of students spend more than 4 h on the Web. The result shows that Web activities took up most of their after-school hours. The main purpose of their Web browsing is entertainment (64%), followed by social activity (31%), with only 3% of the respondents using the Web chiefly for learning. As reported by prior studies, Facebook (73%) is the primary social networking tools. These findings echo recent literature which indicates students of today spending time on the Web for entertainment and social networking (Davies, 2012).

On the other hand, the results also show that the participants are digital natives, who are defined by Gil-Flores, Torres-Gordillo, and Perera-Rodríguez (2012) as those spending much of their leisure surfing on the Internet, engaging in activities such as communication with friends and family members, recreational downloading of music, movies, games, or other programs, and searching for information on

### Table 1

<table>
<thead>
<tr>
<th>Description</th>
<th>Negotiability</th>
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<tbody>
<tr>
<td>Course goal</td>
<td>Non-negotiable</td>
</tr>
<tr>
<td>Topic</td>
<td>Negotiable</td>
</tr>
<tr>
<td>Textbook knowledge</td>
<td>Non-negotiable</td>
</tr>
<tr>
<td>Learning activities and tools</td>
<td>Negotiable</td>
</tr>
<tr>
<td>Assessment</td>
<td>Non-negotiable</td>
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</table>
topics of interest. The participants in this study are thus assumed to have the basic digital literacy to engage into the proposed negotiated learning.

Regarding students' experience and attitude toward negotiated learning before the learning activity, the survey asked the following two questions:

1. Have you ever discussed with your teacher about the course content to be learned? Why?
2. Would you like to discuss with your teacher about the course content to be learned? Why?

According to the responses, none of the students have prior experience of negotiated learning; however, 34 out of 36 respondents are keen on participating in the course content-related discussion. The most common reasons given for the positive response included "I can choose to learn the topics I am interested in." "Joining in such discussion makes me feel respected", and "the activity was special and attract my attention." On the other hand, the two students who showed no interest in negotiated learning expressed concerns of not being sure if the teacher would take students' suggestions and of poor performance in this type of discussion that they had no previous experience of. Taken together, the above results revealed that most students harbored a positive attitude toward negotiated learning. Similar findings were obtained in the study conducted by Ma and Gao (2010), who reported that students were excited about negotiating learning because they were eager to try something new and they were bored with prescribed curricula and authorized textbooks.

As to students' prior experience and knowledge about multimedia tools, the following four questions were asked:

1. Do you have any prior knowledge about multimedia tools? If yes, what kind of knowledge?
2. Are you familiar with any multimedia tool? Please list as many as you can.
3. Have you ever used any multimedia tools in your daily life? If yes, what have you used them for?
4. Can you give an example of the use of a multimedia tool and its related theory or knowledge behind?

Responses to the first question were all negative while those to the third question were all positive. In other words, although the students have had no prior knowledge about multimedia tools, they all have used them in everyday life, mostly for producing and/or modifying photos and videos. For the second question, all the respondents could list a few tools they had used, such as Flash, Adobe, Photoshop, and various video editing tools in English or Chinese brand names, revealing that students have much more opportunities to use diverse technology tools outside school. None of the students could provide an appropriate response to the fourth question. For those who did give detailed answers, they mistook the operations they had done to the multimedia tools as the related principles or theories. For example, how to transform the video format of WMV into MP3 or vice versa was mistaken as the principles or theories of these two multimedia tools. Hence, the above results revealed that while students do have much experience in using multimedia tools, they lack knowledge on the technical details involved.

7.1. Learning autonomy

Table 3 lists the questionnaire survey results on students' learning autonomy before and after the proposed learning activity. Respondents were asked to rank each item using a 10-point scale for the frequency of the behavior mentioned in the item. That is, a score of 0 (10) would mean that the respondent will never (always) behave as described. The Cronbach's alpha values for the internal consistency for the pre-test and post-test were 0.63 and 0.61, respectively. An instrument is generally deemed to be internally consistent if it has an alpha above 0.60 (Lim et al., 2003).

According to the statistical analysis results in Table 3, the students had overall a higher level of autonomy across each factor except for item 9. Pairwise t-test showed significant difference between pre- and post-activity for items 2, 3 and 6. Item 2 reveals that the proposed negotiated learning seemed to provide a structure leading to significant enhancement in students' learning autonomy. Under such learning environment, as item 3 indicated, these students would choose to learn in spite of interference with their social life. Finally, item 6 shows increase in students' positive response in getting along with people on the Web. This finding supports the students' self-reports in which they acknowledged their appreciation for help from strangers on the Web forum for solving questions they raised. As learning autonomy involves students' functioning in concert with others and optimizing the learning process by making efficient and appropriate use of the resources of others (Confessore & Park, 2004; Ng et al., 2011), the results demonstrate that the proposed learning design seems to foster students' autonomy in terms of peer interaction.

Despite of the positive results obtained, the relatively low scores of item 9 left a crucial message for teachers. That is, the proposed learning design has negative impact on students' attitude toward self-developing a plan to satisfy their learning. In one-to-one interviews, students mentioned that the tasks they had to finish in this study involved much work and successful completion of the assigned tasks would require good planning and group work. Though the proposed learning activity seemed to alert them of the importance of task organization and peer collaboration, they worried about the heavy workload involved and expressed need for guidance.

7.2. Presentations and reflections

Regarding how students perceive negotiated learning, the responses show that all groups enjoyed deciding on the topic they would learn and...
preparing the presentation content. One group mentioned that the group members were motivated because they could decide what they were going to do in the course and learn what they wanted to learn.

The topics chosen by students are wide in variety, including the introduction of 3D technology, how to purchase a digital camera according to its technical specifications, and image retention in human eyes, and cover multimedia technologies taught in textbooks and widely applied in their daily life. The variety of topics students explored evidence their choices made on the basis of their group preference and decision, which are the product of negotiated learning under the proposed design.

Two major difficulties faced during the course were reported. One problem was information overload. Students mentioned that they were at a loss when having to process the huge amount of data acquired from the Web for preparing the presentation. They recognized the fact that abundant information is available on the Web and easily accessible through search engines, and Google was the one mentioned and used by most of the groups. When asked how they resolved this problem, students replied that they spent much time reading through the information and searched for related key issues of the topic chosen. The fact that students were willing to collect and read through much data seemed to reflect the extent of their learning autonomy developed for finishing the learning task under such specific context. In addition, when encountering materials beyond their understanding, students would seek help from friends through the social media networks or post questions at discussion forums on the Web. They showed great appreciation for enthusiastic strangers who provided answers and guidance on the knowledge exchange Web forums.

The other challenge was the technical difficulties in adopting multimedia tools for making the presentation. Some groups chose to use tools unfamiliar to them so as to expand their skills. According to students’ self-reports, they were able to solve the technical issues on their own through trial-and-error or through the use of other available resources, such as the ‘Help’ function on the tools, browsing websites of tool vendors or online forums, and seeking solutions from Youtube. Students acknowledged that they were all aware of tutorials offered on the tool vendors’ websites, in text and/or video, that could assist them in learning how to use the tools. Students also mentioned their use of dedicated online sites where members of the communities might be able to offer a solution to their problems posted. All these reveal that when using unfamiliar multimedia tools, students demonstrated both willingness and ability to utilize Web tools and resources.

### 8. Discussion

The current study taps into students’ digital literacy by the pedagogy of negotiated learning. The digital literacy in focus is ICT tools. Using ICT tools in education is certainly not new; what is novel in this study is the way these tools and resources are exploited under the negotiated learning activity to foster autonomous learning among students.

According to the survey results, the participants, students from an institute of technology, are typical digital natives with experience in using multimedia tools but without knowledge of the related technologies and theories. Nevertheless, they demonstrated willingness and engagement in the proposed negotiated learning. Students’ self-reports also reflected their desire for completing the learning task even in face of challenges in preparing the presentation. With their digital literacy, they adopted unfamiliar Web tools and collaborated with both peers and strangers on the Web, thus evidencing their learning autonomy in terms of ability and willingness to function in concert with others and making efficient and appropriate use of the resources of others (Confessore & Park, 2004; Ng et al., 2011). The quantitative survey results also show an enhancement in participants’ learning autonomy between the pre- and post-measurement, though the difference did not reach statistical significance. Longer time may be needed for significant progress in learning autonomy. Similar finding has been found in computer-assisted second-language learning. Students who already have a repertoire of certain skills and strategies in making effective use of Computer Mediated Communication tools in a second-language learning practice can better develop their autonomy further (Figura & Jarvis, 2007).

The significant result obtained for the item “I will choose to learn something even if it interferes with my social life because I enjoy learning” evidences that digital natives in this study feel at ease in completing academic assignments using social networking. In the proposed learning activity, social media networks were voluntarily adopted by students to facilitate their group work in task completion. Preksey (2005) mentioned that today’s students demand the inclusion of technologies in ways that meet their needs and preferences. So (2009) added that the convenience and easy access of communication at any time and compatibility with existing practices are important attributes useful for group communication. This study echoes their assertions and provides a sample learning design.

The current results offer viewpoints different from previous findings, which have raised caution about invading a social networking space

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**Table 3**: Comparison of pre- and post-activity learning autonomy (N = 36).

<table>
<thead>
<tr>
<th></th>
<th>(Pre-) mean (SD)</th>
<th>(Post-) mean (SD)</th>
<th>Differences (post-pre)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When faced with a difficult learning endeavor, I will structure my environment to make learning easier.</td>
<td>7.58 (1.79)</td>
<td>7.88 (1.49)</td>
<td>0.3</td>
<td>0.35</td>
</tr>
<tr>
<td>2. I will often choose to learn something when I am involved in a structured learning project.</td>
<td>6.86 (2.18)</td>
<td>7.72 (1.67)</td>
<td>0.86</td>
<td>0.01*</td>
</tr>
<tr>
<td>3. I will choose to learn something even if it interferes with my social life because I enjoy learning.</td>
<td>6.81 (1.95)</td>
<td>7.70 (1.65)</td>
<td>0.98</td>
<td>0.01*</td>
</tr>
<tr>
<td>4. If I want to learn something, I will plan how to get the required resources.</td>
<td>7.47 (1.70)</td>
<td>7.89 (1.60)</td>
<td>0.41</td>
<td>0.13</td>
</tr>
<tr>
<td>5. If I do not think that I have the resources to participate in my desired learning activity, I will find a way to gather the resources for my learning activity.</td>
<td>7.97 (1.36)</td>
<td>8.06 (1.74)</td>
<td>0.08</td>
<td>0.80</td>
</tr>
<tr>
<td>6. I get along with other people on the Web.</td>
<td>7.36 (2.18)</td>
<td>8.06 (1.69)</td>
<td>0.69</td>
<td>0.05*</td>
</tr>
<tr>
<td>7. I will continue participating in my learning activity even if I think that I do not have the resources to complete the activity successfully.</td>
<td>5.92 (2.15)</td>
<td>6.08 (2.84)</td>
<td>0.10</td>
<td>0.72</td>
</tr>
<tr>
<td>8. If I intend on learning something, I will go to or create an environment that supports that learning.</td>
<td>7.64 (1.42)</td>
<td>7.64 (1.71)</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>9. If I desire to learn something, then I will not wait for someone else to help me develop a plan to satisfy this desire before I begin a learning activity.</td>
<td>5.86 (2.23)</td>
<td>5.08 (2.74)</td>
<td>−0.78</td>
<td>0.14</td>
</tr>
</tbody>
</table>

* P < 0.05.
that students feel clearly their own in order to utilize this space for teaching purposes. Students consider social media networks a “social glue” rather than a formal teaching tool (Berns, Gonzalez-Pardo, & Camacho, 2013). In this study, students voluntarily used social networks to exchange learning materials and post questions, revealing that they treated the assignment as a mix of their school work and social life and tried to accomplish the assignment in a manner similar to how they would pursue their digital literacy.

The ICT Literacy Panel (2002) offers a useful reminder that ICT literacy skills need to be integrated appropriately into curricula addressing cognitive skills as well as those addressing IT and technical skills in order to ensure improved ICT literacy. Nowadays, circumstances have changed and students’ rich experience and knowledge in ICT (digital) literacy should be tapped into to improve their school learning. This study demonstrates that students’ digital literacy coupled with sound pedagogy can be beneficial to higher education learning, revealing a new perspective on students’ digital literacy and an inspiration for teachers.

Furthermore, the traditional view of fostering learning autonomy is to have learners go beyond the classroom and make links between the content of classroom learning and the world beyond (Nunan, 1997). When digital natives who acquire autonomously the Web resources outside school to build up their digital literacy negotiate learning with peers and access and share the Web learning resources for school subject content, a different aspect of autonomy development has been addressed.

9. Conclusion

The majority of teachers may not be aware of the nature and extent of students’ expertise that relates to their out-of-school uses of ICT (Sutherland, 2004). This study valued students’ digital literacy and applied the pedagogy of negotiated learning to connect what they acquired out of school with their school learning. The connection was made on the basis of authenticity and generalizability. The corresponding learning design was to motivate students and help them build up autonomy for their own learning. For evaluating the proposed learning design, this study examined the responses of 36 participating students to a course on introduction to multimedia technology taught through the proposed learning design. The results show that participants have a positive attitude toward the proposed learning design. During Web exploration and data collection, participants experienced difficulties and exercised their digital literacy to resolve them, as evidenced by their autonomous learning in the qualitative analysis of self-reports. The quantitative results also show improvement in participants’ learning autonomy.

In the digital era, teachers must use new pedagogical methods and must understand how ICT and pedagogy interact to facilitate the development of competencies in their students (Lim et al., 2013; Voogt, Erstad, Dede, & Mishra, 2013). Instead of treating students’ digital literacy as an operational capability that allows them to use tools for school learning, there is a need to rethink its educational value, in terms of the curriculum and pedagogy. This study asserts that students’ digital literacy should be related to their autonomous learning and that negotiated learning allows students to perceive and value the connection between knowledge acquired outside school and the subject content studied in classes. This position warrants more in-depth study, especially considering the limitation of the small sample size. To the best of the author’s knowledge, the proposal is novel, and the corresponding learning design and results should provide teachers with an additional perspective of students’ digital literacy as well as a new dimension of bridging students’ formal and informal learning. Finally, the learning effects claimed in this study are preliminary results according to the pre- and post-measurements. Adopting the experimental design method to gauge the claimed learning effects is worth further exploration. Furthermore, in addition to students’ development of autonomy, their ability to critically analyze and use the information acquired from school or the Web is particularly crucial. Such ability indicates a high level of digital literacy, which most students cannot develop autonomously outside schools. Determining how to promote the level of digital literacy in students warrants further investigation.

References


