

**An experience of using Screencasting to teach  
software**

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## **Abstract**

Demonstration of procedural skills is needed for students to learn software applications. Screencasts with their emphasis on recording and playback of such procedures on a computer screen are proposed as a useful means of teaching undergraduate students how to use Microsoft Access to create databases. The paper details screencasting with two successive cohorts in a higher education program and reports on how these two diverse groups, with their own specific features and approaches to their learning, reacted differently to the screencasts.

For the first cohort a set of relevant screencasts were sourced from [www.youtube.com](http://www.youtube.com) and used as a classroom support teaching tool. A post-event focus group with the class revealed that students considered the screencasts useful and helpful, but also that they did not cover all required content features and there were too many different presentation styles across the different screencasts.

For the second cohort the researcher rectified the reported problems of the first cohort by creating a set of screencasts addressing all the required content with a consistent voice and presentation style across all screencasts. Disappointingly, learning outcomes (measured via grades) were poorer than for the first cohort, and most students who achieved a passing grade exhibited little more than surface knowledge of the required software procedures. External (non-academic) factors may account for at least some of this poor result.

While screencasts appear to be a useful and valuable means for teaching software applications to students, they are not a guarantee of success. Increasing student diversity means more challenging student learning environments and student approaches to learning. It seems that varying formats of learning content is not enough to remove obstacles impeding the learning of all students.

## **Keywords**

Screencasts, instructional design, learning outcomes

## **1. Introduction**

Students in higher level education are becoming increasingly diverse. Prior learning, skills levels, motivation and behavioural problems are just some examples of what varies from year to year, and within a given cohort. Nonetheless, students are enrolling with increasing digital/social media knowledge, and cannot devote their full-time to their studies because they need to accommodate part-time jobs. Both of these factors likely impact how students learn.

Screencasting, with its emphasis on computer-screen movements is posited in this paper as a means of teaching software applications to 'netgen' students. A screencast is a means of presenting digitally recorded procedural information to students (Sugar et al, 2010). By demonstrating on a computer screen the required procedures needed to carry out various tasks with the software to be learned, screencasting should be more acceptable to learners than written software manuals. Being web-based allows for more flexibility in where and when the screencasts are accessed.

However, any resource intervention is not a guarantee of successful learning. The learning environment influences achievements of both students and their lecturers. Required student achievement in learning cannot be achieved by merely optimising the learning environment, through appropriate course design, teaching methods, and forms of assessment (Richardson, 2005). It is more complex than this. Student learning behaviour cannot be entirely predicted and students react in different ways to different interventions in their learning environment.

## **2. Background**

### **2.1 Teaching & Learning**

How students learn is an on-going research topic. It has not been exhausted and nor is it likely ever to be. The experience of every student is different. There are too many variables, with too many changing and different values to have one right answer to how students learn. The relationship between cognitive development and learning approaches is hard to find despite decades of research (Zhang & Watkins, 2001). Nonetheless, some theories have emerged.

In order from low level to a higher level of abstract learning, Säljö (1979) in Sweden proposed 5 different conceptions of learning: learning as the increase of knowledge, as memorising, as the acquisition of facts or procedures, as the abstraction of meaning, as an interpretative process aimed at the understanding of reality. Van Rossum & Taylor (1987) added a sixth; learning as a conscious process, directed at obtaining harmony or changing society. Students who hold any of the lower level learning conceptions may struggle to adapt the more sophisticated approaches.

Building on the work of Marton & Säljö (1976) and Entwistle & Ramsden (1983), Biggs (1987) identified three approaches to learning. Students who adopt a *Surface* approach reproduce what is taught to meet the minimum requirements (the lower levels of Säljö's model). A *Deep* approach involves a real understanding of what is learned (the higher levels of Säljö's model), while an *Achieving* approach involves using strategies that maximise one's grades. The Deep approach is the highest in terms of cognitive achievement but is not always adapted by students. There are a number of external (non-academic) influences on the choice of approach made. Zhang & Watkins (2001) list these as self-concept/self-esteem, motivation towards learning, home environment and family support, perceived ability, procrastination behaviour, and perceived self-efficacy. It can be difficult to know if and how any of these might influence the learning of their students.

Many lecturers have evolved informal learning theories that guide how they achieve their goals (Garfield, 1995). They might, knowingly or unknowingly, borrow from the established theories of learning such as behaviourism or cognitivism to balance Watkins & Mortimer's variables (figure 1) in the given class context they find themselves in. It is likely that what happens in a classroom is some function of the prescribed learning outcomes and activities therein (tasks), the culture of the class and the behaviours of the students and lecturers (social structure), what the lecturer and students perceive their responsibilities to be (role), the cognitive abilities of the students and class time available (timing and pacing), and the teaching materials employed (resources). All impact on the goals set by the lecturer, and how well students achieve these goals.



*Figure 1: Watkins & Mortimore (1999) Elements in Teaching Goals*

## **2.2 Screencasts**

Caspi et al, (2005) classify educational videos into three categories: demonstration, narrative and lecture. They cite demonstration videos as more useful than traditional methods (books, manuals, etc.) in improving autonomous learning. A particular form of demonstration video is a screencast: a digital recording of computer screen output, containing audio narration (Ashdown et al, 2011). Screencasts offer a number of advantages which can be mapped onto the elements of figure 1

### **2.2.1 Timing & Pacing**

In a traditional lecture, students have no choice but to go with the pace the lecturer has set. This is not the case with using screencasts outside of the classroom. Being able to control the flow of information with pause, stop, play buttons, even if they do not actually use them, is important to students (Hasler et al, 2007). Merkt et al (2011) refer to pausing, stopping, rewind and forward-wind sliders as micro-level activities. Students can use them to avoid the problem of cognitive overload, defined by Merkt et al (2011) as a poor match between the presentation pace and learner's cognitive capacities. Pausing and rewinding as required facilitates students imposing their own timing and pacing (Mullampy et al, 2010).

Material using web-based screencasts, such as on [www.youtube.com](http://www.youtube.com), is accessible anytime (Clifton & Mann, 2011). This lends to learning being untied from desktops and moving to the mobile world of laptops, notebooks, pads, and smartphones, giving students even more control over the pacing and timing of their learning.

In class, screencasts are a useful and efficient way for lecturers to teach software applications while simultaneously getting across to students the theoretical concepts underlying that software (Ashdown et al, 2011). This helps speed up pace of delivery, leaving time for more interesting content or revision to be included in a class.

### **2.2.2 Social Structures**

Many students are no longer full-time even if attending full time programs. Mullampy et al (2010) refer to these students as the new demographic who increasingly want the ability to access materials from outside college premises and outside of normal work hours. Screencasts are a possible means of retaining the interest of these students whose work life risks taking from their studies. Web-based screencasts (for example, Youtube) are accessible anytime and anyplace (Clifton & Mann, 2011).

Students, particularly undergraduates, see digital world interactions as part of their social structure, and increasingly expect to use digital tools in their college life also (Clifton & Mann, 2011). Smith & Peck (2010) suggest that there is an onus on lecturers to immerse and engage with the technology that students frequently use in their daily lives. There is a need to bring assessment into line with this contemporary digital world to meet learning needs of undergraduates (Smith & Peck, 2010). Youtube is a recognised tool from the undergraduate digital social world, and can be seen as a means of providing a contemporary approach to the traditional ways of delivering content.

### **2.2.3 Role**

The proliferation of digital learning tools available today does not mean that lecturers no longer have an important role to play in instructing their students. Wouters et al (2008) emphasise the role of lecturers as experts modelling tasks for learners. This is exactly what screencasts aim to do – demonstrate a process on a computer screen while the lecturer voice-over explains that process and its procedural steps as it is being demonstrated.

Mullampy et al (2010) highlighted the risk of losing the staff-student relationship as a possible downside of screencasting. While their students appreciated screencasts allowing them time outside class to focus on content they found difficult, they still

needed the lecturer in class to explain these difficult concepts in person. The students did not want lectures to be totally replaced by screencasts, seeing the technology as an assistant to the role carried out by their lecturer.

#### **2.2.4 Tasks**

Screencasts allow students to see exactly what the computer screen looks like when carrying out a particular task (Sugar et al, 2010). This gives reassurance that they have not gone astray on performing the task. Clifton & Mann (2011) claimed using Youtube videos increased their students' engagement, raised critical awareness and facilitated deep learning in tasks set. Smith & Peck (2010) concur, suggesting that Youtube demonstration videos allow for more active participation, further engaging learners in the task.

However, Clifton & Mann (2011) suggest caution when using Youtube and other web-video sites. These sites are unregulated, and content can be misleading, inaccurate or biased. Videos on Youtube can be taken offline without warning, and are often blocked by educational institutions (Bonk, 2008). Hence, pre-existing web-based screencasts are not always suitable for a given task. Lecturers need to exercise judgement and care in selecting the right screencasts for the given tasks they want their students to complete.

#### **2.2.5 Resources**

In sourcing and / or creating the screencast resources lecturers need to bear their students in mind. They need to avoid student cognitive overload. Segmenting the screencasts into small, discrete units is particularly important for students with weak working memory (Hasler et al, 2007). Within the segment, students can decide when to pause and rewind thus managing their own cognitive load. Pre-existing screencasts might not lend to this.

File sizes need to be small enough to facilitate easy downloading (Mullampy et al, 2010), and if used in classrooms they need to be manageable in one session (Clifton & Mann, 2011). Again, pre-existing screencasts might not meet this requirement.

Sugar et al (2010) in a relatively wide-ranging assessment of screencast features and usage introduced a screencasting checklist model (figure 2 below). While meeting

every item on the checklist is not a guarantee of successful student learning, the list is useful. The components seem logical and meaningful.

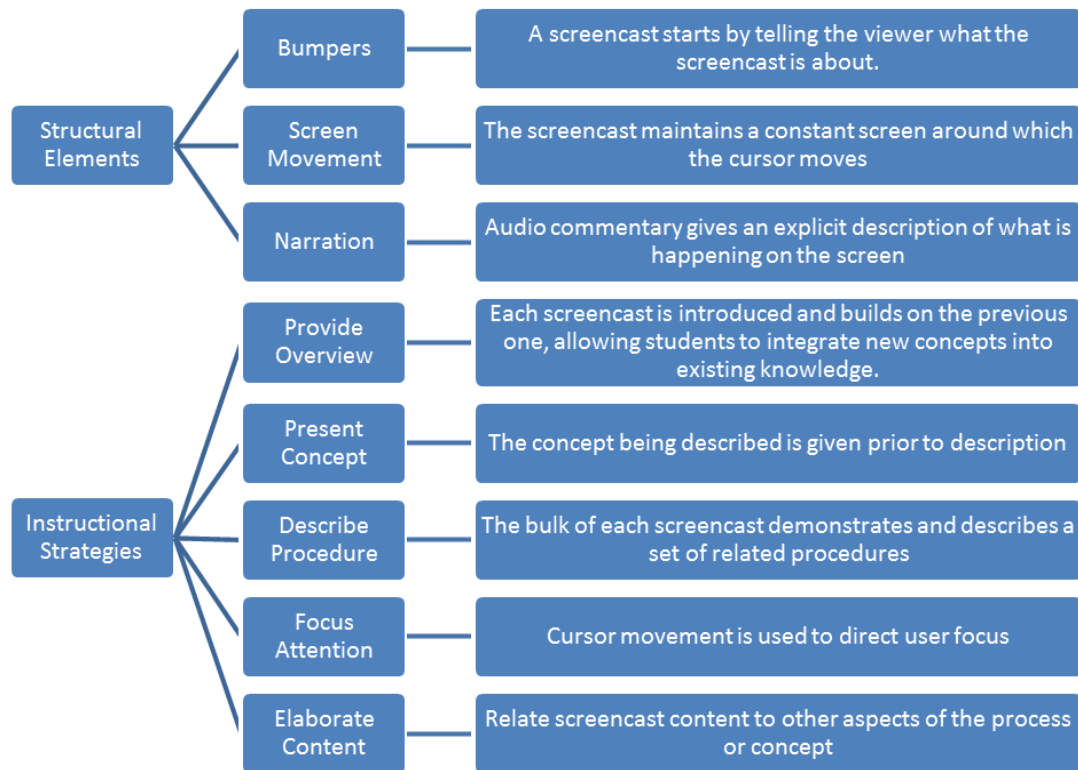


Figure 2: Framework for Screencast design (Sugar et al, 2010)

## 3 Methodology

### 3.1 Background to the Class

The research was carried out with two successive cohorts of an Introduction to Computing module on a combined level 6 & 7<sup>1</sup> Legal & Business Studies program. There were 32 students in the 2011-2011 cohort, and 24 in the 2011-2012 cohort. Having two successive cohorts allowed for problems encountered in the first year to be addressed the following year. It also provided an opportunity for research to be applied to different classes, reflecting a diversity of students.

### 3.2 Process

Demonstration screencast videos were used to teach students the procedural knowledge needed to learn the MS Access database component of the module. The videos were used in class, paused and rewound at various points to revise challenging and facilitate class discussion content ('anchor with discussion' - Bonk, 2008). Links

<sup>1</sup> [http://www.nfq.ie/nfq/en/FanDiagram/nqai\\_nfq\\_08.html](http://www.nfq.ie/nfq/en/FanDiagram/nqai_nfq_08.html)



to the screencasts were made available from the virtual learning environment for the students to access in their own time. A written manual was available to students also.

### **3.3 Validation**

Students had to complete a project on the database content addressed by the screencasts. Their grades in this were used as part of the screencast evaluation mechanism and contributed to students' overall performance in the subject.

Following submission of their projects, students took part in focus groups to obtain their views on their experience with the screencasts. Focus groups allow for discussion and interactivity among participants (Cohen, Manion, & Morrison, 2004) avoiding any researcher bias in the student feedback. The researcher facilitated the discussion, steering it towards important aspects such as: the screencasts as a learning resource, as a supplement or replacement for books or manuals, how many times they accessed or downloaded the screencasts, and the overall quality of the tools.

## **4. Phase One – Implementation & Findings**

The 2010-2011 Academic Year

### **4.1 Implementation**

To achieve the database learning tasks, students worked through paper-based manuals in class. These were complemented with a set of conveniently-selected Youtube videos addressing only the more complex components. The more exposure students could have to the difficult components, the better the chance they have of learning them with sufficient depth. Being available anytime, anywhere (Clifton & Mann, 2011) meant that students could access the resource material in the 'in-between' times (outside of class and other extra-curricular activities). In this way, the instructor accommodates the new demographic (Mullampy et al, 2010) who prefer digital tools and to use these tools when convenient to them.

### **4.2 Findings**

27 of the 32 students passed the database assessment that the screencasts contributed to. While this is a positive result, it is possible that factors other than the screencasts also contributed to this result. There were varying levels of motivation among the students and some had previous experience of databases. All students reported

favourably on being able to follow the screen reproduction to understand the tasks (Sugar et al, 2010), a key feature of screencasting. Most students reached Säljö's (1979) level of learning as the acquisition of facts and procedures, though few went beyond this. Few of the databases produced by the students as part of their assessment exhibited depthful learning (Biggs, 1987), with most reproducing the procedures learned from the screencasts.

In terms of downsides, the concern raised by Bonk (2008) of videos being taken offline without notice occurred for one screencast. The set of screencasts did not cover all required content features. Though nicely segmented into small chunks of information (Hasler et al, 2007), students reported that there were too many presentation styles across the various screencasts. Students expressed a preference for more usage of the tools in class in lieu of paper-based resources. Many of the students agreed with Caspi et al (2005) in showing a preference for the screencasts over the written manuals to catch up on missed classes.

A number of changes were formulated for the following academic year addressing the downsides raised by the students.

## **5 Phase Two – Implementation & Findings**

The 2011-2012 Academic Year

### **5.1 Implementation**

This researcher created 11 screencast videos, addressing all required aspects of the database topic, all with the same style and narrated by the researcher. The videos were uploaded to Youtube to facilitate student access but were also available on the student's VLE.

The framework of Sugar et al (2010) in figure 2 above was used to guide the creation and design of the screencasts. All were sufficiently short, between 3.5 and 5 minutes in length with the first 10 or so seconds acting as 'bumpers' introducing the video. The remainder of each video was allocated to demonstrating the allocated procedure with carefully chosen annotation. Creating the resources herself (using Jing [www.techsmith.com/jing.html](http://www.techsmith.com/jing.html)) allowed the researcher to control screen movement. The videos were numbered in sequence to aid follow-on from video to video.

These screencasts replaced the Youtube videos for in class instruction, though the written resources were still available for students if they wanted to use them. A link to the starting video is <http://tinyurl.com/ca2mu32> and subsequent videos can be found from this starting position.

## 5.2 Findings

Despite tackling the problems of the previous year, only 58% of the cohort passed the database component concerning the screencasts. The set tasks were completed successfully by these students who engaged with the screencasts. However, only two of the students went beyond *surface* reproducing approaches to their learning. A *strategic* approach was exhibited by some students who wanted to achieve a minimum passing grade. For some students, very little was achieved.

The students who attended the focus group reported favourably on the screencasts. Agreeing with (Caspi et al, 2005) and with the previous cohort, the screencasts were preferred over the written manuals as a learning resource. The micro-level features (start, stop, pause, rewind, forward-wind) buttons (Merkt et al, 2011) were highly regarded for their ability to allow students to adjust the pacing and timings of the screencasts to suit themselves, avoiding cognitive overload. These micro features were also much used by the lecturer in class. Addressing all aspects of the database component gave the students a needed boundary to their study, allowing them to contextualise the aspects they were struggling with. Being able to view the videos anywhere and anytime remained a popular feature.

Behaviour and motivational problems manifested more noticeably for this 2011-2012 cohort than for the previous cohort. Some students were reluctant to embrace even the lower levels of Säljö's (1979) approaches to learning. While it is impossible in this paper to explore in depth the reasons for the disappointing output from the cohort, it must be noted that many of Zhang & Watkins (2001) external (non-academic) influences featured. Poor self-concept/self-esteem, low levels of perceived ability, and procrastination problems were particularly prominent. The class dynamic arising among the students needs to be explored further to arrive at more complete understanding of the class output. Engaging with higher level studies proved to be a problematic challenge to these particular students. Their success rate was low for all modules on the program.

## **6. Conclusions and Future Work**

While the researcher satisfied the requirements to embrace 'netgen' tools (Smith & Peck, 2010), such tools are not a guarantee of success. Understanding and managing learner diversity remains a challenge. What works with one group of students does not necessarily work with another group. Theories on student approaches to learning tend to be individualistic, ignoring the dynamic and interactions between students in a cohort that can positively or negatively impact each individual student's approach to their learning. Further research is needed on how varying approaches to learning by students in a class influence those students individually.

Working with screencasts led to an enhanced and more enjoyable learning experience for many, though not all, students across the two years. The flexibility to use the tools anytime and anyplace, as well as impose their own pace and timing on them were favourably reported features, allowing flexibility in when learning takes place. Mullampy et al's (2010) new demographic, who juggle study with other demands on their time, is prominent and is a viable area of further research.

The balance of in-class and out-of-class usage is also an area of future research. Students viewed the screencasts as a supplement and not a replacement to classroom work. Classes were still needed to provide a needed structure and the lecturer on-hand to solve complex problems (Mullampy et al, 2010). From the lecturer's perspective, the screencasts being used outside of class allows more class time to better manage a class with diverging motivations and abilities by being able to focus in on complex content and weaker students.

While recognising that the 2011-12 cohort were particularly unusual in their behaviour and motivations, this lecturer / researcher is concerned that the lack of engagement with this second cohort is part of a growing trend towards a very real problem with student engagement on behalf of some students. There are related problems such as a diminished experience for the more motivated students in the same class as non-engaged students. She urges lecturers not to lose heart and continue efforts to improve the learning experience for all students within increasingly diverse cohorts.

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