Screencast or text – which, when and why?

Abstract

Screencasts are commonly used for delivering conceptual and task-based information. However, there appears to be little research into the effectiveness of screencast instructions compared to written instructions, especially in relation to delivering task-based information.

The aim of the study described here is to compare the effectiveness of screencast and written instructions and to try to identify how the effectiveness of screencast instructions might be improved.

Each participant performed an experiment intended to compare the effectiveness of screencast and written instructions for completing a computer-based task. Pre- and post-task surveys were conducted to explore participant experience and attitudes, and then each participant was interviewed to gain some insight into their views on how the instructions might be improved.

The experimental findings support the results of another similar study, although more research is required to confirm whether these results are consistent for longer or more complex tasks. In terms of overall error rate, screencast instructions appeared to offer a small benefit over written instructions, although results were inconclusive. Screencast instructions took longer to complete and appeared to induce higher cognitive load than written instructions.

However, insights gained from participant interviews support the use of screencasts for delivering both conceptual and task-based information. Participant comments also support screencast design principles gathered from existing information design principles, multimedia design principles and practical observations, and allow these principles to be extended for use with task-based screencasts.

About the author

Steve Moss is based in Auckland. He trained as a mechanical engineer but started his career by developing computer software in an engineering company. After several years in software development, he moved into software support and then into training. The training led to developing course material and other documentation, and he made the move to becoming a self-employed technical communicator in 1988. In the late 1990s he joined the Technical Communicators Association of New Zealand (TCANZ) as website administrator, then Vice President and more recently as President.

This article is based on the research Steve did in April and May 2013 for his Master's dissertation in technical communication from Sheffield Hallam University in the UK.

1.0 Introduction

> Screencasting is "… a digital video-recording of computer screen output, often including voiceover narration." (Reitz, 2010 cited in Bailey, 2012).

To give you some insight into why I was looking at screencasts as a way of providing task based information, I need to take you back to 2008, when I came across the article "Screencasting–the future of technical communication?" in the March issue of the STC Intercom magazine. In that article, Raymond Archee asked if it was likely that you would still be using Robohelp or Word or the Web to create manuals in ten years' time – probably not if you look back 10 years to see what has changed. He suggested that screencasts are the way of the future for technical communicators and described how tools such as Camtasia and Captivate could be used to create instructional videos and tutorials (Archee, 2008).

Then, later in 2008 at the TCANZ conference in Auckland, Tony Self[1] delivered his keynote presentation: "What if readers can't read?" Tony discussed the changing needs of our audience – in terms of both attention span and reading ability. Gone were the days of lengthy user guides and plump online help files. The age of Google and YouTube was upon us.

A British Library study by Williams and Rowlands in 2007 suggests that the "Google Generation prefer quick information in the form of easily digested short chunks rather than full text" and goes on to say, "Power browsing and viewing are the norm for all: reading appears to be only occasionally undertaken online, more often offline or not at all." A 2010[2] study showed that "46% of people from Poland had no contact with a text exceeding three pages of typescript or three pages on a computer's monitor within [the] last month," and, "to make matters worse, 33% of interviewee students and pupils declared that they had no contact with a book [in the] last year."

We all know that nobody reads the manual (Self, 2008; Johnson, 2009; Miodownik, 2009). And we all know that's not quite true. Most users have a well-developed hierarchy of ways to find an answer to their current question: if the manual is the easiest way at that particular time – they will use it. Unfortunately, the manual has rarely been the easiest way. As Sheila Fahey (2003) at Cherryleaf comments:

> When things go wrong and it matters to the user, they will seek assistance. They will look for the easiest way to get to the information they need to do the task. If this is the manual, then they will use it.

And Joel Spolsky (2000) adds some further insight:

> In general, your users are trying to get something done, and they see reading the manual as a waste of time, or at the very least, as a distraction that keeps them from getting their task done.

So, even in the early 2000s manuals were tolerated rather than embraced and the level of tolerance has clearly decreased in the intervening years. New techniques, such as topic-based authoring might help slow the decline of user support for the written word in user assistance material, but a new approach is clearly required.

[1] Self, 2008
[2] Stachowiak, 2010

Significantly, in his concluding remarks, Tony (Self, 2008) suggests using screencasts to deliver conceptual information, such as the four-minute presentation about wikis by Commoncraft. He goes on to say that this "… is the type of conceptual information that Hughes suggests is the primary domain of technical communication. It would easy to argue that the written product of technical communicators is not nearly as effective as Commoncraft-style videos" (ibid).

But if screencasts are really the future of technical communication, we need to be able to use them to deliver task-based information as well, don't we? So, as a technical communicator considering using screencasts for both conceptual and task-based information, I had to ask: are screencast instructions more effective than their written counterparts?

And, secondly, if I am just getting started as a screencast developer, what guidelines are available to me to make sure that any screencasts I develop are as effective as possible?

My attempt to answer these two questions formed the basis of my research and the story of what I found is the basis for the rest of this article. Let's start by looking at how the study was set up.

1.1. Framework of this study

Potential participants were recruited using various channels including industry organisations, local polytechnics and a research participant website. A total of 27 participants registered for the study by using a short survey form set up in SurveyMonkey. The survey collected their contact details and allowed them to identify their level of familiarity with nine Microsoft Office tasks. It turned out that a mail merge was the least familiar task for most of the participants, so I used the mail merge as the experimental task in this study.

Each participant attended the study session separately and started by providing details about their computer experience, educational background and attitudes towards using documentation for computer tasks. They then completed the mail merge task using screencast or written instructions provided for that purpose.

After completing the task, the participant completed the post-task survey (also in SurveyMonkey), which allowed them to comment on their progress with the task. Finally, each participant was interviewed to allow them to supplement their post-task survey information by making more detailed comments and suggestions about the instructions, the task and the session itself.

The results of the experiment provided some insight into whether screencast instructions are more effective that written instructions, while the interview provided some insight into participant views on how the screencast instructions could be improved.

2.0 Are screencast instructions more effective?

In this section we will look at the results of experimental part of the study.

Two laptops were used during the experimental study session. Task instructions were delivered on one laptop while the participant performed the mail merge task on the other. The participant's use of the instruction laptop was video recorded for timing purposes.

2.1. Experimental task

The experimental task was set up so that three measures of the effectiveness of the instructions could be tracked.

1. The **error rate** was the number of errors that each participant made as they completed the mail merge task. The number of errors was determined from the accuracy of the final mail merge letter and how accurately they followed the instructions when creating the letter. I considered the error rate to be the most important measure of the effectiveness of the instructions: the lower the error rate – the more effective the instructions.
2. The **step repeats** tracked the number of times participants replayed any of the instruction steps. This measure was intended to try to find out how hard the participant needed to work to understand or remember the instructions.

   If the participant found the instructions easy to understand and remember, we would expect few steps to be repeated. Conversely, if the instructions were hard to understand or remember, we would expect a higher repeat rate.
3. Task **completion time** was simply the overall time required to complete the task. A shorter completion time suggests that the participant found the instructions easier to follow and understand, but needs to be taken in the context of the error rate: a longer completion time may be acceptable if there are few errors.

The participants were divided into three groups of nine, and each group received the task instructions in a different format.

- The **Screencast continuous** group received the task instructions as a single 5-minute narrated screencast that played fully before the participant started the task.
- The **Screencast separate** group viewed the same screencast, but as a series of separate instructions which they performed on a step-by step basis. The separate screencasts ranged in length from 8 seconds to just over a minute.
- The **Written** group viewed each instruction step in written format and then performed it on a step-by-step basis.

Members of all three groups could replay any instruction step if they needed to while they performed the task.

All screencast and written instructions were delivered in a standard format, using the Instruction Viewer, a browser-based instruction delivery engine developed specifically for this study. Apart from displaying the instructions, the Instruction Viewer also recorded how long each participant took to move from one step to the next and how often they repeated any steps.

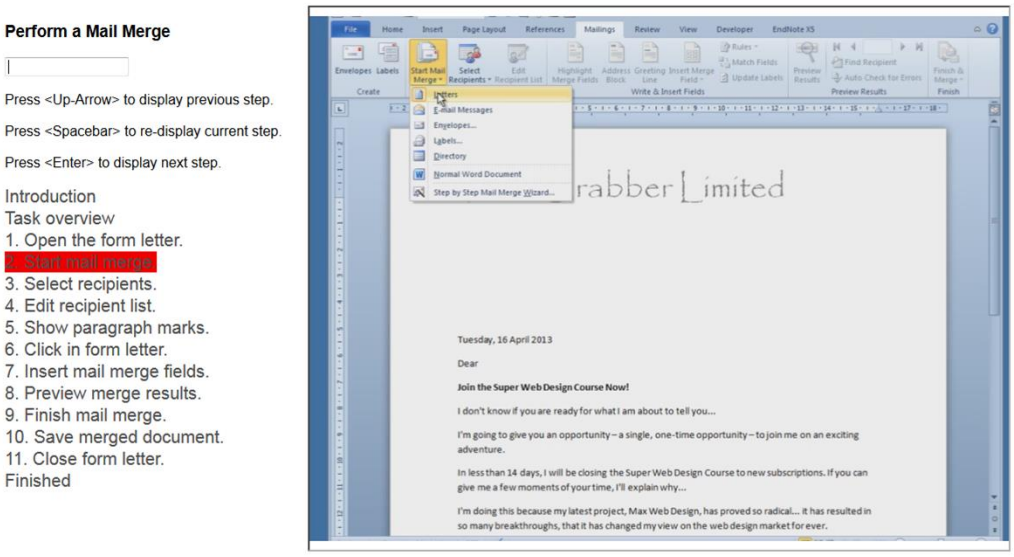

Figure 1 – Instruction Viewer showing a screencast instruction

Instructions were displayed at the right of the screen, either as a screencast (see above) or in a written format (see below). The participant pressed Enter to display the next instruction and the highlight moved automatically to the next instruction heading. If necessary, the participant could click on an instruction heading to replay that instruction.

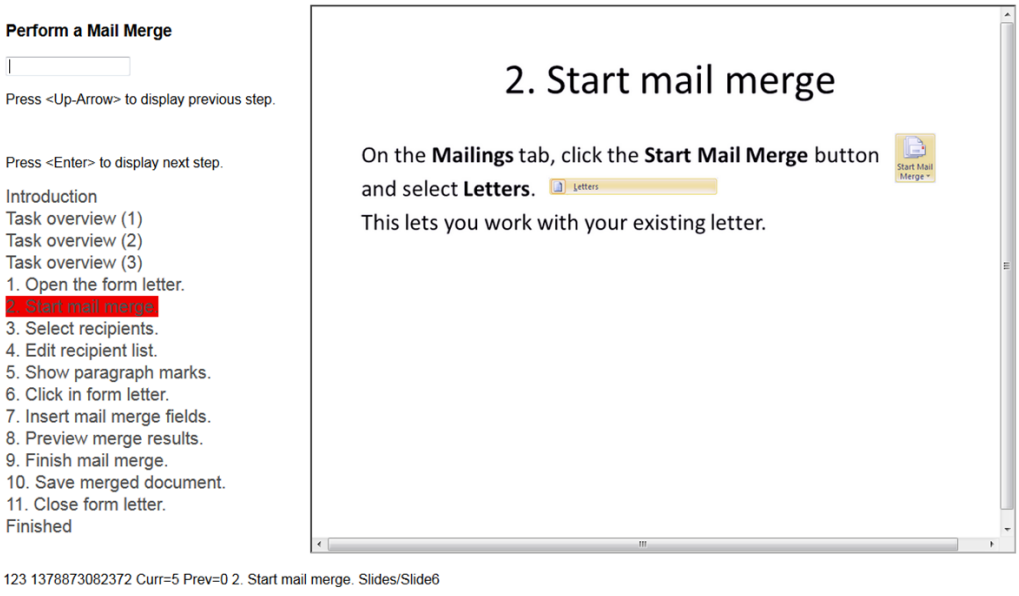

Figure 2 – Instruction Viewer showing a written instruction

2.2. Experimental results

The experimental results consider the three measures of effectiveness proposed earlier: the number of errors made, the number of steps repeated and the task completion time.

2.2.1. Number of errors made

The total number of errors made by each group was lowest for the screencast continuous group and highest for the written group.

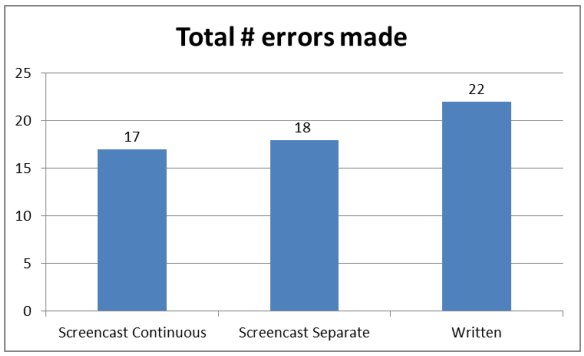

Figure 3 – Total number of errors made by participants during the Mail merge task

2.2.2. Number of steps repeated

The number of steps repeated by each group (Figure 4) shows the opposite trend to the error counts, with the screencast continuous group showing the greatest number of repeated steps. This suggests that the screencast groups had to work harder to remember the instructions, especially the screencast continuous group who had the longest delay between viewing the instructions and starting the task.

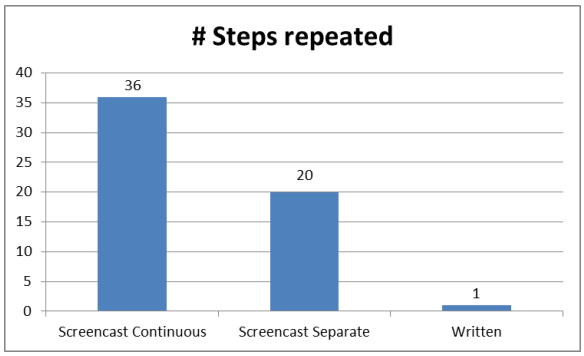

Figure 4 – Number of mail merge task steps repeated by each group

As you can see, the two screencast groups repeated a lot more steps than the written group, suggesting that even when a single instruction could be viewed it was sometimes too much for the participant to remember and they needed to repeat it.

In addition to the overall number of steps repeated by each group, the number of times specific steps were repeated was also examined. Unsurprisingly, there appears to be a direct link between the complexity of an instruction step and the number of times it was repeated. This relationship between number of repeats and step complexity, does seem to confirm that participants were having to work harder to remember the information. Indeed, I would suggest that the participant's level of effort (cognitive load) was the significant factor in step repeats and hence task completion time.

2.2.3. Task completion time

The average time to complete the task was also longest for the screencast continuous group (Figure 5). Again, this was understandable if the completion time was related to the number of repeated steps. You would expect the group with the largest number of repeated steps to have the longest completion time. It may be worthwhile noting that the basic screencast playing time is also a factor, regardless of the number of repeated steps – it may simply be quicker to read a written instruction than to watch its screencast equivalent.

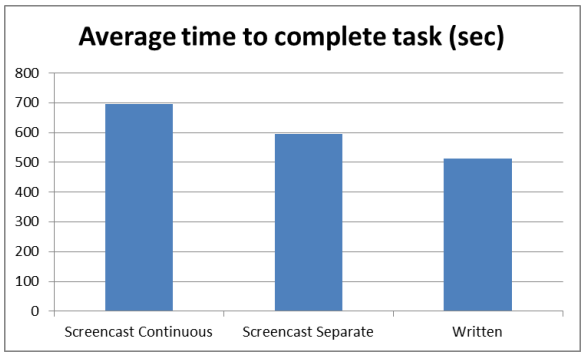

Figure 5 – Average task completion time by group

The differences between the groups were not large and due to the relatively small sample size, it is difficult to say whether screencast instructions will always produce a lower error rate than written ones.

I could find only one other study that compared video-based instructions with printed instructions. That study by Kara Alexander[3], at Baylor University, also found a similar relationship between error rate and task completion time for screencast and written instructions.

2.3. Limitations of this study

The three measures of effectiveness used in this study: error rate, task completion time and step repeats for a single task, completed once, were possibly too simplistic to properly compare the effectiveness of screencast and written instructions. It may have been better to compare participant performance when repeating the task after a period of time and also to include at least one more – possibly more complex – task as well.

By allowing participants to complete both screencast and written task instructions, it would have been possible to ask them more detailed questions about the relative ease of use of the two types of instructions. This was the approach taken by Alexander in her considerably more elaborate study.

[3] Alexander, 2013

2.4. Summary – Are screencasts more effective?

Although screencasts apparently produce a slightly lower error rate (see Figure 3 on page 6), they take longer to complete and appear to generate more cognitive load, based on the number of steps repeated.

Alexander suggested that the lower error rate for screencast instructions may have been due to the fact that viewing the complete screencast before completing the task might have given the participant a better understanding of the context and outcome of the task, allowing them to work towards a clearly understood goal that was not as obvious to the participants who were using the written instructions.

This suggestion has some merit, but I think a lot more study is required, especially for longer and more complex tasks and with larger groups of participants where other factors such as age, education, computer knowledge, audio/visual impairments and first language and can be examined in more detail.

Another area that would benefit from further study would be to compare the development time of screencasts with that of written instructions. It is possible to produce basic screencasts quite quickly, but high-quality presentations can take considerable time to develop due to the planning, scripting, recording, narrating and editing time required. Clearly, even if screencasts provide lower error rates than written instructions, their overall value might be questioned if they take significantly longer to produce. Nevertheless, the investment in producing screencast instructions may be justified for large audiences or audience with specific needs.

Now that we have looked at the experimental results of the study, I would like to go on to consider what guidelines are available to help us as technical communicators to make our screencasts more effective.

3.0 How can they be improved?

One way of improving screencasts is to look at design guidelines that have been developed for multimedia learning in general and see how those guidelines could be extended or modified to make task-based screencasts more effective.

There are several sources that can be considered.

- Are there any applicable multimedia learning theories and what do they suggest? (Mayer, 2010; see also Plass, Moreno & Brünken, 2010:9-22)
- What do existing guidelines suggest? (Plaisant & Shneiderman, 2005:6-10)
- Has anyone reviewed what others are doing with screencasts and identified what works and what should be avoided? (Sugar, Brown & Luterbach, 2010:5-7)
- And finally, what did participants in this study consider worked well for them during the study session?

By reviewing each of these sources in turn, I have assembled a set of guidelines that should assist technical communicators as they design and develop task-based screencasts.

3.1. Design guidelines for task-based screencasts

These design guidelines are based on a combination of information design principles, multimedia design research principles, observations and comments from the participants in this study.

Provide a structural overview. A structural overview is helpful to provide the user with a clear idea of what is being covered in the screencast and in what order. This follows what you normally call "preacher's rules": tell them what you're going to tell them, tell them and then tell them what you told them.

Provide optional conceptual information. Conceptual information in the form of introductions and background information is important for giving the user context. In this study, a number of the participants commented that they found the introduction very helpful for setting the scene and identifying the purpose and goal of the task. Other participants neither wanted nor needed this information, which suggests that it should be provided but clearly identified so that the user can view it or not, as required.

Facilitate user control. The importance of user control was raised by a number of the participants, and you will recall that the Instruction Viewer provided a hyperlinked list of all the segments that the user could use to select any segment they wished to play at any time. The Alexander study found that the participants in that study liked using screencast instructions but found them difficult to operate when they needed to find specific information. This suggests that when you are developing a screencast, it is really important to provide a table of contents or similar device that allows the user to jump to specific information if required.

Maximise clarity and conciseness. Aiming for clarity and conciseness almost go without saying, but you can improve both in screencasts by developing a script as the basis for the presentation, then adding the narration to the completed screencast, rather than trying to narrate as you go. Editing-out pauses, errors, repetition or typing delays helps to keep the presentation brisk and helps to keep the user engaged.

Optimise segment length and complexity. One point that came across clearly in the study was that you need to try to ensure a reasonable balance in segment length and complexity. It may not always be possible, but aim to get the amount of work that the user has to do in each step to be about the same. Consider combining simple instruction steps and splitting more complex ones. This makes it easier for the user to follow the instructions and not get confused on especially long or complex steps.

Label segments appropriately. Each segment of the screencast should be clearly labelled, not just so that the user can view the introduction or not, but so they can see the overall structure of the material and if necessary select information they wish to use. Each labelled segment can then be accessed directly from the table of contents.

Layer the information. Make use of layering (Horton, 1994:178) to provide progressive levels of detail for viewers of your screencast. This will meet the needs of experienced users, who can just use the top-level headings as reminders and less experienced users, who can drill-down to get the detail they need.

The remaining items reflect the previously discussed principles, guidelines and observations, and supplement the design guidelines listed above.

Highlight specific areas or items on screen. Using arrows, boxes, shading or other methods to highlight areas on screen is a valuable way of making the user focus on specific information.

Use consistent terminology and layout. As with any documentation, use consistent terminology and presentation to avoid confusion.

Be faithful to the user interface. Make sure that you are using the same version of the software as the user when demonstrating features.

Provide user feedback. User feedback is possibly more important for written material, but even with screencasts you need to show clearly the results of user actions to keep them on track and to facilitate error recovery if necessary.

Engage the user. Keeping the segments short and direct will help maintain the user's engagement, but you might consider other options like using two narrators or including novel or amusing items in the material. However, take care when using supposedly amusing material – if it is in an overview or introduction that the user will view only once, it might work well. Including it in instructional steps that could be used many times, will rapidly undo any engagement you may have achieved.

Strive for universal usability. Finally, strive for universal usability by using commonly used video formats and avoiding Flash. Use closed captions for users with hearing impairment, use high resolution to give maximum clarity and use techniques like pattern language (Ellison, 2009) to present commonly used elements in ways that are familiar to the user. An example of this is the way that multiple search results are shown with a list of pages and a next and a previous button.

4.0 Conclusions

I think that the jury is still out on whether screencasts are more effective than written material for delivering task instructions. However, screencasts can definitely be used to deliver instructions effectively, provided you manage the level of cognitive load experienced by the user.

As I mentioned earlier, more study is required in several areas, especially in relation to longer or more complex tasks and a comparison of development times.

Looking at the interview comments made by the participants, it appears that they found the screencasts extremely valuable for the "show and tell" of both conceptual and task-based information. This suggests that screencasts are ideal for showing how something works or explaining concepts, employing the power of both animation and narration.

It was also clear from participant comments that fine control of the display and re-display of instruction steps was an important factor for making the screencast instructions as easy to use as possible. Without the Instruction Viewer controls, the situation would have been the same as for the Alexander study, where over 64% of participants found it difficult to locate specific information when required.

Although more research is required to confirm how well screencasts work for complex or detailed information, there is no reason why you should not use screencast material for conceptual and instruction overviews, combined with written material for detailed instructions. For example, the default instruction mode may be in written format but with additional supporting material in the form of "show me" screencasts.

As fine control of screencast instructions is so important, it is worth looking for a development tool that can provide some form of table of contents or bookmarking that will allow the user to easily select individual instructions or other information when required. This will support full layering of information to provide optimum accessibility for users with all levels of experience.

And finally, with the advent of user-friendly delivery channels such as YouTube and the flexibility of hand-held devices such as tablet computers, there is no reason why screencasts cannot be used as part of more extensive instructional material that can be delivered direct to users as they perform tasks that are not necessarily online. For example, assembling furniture or repairing an appliance. Bearing this in mind, I would be very interested to see how far screencasts, or at least video-based instructions, will start to replace many forms of more traditional online and written instructions over the next two to three years.

I started this article by mentioning Tony Self's 2008 presentation about readers not being able (or wanting) to read, and I would like to leave you to reflect on the same point, neatly underscored by school principal Michael Cheers[4]:

> Text assumes the user can read, with audio and video, literacy is no longer a constraint – from our five-year-old children to the parents from non-English speaking backgrounds. The same cannot be said about text-based instructions.

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