Exploring the Feasibility of Conducting Software Training in a Peer Learning Context with the Aid of Student-produced Screencasts

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Abstract

In this paper we explore the feasibility of conducting software training in a peer learning context with the aid of student-produced screencasts. Three case studies were conducted to collect data. Wikispaces and Screencast-O-Matic were used during software training sessions to support peer learning in three Information Systems and Technologies (IST) courses. Screencasts were produced by students to promote peer learning. We present the results of our five-month study which suggested that student-produced screencasts were feasible to support software training in a peer learning context.

1. Introduction

As software engineering advances, software tends to be more user-friendly and feature-rich. New features are often added whenever a new version of software is released. While software is getting more feature-rich and extensible (add-ons) but also complex, a software instructor is likely to face different challenges to train novice users to learn most features of software in a limited time frame. Novice software users often need help in the middle of training, but an instructor cannot help multiple people at the same time. When this happens, software learners feel frustrated and their motivation to learn software can decrease. Besides, software learners may not recall every step of software manipulation after training. Innovative ways to conduct software training are needed to improve learners' training outcomes.

Derived from the literature in constructive learning activities [1], multimedia learning [3] and peer learning [4], this study attempts to explore the feasibility of conducting software training in a peer learning context with the aid of student-produced screencasts [5]. A number of studies [24] have identified the effectiveness of constructive learning activities to promote learning.

Mayer [3] coined the term multimedia learning to refer to learning from both text and pictures. The case for multimedia learning rests on the premise that learners can better understand an explanation when it is presented in words and pictures [3].

Peer learning should be mutually beneficial and involve the sharing of knowledge, ideas and experience between the participants [4]. Boud et al. [4] explain that peer learning involves formal and informal activities that allow students to learn from each other.

Researchers and practitioners have been paying more attention to applications of wikis. A wiki is asocial technology that allows users to write and edit documents collaboratively. Wikis are designed to help groups collaborate, share, and build online content through single-point access. A screencast is a screen capture of the actions on a user's computer screen with or without real time audio narration. Screencasts have been used in many ways such as providing tutorials of using library databases, promoting new software products, etc.

This paper reports three case studies that examine the feasibility of conducting software training in a peer learning context with the aid of student-produced screencasts. Graduate and undergraduate students from a public university located in the south-west region of the United States were selected as subjects for the case studies.

The paper is organized as follows: First we examine the possibility of combining studies in constructive learning activities, multimedia learning, peer learning and the wiki and screencasting technology to propose an innovative way of conducting software training in a peer learning context with the aid of student-produced screencasts. Second, we describe the settings of three case studies and how they were conducted. Third, we report the results of quantitative and qualitative data collected from the case studies. Finally, we conclude the

lessons learned from the cases and discuss the contributions and limitations.

2. Background

2.1. Screencasts in Various Contexts

The term "screencast" was coined by Udell [5]. A screencast is a screen capture of the actions on a user's computer screen with or without real time audio narration. Screencasts are usually produced and outputted in various video formats and can be post-processed to enhance video quality such as trimming unnecessary parts and adding transition effects. Compared to common video tutorials, screencasts tend to be shorter and are easily produced by a single person on a computer with screencasting software and an audio recording device, if available [16]. Recent products like Screencast-O-Matic and Screenr are free web-based screencasting tools by which users can easily record screencasts and download them or share them on internet sites such as YouTube.com. Proprietary products like Camtasia Studio [19] support more compact, cross-platform file formats such as Adobe Flash which are suitable for web-based delivery, and have more sophisticated editing features allowing changes in sequence, mouse movement, and audio.

Screencasts have been used in various contexts including information literacy instruction, specialized library database instruction, common reference queries and distance learning. They are also showing up on the web in the form of software tutorials. A natural application of this technology would be in the creation of web-based lectures demonstrating and explaining, step-by-step, the process of using software.

2.2. Constructive Learning Activities and Screencasts

The discovery of constructive learning activities hinges on the assumption that new knowledge cannot be readily and perfectly assimilated (or encoded) by the learner from direct instruction, either in the form of listening to an instructor's explanation or reading a textbook. Instead, the acquisition of new knowledge requires the learners to be actively involved in the *construction* of their own knowledge. This active *construction* is a broad term denoting both the external activities or behavioral aspects of learning (e.g., drawing a diagram, answering and asking questions, solving a problem) as well as the internal processes of cognitive reorganization (e.g., the

construction and revision of one's mental models) [7, 8, 22].

On the behavioral side, to be constructive means to be actively doing something while learning. By this definition, engaging in any externally observable activities, such as drawing a diagram, self-explaining a concept, highlighting sentences, and summarizing a book chapter, can be broadly construed to be constructive, as opposed to passively assimilating instructions. Being constructive in this activity sense facilitates learning. Intervention studies [24] have repeatedly shown that learners who were required to construct knowledge (by engaging in any of the activities previously listed) learn more and perform better than learners who did not actively engage in any of the aforementioned activities. Producing screencasts can be viewed as a constructive learning activity.

In addition to recognizing individuals' benefits of consuming (watching) screencasts in different learning domains, this paper aims to determine individuals' benefits of producing screencasts as a constructive learning activity in the context of software training. When creating a screencast, the creator needs to conceptually organize different pieces of information and output them as dynamic screen motion with his/her verbal descriptions. Creating screencasts can be seen as an external behavioral aspect of learning, which is one of the two active processes of knowledge construction [22]. This external learning activity is likely to influence learners' internal processes of cognitive reorganization (the construction or revision of one's mental models).

2.3. Multimedia Learning and Screencasts

Mayer [3] defines multimedia learning as "learning from words (such as spoken text or printed text) and pictures (such as illustrations, photos, animation, or video) (p. 3)." The case for multimedia learning rests on the premise that learners can better understand an explanation when it is presented in words and pictures [3]. Mayer [3] also defines multimedia instruction as "presentations involving words and pictures that are intended to foster learning (p. 3)".

In a review of multimedia learning research across thirteen experimental comparisons involving lessons on topics such as how a brakes, a pump, or lighting works [23], people performed better on transfer tests when they learned from printed text and illustrations than from printed text alone or from narration and animation than from narration alone.

According to Mayer [3], multimedia learning can be viewed from three perspectives—as response strengthening, as information acquisition, and as knowledge construction. If multimedia is viewed as response strengthening, then multimedia is a drill-and-practice system. If multimedia is viewed as information acquisition, then multimedia is an information delivery system. If multimedia is viewed as knowledge construction, then multimedia is a cognitive aid. In this research, we favor the knowledge-construction view that multimedia learning is a sense-making activity in which a learner seeks to build a coherent mental representation (mental model) from the presented material [3]. Specifically, students produced screencasts as multimedia instructions to help their peers learn software.

2.4. Wiki and Peer Learning

A wiki is a "collaborative web space where anyone can add content and anyone can edit content that has already been published" [9]. Wikis are designed to help groups collaborate, share, and build online content through single-point access, and are especially useful for distance learners who are separated by time and place. Wikis are flexible enough to be adapted to small group projects as well as large-scale global collaborations [9]. For face-to-face, hybrid and online learning courses, wiki collaborations have the potential to break down the boundaries of the classroom. More and more wikis also offer extended editing capabilities and features that enable file sharing, commenting, and embedded widgets such as calendar, document and video widgets. In this research, the selected wiki environment (Wikispaces) supports the aforementioned features that allow users to embed multimedia instructional presentations produced in video format.

Peer learning is not a single, undifferentiated educational strategy. It encompasses a broad sweep of activities [4]. Researchers have identified 10 different models of peer learning ranging from the traditional proctor model in which senior students tutor junior students, to the more innovative learning cells in which students in the same year form partnerships to assist each other with both course content and personal concerns [15]. It is important to consider who the "peers" are in peer learning. Generally, peers are other people in a similar situation to each other who do not have a role in that situation as teacher or expert practitioner [4]. They may have considerable experience and expertise or they may have relatively little. They share the status

as fellow learners and they are accepted as such. Most importantly, they do not have power over each other by virtue of their position or responsibilities.

Peer learning should be mutually beneficial and involve the sharing of knowledge, ideas and experience between the participants [4]. Boud et al. [4] define peer learning in its broadest sense as "students learning from and with each other in both formal and informal ways (p. 4)." In peer teaching the roles of teacher and learner are fixed, whereas in peer learning they are either undefined or may shift during the course of the learning experience [4].

In the reported case studies, students were oriented to engage in peer learning activities in which students shift their roles between a teacher and a student. When acting the teacher role, students produce and share their screencasts for teaching their peers to use software, while when acting the student role, they watch screencasts produced by their peers to learn software.

2.5. The Benefits of Student-produced Screencasts

Based on the literature review above, the student-produced screencast is likely to benefit students from two sources. First, when producing screencasts, students engage in a constructive learning activity, which is an active process of cognitive reorganization that helps students not only to identify and fill in knowledge gaps, but also to construct and repair their mental models [10, 11]. Second, when watching screencasts, students can benefits from the multimedia instructions which help students reduce their cognitive loads and develop mental models. This research attempts to determine whether these benefits are perceived by students during software training sessions.

3. Case Studies

3.1. General description

Three case studies were conducted to determine the benefits of students-produced screencasts in a peer learning context for acquiring computer skills. Graduate and undergraduate students from a public university located in the south-west region of the United States were selected as subjects in three case studies. In each case, 4 or 6 web tools learning sessions were integrated into the Information Systems and Technologies (IST) class as one of the IST tools assignments. The purpose of web tools

learning sessions is to train students to learn software that is used to build web sites.

There were two types of activities during the web tools learning sessions. The first type is classroom instruction and hands-on activities (learning from the instructor) and the second type is peer learning activities outside of the classroom (learning from peers). In the first type of activities, one of the researchers introduced the web site development software and led the hands-on activities for training students to use the core functions of the selected software. In the second type of activities, students were asked to explore and learn the add-on functions of the software by themselves, a strategy of discovery learning [12, 13, 14], and were required to produce screencasts to share and teach what they learned with their peers.

Wikispaces is a hosted wiki platform selected to support students' peer learning activities during the web tool learning sessions. At the beginning of the training, each student was required to register an account to access the class wiki space. Students were also instructed how to use Wikispaces. Screencast-O-Matic, a free web-based screencasting tool, was chosen for students to produce their screencasts. They were required to upload their screencasts to YouTube and embed them as video widgets (one of features supported by Wikispaces) in the class wiki space.

Data were collected through a survey questionnaire and interview(s) after the web tools learning sessions were completed.

3.2. Case Study #1

Twenty-nine undergraduate students who enrolled in the IST course participated in the study. There were 6 web tools learning sessions starting from the third week of the school quarter. There were 2 training sessions in a week and each session took about one hour. One of the researchers was responsible to instruct and lead the web tools learning sessions.

An open source content management system (CMS), Joomla (version 1.5) [17], was selected as the target software for students to learn. Joomla can be used to build various web sites such as a corporate web site or portal, small business web site, community-based portal, and school or church web site [17]. With its ease-of-use and extensibility, Joomla has become one of the most popular CMSs available. A major advantage of using a CMS is it requires only basic technical skills to manage it. Students are not required to have programming skills to learn Joomla. Since Joomla is a web-based

application, having knowledge of browsing the Internet, uploading and downloading are sufficient to learn how to use Joomla. Students are expected to learn how to manipulate Joomla core functions and some extensions[1] (add-on functions) in order to build a simple web site.

As mentioned in the general description section, the web tools training sessions included two types of activities. There were two phases in this case. In the first phase, which lasted for 3 sessions, students focused on the first type of activities, learning Joomla core functions from the instructor. The instructor first explained the structure of Joomla and its different core functions/features on PowerPoint slides and then asked students to watch instructional screencasts produced and posted by him on the class wiki space. These screencasts contained information that would allow students to complete assigned learning tasks (hands-on activities) such as finding and changing a new template (theme), creating a new menu module and a menu item, and creating and managing sections, etc. Students can learn from those screencasts at their own pace and the instructor can walk around the classroom to assist students.

From the fourth session, the beginning of the second phase, students focused on learning Joomla extensions (over 7,000 extensions were available on Joomla's extension directory[2] when the study was conducted). The second phase included both types of learning activities (learning from the instructor and from peers). While learning Joomla extensions from the instructor in the classroom, students were asked to explore and learn Joomla extensions (add-on functions) by themselves outside the class as an assignment. They were required to produce at least 6 screencasts covering each of three types of Joomla extensions (component, module and plug-in) and share their screencasts with peers on the class wiki space. The assignment instructions were posted on the class wiki space. Students created their own wiki pages and posted their instructional screencasts on them. One "Joomla Extensions" page was created to collect all hyperlinks of student-produced screencasts.

Twenty-four students answered the survey questionnaire and 5 students agreed to have individual interviews with one of the researchers after the final training session.

3.3. Case Study #2

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[1] Joomla extensions are add-on functions that can be easily installed into or removed from Joomla.
[2] http://extensions.joomla.org.

Ten MBA students who enrolled in a graduate level IST class participated in the second case study. There were 4 web tools learning sessions starting from the third week of the school quarter. There was one training session in a week and each session took about one hour. One of the researchers was responsible to instruct and lead the web tools learning sessions and another researcher assisted students during hands-on activities.

In this case study, a web-based website builder called Wix[3] was chosen as the target software. Wix is a free web site builder, an online tool that lets users create customized web sites with ease. A user friendly, drag and drop interface lets users edit their web design without the need to code [18]. Two of the researchers compared the experience of using Joomla and Wix and found that Wix is less complex than Joomla and easy to learn, so Wix was selected as the target software to compare whether the complexity of software could affect users' perceptions of their peer learning experience.

Unlike the first case study, the second case study introduced peer learning activities in the first training session. Students were instructed to learn the screencasting tool (Screencast-O-Matic) [20] and Wikispaces [21] first in the classroom and then were required to explore Wikispaces more by themselves and produce at least one screencast as the first assignment to teach their peers about using Wikispaces. The purpose of this different arrangement was to let students get familiar with the class wiki space and the screencasting tool earlier to minimize the effects of learning to use Wikispaces and Screencast-O-Matic when students were doing Wix peer learning activities.

Wix training was introduced in the second web tools training session. The instructor provided a couple of screencasts and step-by-step handouts to help students complete several learning tasks. Then, the instructor grouped Wix functions/features into four categories and randomly assigned students into those four groups in which each student was responsible for producing instructional screencasts, as assignment 2, about Wix functions/features listed in their assigned categories. Students then shared those screencasts on their own wiki pages. A "Wix Instructions" page was created by the instructor to collect all hyperlinks of student-produced screencasts.

In the third training session, students were introduced to a couple of advanced features, then started to work on their assignment 3, which was an individual web site project that needed to include at least one Wix feature from each assigned category. At this time, students had posted their Wix instructional screencasts on the class wiki space, so they could learn from their classmates and apply those Wix features to their web sites.

In the last training session, students presented their web sites and discussed how they used different features on their web site. After the presentation, 9 students answered the survey questionnaire and a group interview was conducted by one of the researchers.

3.4. Case Study #3

Forty-four undergraduate students from an IST class participated in this case study. The setting for the web tools learning sessions in this case study were the same as the setting in case study #2 except that the subjects were undergraduate students and met the web tools instructor (one of the researchers) once in two weeks instead of once in a week.

The purpose of this scheduling was to allow students more time to do peer learning activities. For other information about the case study #3, please refer to case study #2.

Thirty-three students from the section completed survey questionnaires. Ten students agreed to have an interview with one of researchers.

4. Results

4.1. Results of Case Study #1

Case study #1 is the first step of a series of research plans. This pilot study explored students' experience of producing and watching screencasts. One purpose of case study #1 was to understand students' perception of using a screencasting tool and perception of watching student-produced screencasts, so the survey questions were mainly designed to collect quantitative data about the students' perceived *ease of use* of the web-based screencasting tool, perceived *usefulness* of the web-based screencasting tool and perceived *usefulness* of student-produced screencasts.

The survey showed that 20 out of 24 (83%) students had no previous experience using any screencasting tool. Twelve out of 24 (50%) students had previous experience making videos and sharing them on the Internet before they used the screencasting tool in the class. A 5-point Likert scale was used to measure those items listed in Table 1. The survey results shown in Table 1 indicate that most students had positive (e.g., 5 on easy/strongly

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[3] http://wix.com

agree and 4 on somewhat easy/agree) perceptions of using the screencasting tool and watching screencasts (screen videos). Over 75% of the students had positive experiences using the selected web-based screencasting tool in terms of different important features. Because the screencasting tool is a web-based application, its performance depends on the web site servers[4] and users' bandwidth which could have negatively affected perceptions of ease of use. However, most students reported favorable ease of use. About 88% of the students agreed that the screencasting tool helped them to share what they learned with their peers. Over 83% of the students agreed that student-produced screencasts were valuable for them to learn the target software, Joomla, and were helpful for them to learn at their pace and to repeatedly review what they learned. About 79% of the students predicted that they would use the screencasting tool in the future.

Table 1. Survey results of case study #1

Item	P*
Perceived Ease of Use—the web-based screencasting tool.	
• Initially learning how to use the tool.	79% (19)
• Recording a new screencast.	79% (19)
• Uploading a new screencast.	91% (22)
• Exporting a new screencast.	75% (18)
Perceived Usefulness—the web-based screencasting tool.	
• Using the tool to make screencasts has helped me to remember how "Joomla" works.	71% (17)
• Using the tool has helped me easily share what I have learned about "Joomla".	88% (21)
• The tool enables knowledge sharing among students.	88% (21)
Perceived Usefulness—student-produced screencasts.	
• I found student-produced screencasts presented in the Joomla wiki space valuable for learning "Joomla".	83% (20)
• Watching student-produced screencasts facilitates self-paced learning.	88% (21)
• The availability of student-produced screencasts online helps me easily review what I have learned.	83% (20)
Intend to use—the screencasting tool.	71% (17)
• Assuming I could use a screencasting tool to make screencasts, I intend to use it.	
• Given that I could use a screencasting tool, I predict that I will use it.	79% (19)

* Percentage of students who gave positive ratings.

Qualitative data were collected through open-ended questions and individual semi-structured interviews. Some students did not answer all open-ended questions. The following summaries of qualitative data are based on available answers.

Students were asked to describe "**their experience of using the screencasting tool for producing screencasts**." Representative responses follow.

- Most students described the screencasting tool as very easy to use; it was simple, fast, fun, helpful and time-saving. Only one student felt the tool was not easy to use and got frustrated.
- A couple of students described that initially the tool was slightly difficult, but once they figured out how it worked they found the tool was easy to use.
- Two students thought better editing functionality of the screencasting tool may improve their use experience.
- One student suggested it would be fun and helpful to compile of all screen videos that were made by students.

Students were asked to describe "**the major benefits they have received during their interaction with the screencasting tool**." Representative responses follow.

- It is a fast way to teach other people.
- It helped me retain what I learned while making videos.
- It allowed me to record my process on how to do something so that I can later refresh my memory if I ever need it.
- I was actually able to implement it for a training presentation I was presenting to my work.
- Now I have the ability to make screencasts easily and affordably for use in other classes to make tutorials.
- Now I have a new tool that I will use in my employment practices for training purposes.

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[4] http://screencast-o-matic.com

- The benefits are the instructor set a hands-on learning experience at my own pace. I can instantly remind myself if I do not understand something.

Students were asked **"During the training/learning sessions, you were asked to use a web-based screencasting tool to produce and share screencasts online with peers. What is your opinion on doing so?"** Representative responses follow.

- It was fun and it is an excellent way to learn.
- It was a creative way to teach someone. People can see what I am doing.
- I enjoyed making these videos. It allowed me to display to others what was on my computer.
- I think that it is a good way to learn from others.
- The screencasts are extremely helpful and you can pause to review and learn at your own pace.
- I feel screencasts helped learn the process of using Joomla by being able to go back and watch your videos, along with other students' videos.
- I feel that it is the education process of the future. Video delivery learning will be the standard.
- I prefer doing oral presentation and demonstrations because it can be more interactive with the audience.

Students were asked "**In your experience during training sessions, what can be done to motivate people to use a screencasting tool for peer learning purposes?"** and their responses can be summarized as follows:

- Expose people to the tool.
- Perhaps show people really quickly how it is used and how easy they can use it.
- To motivate people to use the tool, you tell them videos promote peer teaching and learning at your pace.
- Offer it in more classes. When people see how it works they will accept it in my opinion.
- Give them examples of good videos so they can see the ease and clarity it offers.

When students were asked "**To what degree do you feel you accomplished the learning objectives established for the "Joomla" training sessions?"** Representative responses follow.

- Learned about Joomla and its powerful plugins.
- I feel comfortable to use Joomla.

- I feel a good degree of accomplishment about the learning objectives in the Joomla teaching section.
- I feel I learned the basics of adding plugins and other basic functions from Joomla.
- Moderate, I still don't really know how to navigate in Joomla.
- I think I could handle most Joomla features.
- I understood just about everything posted on the wikispace.
- I felt I got a mediocre gist of using Joomla, but I intend on learning more once time permits.
- I feel confident enough to help small business owners design a web site. I had no previous knowledge of any web design software. Joomla was that easy and intuitive to learn.
- I feel I did very well and learned some new things.
- I feel I learned the basics, and I would like to learn the more advanced stuff.

4.2. Results of Case Study #2 and #3

Except for that subjects were studying in different programs (graduate and undergraduate), case study #2 and case study #3 were conducted in the same settings and evaluated with the same survey questions, so collected data are analyzed and presented together.

Table 2. Survey results of case study #2 & #3

Items	Case #2	Case #3
PEOU-ST1	78% (7/9)	61% (20/33)
PEOU-ST2	78% (7/9)	67% (22/33)
PEOU-ST3	44% (4/9)	61% (20/33)
PU-ST1	78% (7/9)	67% (22/33)
PU-ST2	78% (7/9)	85% (28/33)
PU-ST3	89% (8/9)	91% (30/33)
PU-SC1	78% (7/9)	85% (28/33)
PU-SC2	89% (8/9)	85% (28/33)
PU-SC3	89% (8/9)	76% (25/33)
IU-ST1	67% (6/9)	64% (21/33)
IU-ST2	78% (7/9)	67% (22/33)

Quantitative data about the students' perceived ease of use (PEOU-ST) and perceived usefulness of the web-based screencasting tool (PU-ST), and their perceived usefulness of student-produced screencasts (PU-SC), and intention to use the screencasts (IU-SC) were collected in case study #2 and #3. The

measurement items were adapted from case study #1. Table 2 shows the results of students' survey responses. The percentages in Table 2 mean the proportion of the total number of people whose answers are "positive" on a 5-point Likert scale question (1-2: negative; 4-5: positive) to the total number of people who answered the question. The results are basically similar to case study #1. Except for the negative responses on PEOU-ST3 in case #2, all responses on other items show positive agreement over 61%. These results show that most students agreed the selected web-based screencasting tool was easy to use and useful for promoting knowledge sharing in the peer learning context, and the student-produced screencasts posted on the class wiki were valuable and helpful for them to learn software at their pace.

Figure 1. Responses of Intention to Use the Target Software in Case Study #2
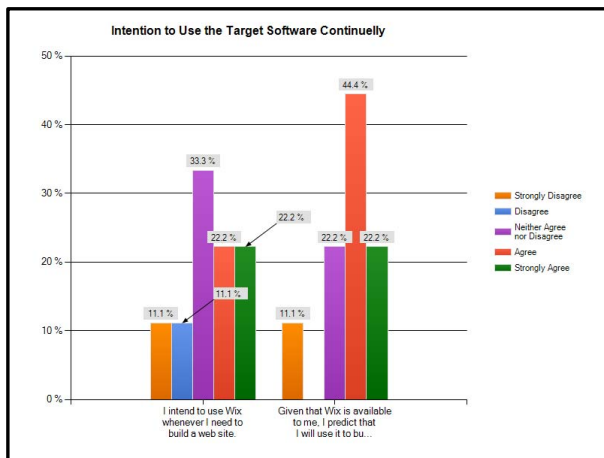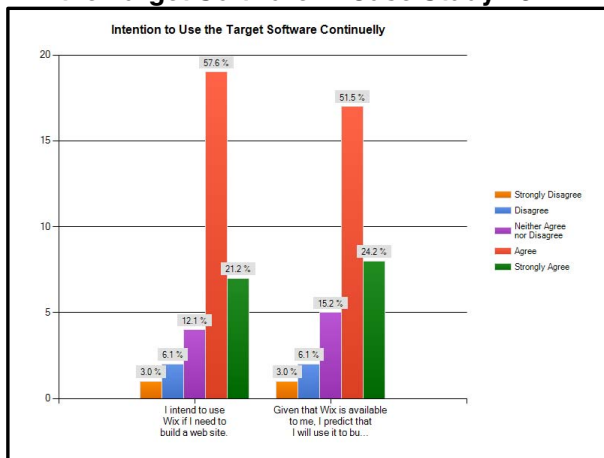

Figure 2. Responses of Intention to Use the Target Software in Case Study #3

Bostrom et al. [2, 6] believe that there are principally two types of training outcomes: understanding (measured through learning performance) and motivation to use (measured though attitudes toward the system). This study uses "Intention to Use" (IU), similar to attitudes toward the system, to evaluate training outcomes of the target software. In case study #2, when students were asked "Given that Wix is available to me, I predict that I will use it to build web sites", 44.4% agreed with the statement and 22.2% strongly agreed with the statement (illustrated in Figure 1). In case study #3, when students were asked the same question, 51.5% agreed with the statement and 24.2% strongly agreed with the statement (illustrated in Figure 2). The results show that it seems feasible for educators to incorporate wikis with student-produced screencasts to support peer learning in the software training context.

Qualitative data were collected through the open-ended questions and a group interview (case study #2 only). Some students did not answer all open-ended questions. The following summaries of qualitative data are based on available answers.

Students were asked "**What is your opinion on producing and sharing screencasts on the class wiki space to support peer learning in the web-tools learning sessions?**" Representative responses follow.

From case study #2:
- Nice tool for teaching and learning.
- Wikispaces is kind of a good communication web tool; it is an easy way to share information.
- It is a useful tool, especially for group work.
- Wikispaces is helpful and better than Blackboard which they also use in the class.

From case study #3
- We are able to cover more material in that way.
- It was helpful and I was able to receive different views from classmates.
- It was very useful because we can learn a lot from others.
- It helped to see what your classmates are doing and seeing what you can take and incorporate it into your work.
- It helped understand the various working parts of the website better, as humans are visual learners.

Students were asked "**What is your opinion on learning from your classmates?**" Representative responses follow.

From case study #2:

- It is a great way to learn together.
- It helped a lot. One person cannot learn all parts of software features in a short period.
- If they do not challenge themselves and really learn something new, they cannot teach you anything new.
- One student thought that most of the Wix instructions were simple enough that learning from classmates was not really needed.

From cast study #3

- It is good to get ideas from classmates. It makes the learning process even easier and faster.
- It is very helpful to use peers as sources.
- Immensely helpful. It also helps others learn how to teach. We are able to cover more material in that way.
- It was helpful and I was able to receive different views from classmates.
- Only worth it if you put time into looking at others' work.

5. Discussion and Limitations

As discussed earlier in the introduction section, novice software users often ask for help during training, but the instructor cannot help multiple people at the same time. Software learners may also not be able to recall every step of software manipulation after training. This research proposes an innovative way of conducting software training in a peer learning context with the aid of student-produced screencasts. The results of this study shows that peer learning activities (two main activities in this paper: producing screencasts to teach peers and watching student-produced screencasts to learn from peers) are feasible to resolve the aforementioned problems. Student-produced screencasts allow software learners to learn from peers at their pace. From students' responses gathered during the three case studies reported herein, the majority of students in each case study agreed that screencasts facilitate self-paced learning.

The complexity of software has been recognized as an important success factor for software training. We found that it is also important for conducting software training in a peer learning context. Some students in case study #2 and #3 think that the target software, Wix, is somewhat easy to use and that peer learning was not really needed, but this kind of comment was not found in case study #1 in which Joomla was the target software. Joomla is known for its extensibility, so students may be motivated to learn extension (add-on) features that fall within their own interests. Also, a couple of students thought that peer learning is helpful because they felt challenges when learning Joomla. These responses from students suggest that the peer learning settings used in this study may better fit with software that has more complex features.

Some students indicated that they expect deeper levels of knowledge sharing from their peers, when there is something they cannot easily find by themselves. If their peers do not challenge themselves to learn something different from others, they may not learn anything new from them. How to better design training activities, including assignments, in-class and online activities, can be important to motivate students to share deeper knowledge.

One of the interesting findings is that students learned from their peers not only about manipulating software, but also creative ways of using the target software. They got ideas from their peers and incorporated their own ideas to apply what they learned in another way. One example is that students could view how their peers applied Wix features in their web sites and then came up with their own applications. This finding suggests that there could be benefits other than learning more features of the target software.

There are several limitations in our case studies. First, three case studies were all conducted in classes in which students had other class assignments or presentations due on the same day that software training was given, so they would often focus on doing those assignments instead of paying attention to the training. This conflict could reduce students' dedication to peer learning activities. Second, the researchers had no control over scheduling training sessions, so a couple of training sessions were delayed due to changes in the class schedule. Another limitation is the small sample size. One of the case studies had only 10 students, so we were not able to do quantitative analysis across cases.

6. Conclusion

In this paper we report three case studies that explore the feasibility of conducting software training in a peer learning context with the aid of student-produced screencasts.

Our results show that learning software from peers is feasible as long as the complexity of the target software is appropriate. Selecting the right software can be one of the success factors to adopt the new approach. Our findings also show that a screencasting tool can be a useful tool to facilitate the

process of knowledge sharing in the software learning context. The majority of students who participated in the study agreed that student-produced screencasts are helpful for them to learn at their pace and refresh what they have learned. Many students enjoyed producing screencasts to help peers learn software. They also liked learning from and with each other because it helps them to learn more and faster.

The new wiki feature of integrating Web 2.0 tools such as embedding videos, audios, slideshows, documents and other widgets has made wikis a better tool for education and other purposes. Unlike some wiki studies [25, 26] that focus on the use of editing text contents, this study focuses on the use of editing multimedia content (screencasts). We conclude that it is feasible to conduct software training in a peer learning context with the aid of student-produced screencasts.

Future research can be conducted to determine to what extent software learners can benefit from producing screencasts and compare the results of using screencasts with those of using non-screencasting media to support software training in a peer learning context. A future study should examine the feasibility of incorporating wikis with screencasts to support peer learning in other contexts.

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