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Clone Yourself: Using Screencasts in the Classroom to Work with Students One-on-One

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Abstract

Despite the fact that screencasts have been used in higher education for years, little is known about the effectiveness of using them inside the classroom – as part of a lecture. One of the main benefits of using screencasts in class is that it allows the professor to work with students one-on-one. This novel instructional method was implemented to teach the fundamentals of Microsoft Office and Google Sites as part of a required freshman undergraduate Computer Information Systems class. Effectiveness was evaluated at the end of the semester (N = 72). Results support the efficacy of screencasts over traditional lectures for step-by-step instruction. To maximize effectiveness, students should follow along with the screencasts during class time. Moreover, professors should consider interspersing screencasts with collaborative group work. Also, professors should ensure that the screencasts have an adequate level of difficulty for the students. Moreover, students should be encouraged to follow the screencast in real time, possibly by dividing the computer screen between the screencast and their workspace. Lastly, students should review screencasts after class to further increase learning outcomes. This paper discusses these and additional findings in detail and positions contributions in the context of prior research.

Keywords: screencast, differentiated instruction, flipped classroom, hybrid learning

1. INTRODUCTION

"Everyone can work independently, while still having the professor available for help. It's like cloning yourself." – Student

A screencast is "a digital movie in which the setting is partly or wholly a computer screen, and in which audio narration describes the on-screen action" (Udell, 2005, n.p.). The use of screencasts as an instructional tool in higher education is not new (Peterson, 2007; Winterbottom, 2007) and its efficacy has been addressed before (see e.g. Lee & Dalgarno, 2008; Ashdown, Doria, & Wozny, 2011; Pinder-Grover, Green, & Millunchick, 2011). Moreover, the recent rise of flipped classroom and hybrid learning models, as supported by Khan Academy, Udacity, Coursera, and EdX, has put screencasts back in the center of attention (Wakeman, 2013). However, most research has addressed the use of screencasts outside of the classroom – to replace or supplement traditional lectures (Sugar, Brown, & Luterbach, 2010). In contrast, this study concerns the use of screencasts inside the classroom – as part of a lecture.

The idea to use screencasts in the classroom arose in an undergraduate Computer Information Systems class during which fundamentals of Microsoft Office and Google Sites were taught to freshmen. Traditionally a specific function would be demonstrated, such as creating a chart in Excel, in front of the class using a video projector. Meanwhile, students would follow along on their personal laptops. In essence, the traditional lecture format was applied to technical content. However, often one or two students missed a step in the process and were unable to follow along. As a result, the professor would interrupt the demonstration and help the students catch up while the rest of the class waited. Despite being an unproductive use of time for students who were following along, it was stressful for students having to admit that they are unable to master a certain step in front of the whole class.

To address this issue, seven screencasts were created containing step-by-step instructions for Microsoft Excel, Microsoft Word, and Google Sites. Four screencasts covering Excel dealt with financial models, revenue forecasts, and loan payments. Two screencasts showed how to create a website in Google Sites and integrated it with a form to collect data. Finally, one screencast showed how to create a professional report in Word, using automatic table of contents, site numbers, and tables. Each 50-minute class began with a brief introduction of the activity by the professor, followed by individual work on the screencasts. Students wore headphones to avoid disturbing others. The professor walked around the room and worked with students who needed additional support. Students that completed a screencast were asked to help other students.

It was hoped that the use of screencasts in the classroom would allow students to work at their own pace, while allowing the professor to work one-on-one with students that need additional support – an approach known as differentiated instruction (Tomlinson, 1999). At the end of the semester, a survey was conducted ($N = 72$) to capture students' attitudes towards the use screencasts for step-by-step instruction. Of specific interest were the following questions, which this paper aims to address:
- What are students' screencast preferences?
- How do students utilize screencasts?
- What are the perceived benefits of screencasts vis-à-vis lectures?

- What are the perceived disadvantages of screencasts vis-à-vis lectures?
- Do students prefer screencasts over lectures for step-by-step instruction?
- How does the use of screencasts influence learning outcomes?

The remainder of this paper is structured as follows. First, prior research related to the use of screencasts in higher education is reviewed. Next, a description of the methodology of work, followed by the results of the survey is presented. Lastly, the results in terms of lessons learned are discussed.

2. LITERATURE REVIEW

Screencasts for instructional use range from simple lecture capture, such as narrated PowerPoint presentations, to more involved demonstrations of problem-solving or application usage. Screencasts have been successfully implemented in online education, for the recording of lectures (e.g. podcasting) and to augment classroom material. Pindar-Grover et al. (2011) used screencasts to explain assignment solutions and difficult topics in their Engineering courses. Their results indicated that students perceive screencasts to be helpful and they tended to use the resources as a study supplement. Pindar-Grover et al. (2011) found usage to be positively and significantly correlated with course performance. The most significant effect was found in students with the least amount of prior exposure to the concepts used in the course material.

Mullamphy, Higgins, Belward and Ward (2009) gathered students' opinions on the effectiveness of screencasts in teaching math at James Cook University. Ninety-eight point one percent of students found that the screencasts were useful. Eighty seven percent believed that they should be used as a supplement for lectures, but only 39 percent believed that they should be used to replace lectures.

Lloyd and Robertson (2012) used screencasts to assist in teaching statistics to undergraduate psychology students. They found that the students "were not just following algorithms based on rote memorization, but that their demonstrated enhanced learning arose from better conceptual understanding and problem-solving transfer."

Some of the benefits of screencasting include:

- Greater flexibility and access. Students prefer asynchronous access to learning materials to access them when it suits their schedules and life styles (Roach, 2006);
- Students can review the material at their own pace, rewinding and pausing as needed;
- Students engage better with familiar technology (Mullamphy , 2009);
- Increased student performance (Falconer et al., 2009; Lloyd, 2012 Pindar-Grover et al., 2011);
- Materials can be reused and shared across courses;
- Students can listen to the instructor explain the problem solving strategies that are used (Falconer et al., 2009);
- The number of views can be tracked when the screencasts are posted in a course management software system.

Screencasts have been shown to be an effective supplement to class materials. In numerous documented cases, student feedback has been positive and they feel that it is a valuable tool that aids in their learning process (Falconer et al.,2009; Mullamphy et al., 2009; Pindar-Grover, 2011).

3. METHODOLOGY

Seven screencasts were created with an average duration of 24:51 minutes (*SD* = 6:59 minutes) using Camtasia Relay, a commercial screen recording software (TechSmith Corp., n.d.). All screencasts were recorded on a Windows laptop. The software automatically converts a recording into MP4 format, uploads it to a video streaming server, and creates a public link. Four screencasts covered Excel (financial models, revenue forecasts, and loan payments), two covered Google Sites (how to create a website and contact form), and one covered Word (automatic table of contents, site numbers, and tables). The purpose of the screencasts was to replace the traditional lecture. Given that the class time was 50 minutes, the instructor aimed to create screencasts that would fill an entire class session, while still leaving enough time for an introduction and giving students the option to pause the screencast and ask questions. Students that finished a screencast early were asked to help other students.

Student learning based on the screencasts was assessed using a combination of project work and Excel-specific questions on the final exam. The project task, which spanned the entire semester, asked students to develop an idea for an iOS app, create a website marketing the app, and write a business case for their app as a final report and presentation. This project required students to apply the skills covered in the screencasts (e.g. develop a financial model, forecast revenues, calculate loan payments, create a website, and design a professional report). Moreover, the final exam included two Excel-specific questions, which required students to calculate loan payments (see Appendix A).

At the end of the semester, a student survey consisting of 14 multiple-choice and 2 open-ended questions was given. The order of questions was randomized for each respondent. Given that four out of seven screencasts dealt with Excel, questions were worded with a focus on Excel (see Appendix B). Students were encouraged to complete the survey and 72 usable responses were received, representing a 100% response rate.

4. RESULTS

What are students' screencast preferences?
To better understand students' preferences for screencasts, they were asked how they felt about the level of difficulty, amount of spoken instructions, pace in the screencasts, and length of screencasts. Almost everyone (94.5%) felt that the level of difficulty was "just right," while 4.1% thought it was "too high" and only 1.4% thought it was "too low." Similarly, 90.4% of students felt that the amount of spoken instructions was "just right," whereas 2.7% thought it was "too little" and 5.5% thought it was "too much." More than two thirds (79.5%) felt that the pace in the screencasts was "just right" and 5.5% thought it was "too slow." Interestingly, 15.1% felt the pace was "too fast," indicating a potential for improvement. In a similar vein, although 78.1% of students stated that the length of the screencasts was "just right," almost a quarter (21.9%) felt that it was "too long." Thus, it appears that a duration of maximum 25 minutes suits most students.

How do students utilize screencasts?
Students were also asked about their mode of consumption with regards to screencasts. Given that for all but 2 (2.8%) students, this was the first class in which a professor used screencasts,

it is particularly important to understand the evolving consumption practices for this medium. Specifically, they were asked how they watched the screencasts (screencast and Excel open side-by-side vs. switching back and forth between screencast and Excel) and how they followed the instructions (while the screencast was playing vs. while the screencast was paused). Although, all four combinations are equally possible, students who had the screencast and Excel open side-by-side were more likely to follow the instructions while the screencast was playing than students who switched back and forth between the screencast and Excel (χ^2 (1) = 11.567, p = .001). In fact, the majority (58.3%) of students used this mode of consumption for the screencasts. The distribution among the four combinations can be seen in Table 1.

	Could see screencast and Excel at the same time	Could not see screencast and Excel at the same time
Followed instructions while screencast was playing	42 (58.3%)	11 (15.3%)
Followed instructions while screencast was paused	7 (9.7%)	12 (16.7%)

Table 1: How did you watch the screencasts?

Interestingly, it was found that the mode of consumption is related to the perceived level of content difficulty. Students who had the screencast and Excel open side-by-side perceived the content of the screencasts to be less difficult (M = 1.98, SD = .143) than students who switched back and forth between the screencast and Excel (M = 2.13, SD = .344, t(70) = -2.636, p = .010).

In addition, of interest was understanding whether students would have preferred a "flipped classroom" model (Frydenberg, 2012), in which students watch screencasts on their own at home, thus freeing up class time for additional exercises and discussions. When asked if they would have preferred to watch the screencasts on their own at home and use class time for other activities, the majority (57.6%) were against (responded "strongly disagree" or "disagree"), while almost a quarter (23.3%) were in favor. It is important to note that students were not assigned any additional homework or preparation for the screencasts. Figure 1 below presents the distribution for this item.
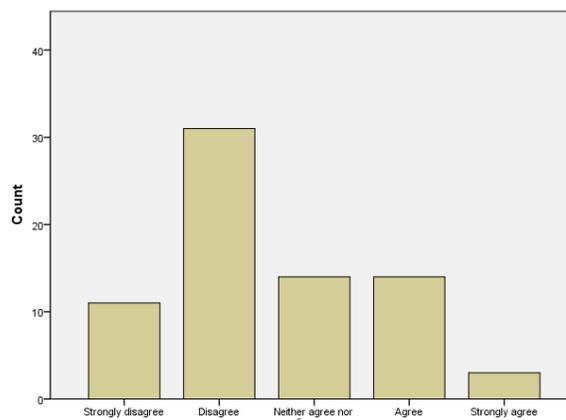
Figure 1: I would have preferred to watch the screencasts on my own at home and use the class time for other activities.

Students were also asked if they reviewed the screencasts on their own after class. In what appears to be honest self-reporting, 34 (46.6%) students responded that they "never" reviewed the screencasts and 36 (49.3%) responded that they reviewed the screencasts "sometimes" after class. The results are presented in Figure 2 below.
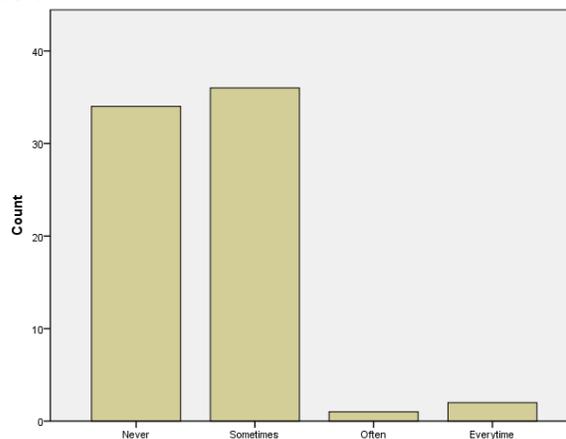
Figure 2: I reviewed the screencasts after class.

The amount of time spent reviewing is negatively correlated with the extent to which students felt the pace in the screencasts was too fast (r(70) = .366, p = .001). Thus, the more a student felt that the screencasts were moving too fast, the more time he or she spent reviewing the screencasts after class.

What are the perceived benefits of screencasts vis-à-vis lectures?
Next, questions were asked to assess students' perceived benefits of using screencasts. To better understand if students felt that personal

attention by the professor was increased using screencasts vis-à-vis regular lectures, we asked students to indicate their agreement with the statement "the professor can give me more personal attention when the class is using screencasts than during regular lectures" (on a scale from 1 – strongly disagree to 5 – strongly agree). As can be seen in Figure 3, almost three quarters (74%) of students either agreed or strongly agreed with this statement.
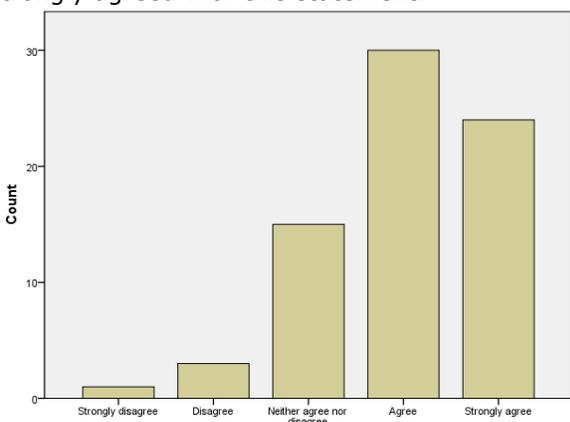
Figure 3: The professor can give me more personal attention when the class is using screencasts than during regular lectures.

Interestingly, the feeling that the professor can give more personal attention when the class is using screencasts than during regular lectures is negatively correlated with the preference to watch the screencasts at home ($r(70) = -.334$, $p = .004$). Thus, the more a student perceives the benefits of using screencasts during class (i.e. the professor giving him or her more personal attention), the more he or she prefers to watch the screencasts during class.

Next students were asked if they felt more comfortable following instructions using screencasts than following instructions during a regular lecture (on a scale from 1 – strongly disagree to 5 – strongly agree). Students' responses suggest that almost two-thirds (65.4%) felt more comfortable following instructions using screencasts than during regular lectures (responded "strongly agree" or "agree"). The results are shown in Figure 4.

Importantly, the extent to which students felt more comfortable using screencasts than during regular lectures is negatively correlated with the perceived level of difficulty ($r(70) = -.360$, $p = .002$). Therefore, the more students felt that the level of difficulty in the screencasts was too

high, the less they felt comfortable using screencasts. Also, the extent to which students felt more comfortable using screencasts than during regular lectures is positively correlated with the feeling that the professor can give more personal attention when the class is using screencasts than during regular lectures ($r(70) = .316$, $p = .007$). Thus, the more students felt the benefit of increased personal attention by the professor, the more they felt comfortable using screencasts.
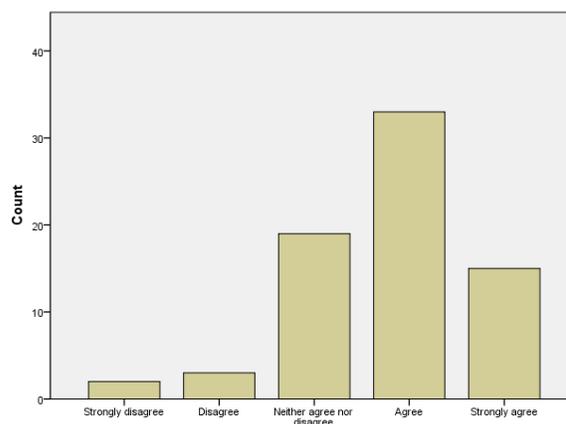
Figure 4: I felt more comfortable following instructions using screencasts than following instructions during a regular lecture.

In addition, students were asked for open-ended feedback to the question "what are the main benefits of using screencasts from your point of view?" Seventy-one out of 72 (98.6%) students responded to this question. Three main benefit-themes emerged out of an in-depth reading of the responses: (1) moving at your own pace, (2) catching up if you missed class, (3) receiving individual attention from the professor. The following sections address each of the themes.

Moving at your own pace
A lot of responses highlighted the fact that screencasts allow student to go through the material at theirr own pace. As one student noted: *"I'm a slower worker so being able to start and stop the screencasts helped."* Moreover, other students specifically pointed to the fact that screencasts allowed them to ask questions without the potential of being embarrassed or holding back the rest of the class. For example, one student stated: *"If you miss something you can always rewind the video instead of asking a question which saves some students the embarrassment and saves you time."*

Some of the students pointed out that screencasts allowed them to skip content. For example, one student stated: *"I found I could skip ahead if I already knew how to do a certain activity in Excel, so that was nice."* In a similar vein, some students were happy about not having to wait for other students. For example, another student stated: *"You can move at your own pace and don't need to wait for people who are slower."*

Catching up if you missed class
Several students specifically noted the advantage of being able to watch the screencasts if one missed class. For example, one student stated: *"If you miss a lecture you can still be up to date on what happened in class."* Similarly, another student stated: *"The main benefit is for kids that missed class because they wont [sic!] be as confused trying to complete the assignment outside of class."*

Receiving individual attention from the professor
Lastly, several students noted the benefits of receiving individual attention from the professor. For example, one student stated: *"Using screencasts allows you to get all the work done easier and faster because it's like having a one-on-one class. You are receiving individual attention as opposed to learning with the whole class."* Another student simply stated: *"It's like cloning yourself."*

What are the perceived disadvantages of screencasts vis-à-vis lectures?
Similar to the benefits, students were asked "what are the main disadvantages of using screencasts for instructions from your point of view?" Sixty-four out of 72 (88.9%) students responded to this question. A close reading of the responses led to the emergence of four main disadvantage-themes: (1) having a different software version, (2) being easily distracted, (3) following instructions without thinking, (4) having less personal interaction. The following sections address each of the themes.

Having a different software version
A lot of students have a Mac computer, while the screencasts were created on a Windows PC. Despite the fact that students could use a virtual application server, such as Citrix, to access the latest Windows version of Excel, many preferred to use the native Mac version of Excel. Thus, several students complained about the differences resulting from disparities in software versions. For example, one student noted:

"Using a Mac and following Windows instructions can be somewhat difficult."

Being easily distracted
Several students were honest about being easily distracted on their own computers – especially when watching screencasts on the Internet. For example, one student stated: *"I just felt like I got distracted with other things on the computer because I knew that I could go back if I wanted to and re-listen."* Similarly, another student noted: *"Just having so many distractions at your disposal makes it tough to focus."*

Following instructions without thinking
Although noted by just one student, students might be tempted to follow instructions without really thinking about what they are doing which might be a disadvantage of screencasts. The student stated: *"Sometimes I don't focus on the content, I just do exactly what is done on the screencast without thinking about it."*

Reducing personal interaction
Lastly, several students stated that the use of screencasts precludes more personal interaction among students. Statements such as *"its [sic!] less interaction as a class"* and *"not very collaborative"* point to this shortcoming. Also, some students found that screencasts make teaching feel less personal – especially for students not asking any questions. As one student noted: *"Could be less personal if you do not ask the professor for help."*

Do students prefer screencasts over lectures for step-by-step instruction?
To understand students' general preference for screencasts over lectures for step-by-step instruction, they were to rate the statement "I prefer screencasts over lectures for step-by-step instructions" on a scale from 1 – strongly disagree to 5 – strongly agree. As can be seen in Figure 5, the majority (51.7%) indicated preference for screencasts over lectures for step-by-step instruction (responded "strongly agree" or "agree").

Surprisingly, general preference for screencasts vis-à-vis lectures for step-by-step instruction is influenced by the mode of consumption. Specifically, students who had the screencast and Excel open side-by-side were more likely to prefer screencasts over lectures for step-by-step instructions ($M = 3.86$, $SD = .913$) than students who switched back and forth between the screencast and Excel ($M = 3.26$, $SD = $

1.287, *t*(70) = 2.258, *p* = .027). This suggests that encouraging students to have the screencasts and Excel open side-by-side could increase overall preference for screencasts.
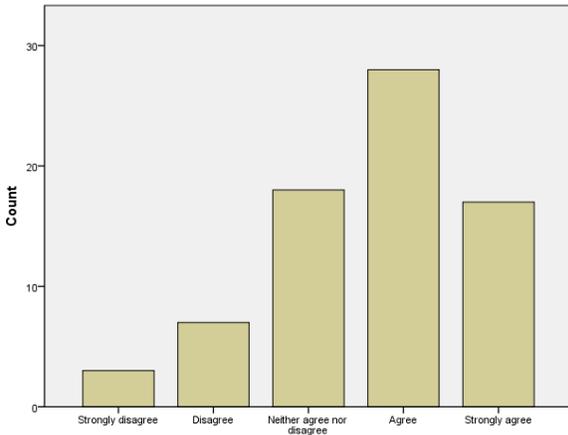

Figure 5: I prefer screencasts over lectures for step-by-step instruction.

Moreover, preference for screencasts over lectures is positively correlated with the extent to which students feel that the professor can give more personal attention when the class is using screencasts (*r*(70) = .271, *p* = .021). This further underlines the importance of individual attention for the effective use of screencasts during class time. Lastly, preference for screencasts is related to the perceived level of difficulty (*r*(70) = -.297, *p* = .011). Thus, the more a student felt that the screencasts were too difficult, the less he or she prefers screencasts over lectures for step-by-step instructions.

How does the use of screencasts influence learning outcomes?
To understand the impact on learning outcomes, students were asked how comfortable they felt using Excel prior to this class (on a scale from 1 – strongly disagree to 5 – strongly agree). Results suggest that students' self-reported level of prior knowledge varied significantly. In fact, 40.3% stated that they did not feel comfortable (responded "disagree" or "strongly disagree") while 42.4% stated that they felt comfortable using Excel prior to this class (responded "agree" or "strongly agree"). Thus, students began this class with significant differences in their perceived Excel skills. The specific distribution is shown in Figure 6 below.
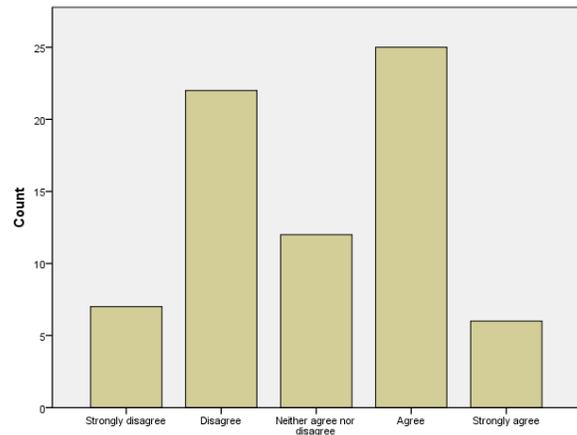
Figure 6: I felt comfortable using Excel prior to this class.

Perhaps not surprisingly, students' level of Excel skills prior to class is correlated with the extent to which students felt that the pace in the screencasts was too fast (*r*(70) = -.268, *p* = .023). In other words, students who were more comfortable using Excel prior to this class were less likely to feel that the pace of the screencasts is too fast. Moreover, students' perceived level of Excel skills is correlated with the extent to which students reviewed the screencasts after class (*r*(70) = -.263, *p* = .025). Thus, students who were more comfortable using Excel prior to this class were less likely to spend additional time outside of class reviewing the screencasts.
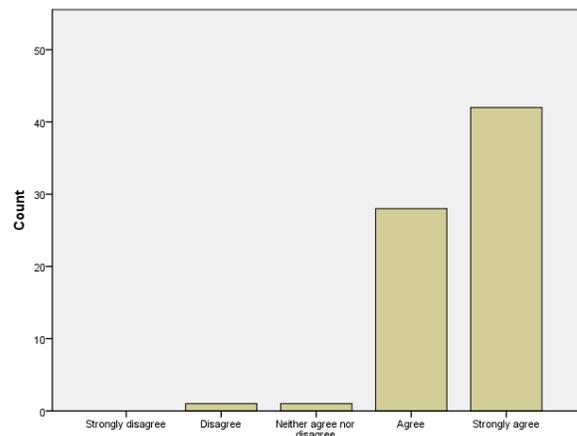
Figure 7: This class improved my Excel skills.

Next, students' perceived improvement of Excel skills as a result of this class was explored. Almost all students (95.9%) agreed or strongly agreed with the statement that this class improved their Excel skills. The specific

distribution for this question can be seen in Figure 7.

Note that students' prior knowledge is not significantly correlated with skill improvement (r(70) = -.109, p = .360). This suggests that this class was effective in improving students Excel skills for learners at all levels. However, students' perceived improvement in Excel skills is significantly correlated with the extent to which students reviewed the screencasts after class (r(70) = .253, p = .032). Thus, students who spent more time reviewing screencasts after class were more likely to believe that their Excel skills improved.

Lastly, students' project work and Excel-specific final exam questions allowed for a partial assessment of student learning outcomes. Although students had to apply the skills they obtained in the screencasts in their final report and presentation, these artifacts were not graded solely based on mastery of Excel, Word, and Google Sites. However, given that students did very well in their final reports (the average grade was 91.33%, SD = 6.39%), it is reasonable to suggest that students learned most of the required skills. Moreover, almost half (47.3%) of the students answered correctly to the two Excel-specific problem-solving questions in the final exam (see Appendix A). Although these measures assess only parts of the skills that were covered in the screencasts, they are nevertheless a good indication of successful student learning.

5. DISCUSSION

The results of the survey can be distilled into five best practices. Obviously, these best practices are preliminary in nature and must be viewed with caution, as they are solely based on the experience of using screencasts for differentiated instruction in two introductory computer information systems classes. Each insight should be further investigated and thus points to potential for future research. Also, it is important to point out that findings are based on a self-reported survey and thus may be biased by students' perceptions of their own behavior and learning. The following sections describe each of the proposed best practices.

First, students should be able to work on screencasts during class time. Especially in introductory classes, where the level of skills can vary greatly, students feel an increased level of comfort if they are able to work on the screencasts in class – with fellow students and the professor present to answer questions. Similarly, professors should assign class time to screencasts if the level of difficulty of a screencast is particularly high. It might be adequate to assign screencasts as homework if – and only if – the level of difficulty is sufficiently low that students are unlikely to encounter difficulties or raise questions in the process.

Second, professors should intersperse screencasts with collaborative group work. Two disadvantages of screencasts – the potential to follow instructions without thinking and reduced personal interaction – could be addressed by having students pair up and work on an assignment that is posed after they completed a screencast individually. This way, students could work in pairs and apply the newly-gained knowledge while also increasing personal interaction.

Third, professors should ensure that the level of difficulty of the screencasts is not too low and not too high. For example, professors could regularly elicit student feedback regarding the level of difficulty in the screencasts. Quick student surveys after the first, fifth, tenth, etc. screencast could be used to ensure that the level of difficulty is adequate for the majority of students. The perceived level of difficulty is extremely important, since the survey has shown that it influences students' level of comfort with screencasts, as well as their general preferences for screencasts as an instructional tool.

Fourth, students should be encouraged to have the screencast and Excel (or whatever they are working on) open side-by-side. Being able to see the screencast and work simultaneously was found to be related with reduced perceptions of content difficulty and an increased preference for screencasts overall.

Fifth, students feeling that the screencasts are moving too fast or are too difficult should be encouraged to review the screencasts after class. Here, it is important to point out that this should only apply to a small minority of the class, since an adequate pace and level of difficulty are key factors influencing the successful use of screencasts in the class room. Also, students that missed a class should be encouraged to review the screencasts on their

own, while making adequate arrangements to address any questions they might have.

6. CONCLUSIONS

Despite the widespread use of screencasts to support or replace lectures outside of the classroom, little is known about their effectiveness as an instructional tool inside the classroom. Screencasts were used to teach fundamentals of Microsoft Office and Google Sites as part of a required freshman undergraduate Computer Information Systems class and their effectiveness was evaluated at the end of the semester.

Results of the student survey (N = 72) suggest that students prefer screencasts over traditional lectures for technical, step-by-step instruction. Moreover, results indicate five best practices that can increase the effectiveness of screencasts: (1) students should be able to work on screencasts during class time, (2) professors should intersperse screencasts with collaborative group work, (4) students should be encouraged to follow the screencast in real time, possibly by dividing the computer screen between the screencast and their workspace, and (5) students should be encouraged to review the screencasts after class. Taken together, these findings lend strong initial support to the efficacy of using screencasts in the classroom to work with students one-on-one.

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Appendix A: Excel-Specific Final Exam Questions

You want to start a new company and need to borrow $50,000. A bank offers you a loan to be paid back over 10 years at an annual interest rate of 5%. You will make monthly payments, due at the end of each month. You want to completely pay off the loan in 10 years. What is the monthly payment you have to make? [*Note: The order of answer choices was randomized. Percentage of students who chose an answer is provided in brackets.*]

    a) $528.13 [*23.0%*]
    b) $530.33 [*50.0%; correct answer*]
    c) $2,507.19 [*5.4%*]
    d) $5,115.30 [*4.1%*]
    e) $6,475.23 [*17.6%*]

You want to buy a house and need to borrow $500,000. Several banks offer 30-year mortgages. Payments are always due at the end of each month. You intend to pay off the mortgage in 30 years. What is the Annual Percentage Rate (APR; rounded to two decimal places) at which monthly payments are exactly $2,500? Hint: Use Excel Goal Seek to find the answer. [*Note: The order of answer choices was randomized. Percentage of students who chose an answer is provided in brackets.*]

    a) 4.16% [*17.6%*]
    b) 4.39% [*44.6%; correct answer*]
    c) 4.42% [*27.0%*]
    d) 4.78% [*10.8%*]

Appendix B: Survey Items

Question	*Answer choices*
1. This was the first class in which my professor used screencasts.	(1 = True; 2 = False)
2. How did you watch the screencasts?	(1 = I had the screencast and Excel open side-by-side and could see both at the same time.; 2 = I switched back and forth between the screencast and Excel and thus could not see both at the same time.)
3. How did you follow the instructions in the screencasts?	(1 = I followed the instructions "live" while the screencast was playing; 2 = I followed the instructions while the screencast was paused.)
4. I felt comfortable using Excel prior to this class.	(1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree)
5. I felt more comfortable following instructions using screencasts than following instructions during a regular lecture.	(1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree)
6. I prefer screencasts over lectures for step-by-step instructions.	(1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree)
7. I would have preferred to watch the screencasts on my own at home and use the class time for other activities.	(1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree)
8. The professor can give me more personal attention when the class is using screencasts than during regular lectures.	(1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree)
9. This class improved my Excel skills.	(1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree)
10. I reviewed the screencasts after class.	(1 = Never; 2 = Sometimes; 3 = Often; 4 = Everytime)
11. The amount of spoken instructions in the screencasts was _____.	(1 = Too little; 2 = Just right; 3 = Too much)
12. The length of the screencasts was _____.	(1 = Too short; 2 = Just right; 3 = Too long)
13. The level of difficulty of the screencasts was _____.	(1 = Too low; 2 = Just right; 3 = Too high)
14. The pace in the screencasts was _____.	(1 = Too slow; 2 = Just right; 3 = Too fast)
15. What are the main benefits of using screencasts for instructions from your point of view (as a student)?	(Open-ended)
16. What are the main disadvantages of using screencasts for instructions from your point of view (as a student)?	(Open-ended)