Screen and Audio Capture Software

A Comparison of Development Tools and Techniques

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Executive Summary

The purpose of this report is to determine which product would serve our faculty the best as a screen capture-based learning development tool. Even though we did not assess faculty needs in terms of a screen-capture tool, we assume, from our experience, that the usage of this tool would be minimal in terms of functionality and that it would be used mostly to deliver content to learners.

We have determined that there were two specific types of learning objects that could be developed using screen-capture tools: PowerPoint conversions and software demonstrations.

- The most complete PowerPoint converter is Articulate Presenter Pro, but since a lot of people on campus are already using Impatica and that it is available on Macs, it should not be discarded. LecShare is a much cheaper alternative that should also be considered.

- As feared, it is very difficult to give an edge to Camtasia or to Captivate. They both have their strengths and weaknesses; they work in a different way... Camtasia should be used for very rapid development. The objects that are built with Camtasia look a little bit less professional than those built with Captivate, which is a more complete software product that should be used by more advanced users who need to build longer lasting learning objects, online tutorial, or communicational and marketing material.

The best way to promote the use of any of these products would be to give access to anybody for free by signing a campus agreement with a vendor. If a faculty member has to spend $700 on Articulate, the chances are he/she might not buy it.

The other alternative would be to develop internally the expertise to support open source and free products. By offering training, job aids and templates, we could easily accommodate the majority of faculty needs regarding screen capture and PowerPoint conversion.
I. Introduction

With over 20,000 on-campus students and over 4,000 staff and faculty members, University of Delaware is a considerable community. IT Services’ staff is the main service provider that supports the use of technology for administrative, research, teaching and learning needs of the community. Over the years, a growing number of technologies have been implemented and supported by the IT people and by individual departments and colleges. Some of these technologies are answers to the same need while some are definitely innovative and unique.

IT-User Services, a unit that focuses on improving teaching and learning with technology, has a responsibility of evaluating and recommending the tools and techniques proven to be the most efficient to help faculty members achieve their goal: to provide a better way to teach in order to generate deeper learning for students.

II. The Topic of this Report

The development of complex learning objects¹ is no longer reserved to web developers, instructional designers or computer specialists. Multiple rapid development tools are now available to every subject matter expert (in higher education, we refer to them as Professors). A lot of these tools focus on screen capture and presentation conversion with added audio (usually narration). This report will compare some of the most popular products available and some other open-source or free software bundles that can be used in order to produce stand-alone learning objects.

III. Methodology

A member of IT-User Services has been appointed to assess the value and usability a series of products in the most objective way possible. All the software products have been installed and tested on a Tablet PC² equipped with a USB Headset and microphone. After reviewing the features for each software, a series of criteria have been written in order to evaluate the performance of each software product. Finally, a recommendation on which software product works best and which one should be most largely supported at University of Delaware will be made available.

¹ A learning object is any kind of teaching and learning resource that can be transmitted or used with the use of one or a network of computers. It can consist of a text, a picture, a diagram, a sound, a video, a multimedia presentation, or a blend or a sequence of the above-named items. Multiple learning objects can be assembled to build a learning module, a lesson, a course, etc.

² The exact model of the computer is a Gateway E-155C with a Intel Core 2 CPU @ 1.20 GHz and 2 GB of RAM, Windows XP. It is representative of the kind of computer that any faculty member would buy during the fall semester of 2007.
1. **Overview of Tested Software**

This section is dedicated to presenting each evaluated software and their key features. See Table 1 for the complete list.

**Table 1: List of tested software**

<table>
<thead>
<tr>
<th>Software</th>
<th>Company/Owner</th>
<th>Pricing</th>
<th>Windows Vista</th>
<th>Windows XP</th>
<th>Macintosh</th>
<th>Linux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulate Presenter Pro</td>
<td>Articulate</td>
<td>$699</td>
<td>5.3</td>
<td>5.3</td>
<td>NS⁴</td>
<td>NS</td>
</tr>
<tr>
<td>Camtasia Studio</td>
<td>Techsmith</td>
<td>$179</td>
<td>4.1</td>
<td>4.1</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Captivate</td>
<td>Adobe</td>
<td>$199</td>
<td>3</td>
<td>3</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>FlashDemo</td>
<td>FlashDemo Inc.</td>
<td>$59</td>
<td>1.14</td>
<td>1.14</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>FlashPoint</td>
<td>FlashDemo Inc.</td>
<td>$49</td>
<td>2.81</td>
<td>2.81</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Impatica for PowerPoint</td>
<td>Impatica Inc.</td>
<td>$499</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>NS</td>
</tr>
<tr>
<td>Speechi Standard</td>
<td>Speechi!</td>
<td>$495</td>
<td>3.1</td>
<td>3.1</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>LecShare Pro</td>
<td>LecShare inc.</td>
<td>$69</td>
<td>1.30</td>
<td>1.30</td>
<td>1.30</td>
<td>NS</td>
</tr>
</tbody>
</table>

**COMMERCIAL PRODUCTS**

**OPEN SOURCE OR FREE PRODUCTS**

| CamStudio                | CamStudio.org   | Free    | 2.5.1         | 2.5.1      | NS        | 2.5.1 |
| Photo Story              | Microsoft       | Free    | 3             | 3          | NS        | NS    |
| Wink                     | Satish Kumar. S.| Free    | 2             | 2          | NS        | 1.5   |

A gallery of exported PowerPoint conversions and screen captures using the listed software is available online at [http://copland.udel.edu/~mathieu/sc/index.html](http://copland.udel.edu/~mathieu/sc/index.html).

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³ Individual license, educational pricing when available.
⁴ NS = Not supported
1.1 Articulate Presenter Pro

Articulate Presenter is a PowerPoint-to-Flash converter. When installed, you get a new drop-down menu item in PowerPoint. Since it supports importing Flash objects, it can be considered as an authoring tool.

Key features:

- PowerPoint add-in that leverages a mainstream software tool.
- Very simple voice-over-PPT recording capabilities.
- Import audio feature enables rich audio effects.
- Converts almost all PPT animations.
- Exports a standalone Flash learning object with a navigation.
- Possibility of embedding Flash objects within the Articulate-generated object.
- Can be expanded into a complete e-learning development tool when integrated with QuizMaker (quiz editor) and Engage (templates).

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Figure 1.1-1: The drop-down menu of Articulate Presenter 5.3 in PowerPoint 2007.

Figure 1.1-2: Articulate Presenter audio import option supports WAV and MP3 files.

Figure 1.1-3: The Record Narration option lets the user go through his/her slides in presentation view to synchronize the audio.
Figure 1.1-4: The Slide Properties Manager controls the user experience in many ways.

Figure 1.1-5: The Library and Options menu is a very useful tool to customize the output.

Figure 1.1-6: When publishing, the user can always adjust the output to the appropriate media.

Outputs:

- Flash-based portable learning object.
- Includes a slide navigation bar on the side of the screen (which is optional, but present by default).
- Includes simple playback options.
- SCORM compliant.

Figure 1.1-7: The look and feel of the Flash-based exported learning object.

http://www.articulate.com/products/presenter.php
1.2 Camtasia Studio

Camtasia Studio is a real-time full-motion screen and audio capture software. It has a PowerPoint add-in that transforms any PowerPoint presentation into a full-motion movie with audio.

Key features:

- Easy user interface makes the software very easy to learn.
- Zooming and panning features help keep file size low by and focus on sections of the screen without pixelating the image.
- PIP capability helps build more “human” learning objects by superposing a webcam to a full-motion screen capture.
- There is a second audio track available, making mixing possible.
- Editing tool is drag and drop based, so it is very intuitive.

Figure 1.2-1: Camtasia Studio offers its user to start from scratch by recording the screen or to begin with a PowerPoint presentation.

Figure 1.2-2: Camtasia is a very robust tool to build a guided tour or a software demonstration using its audio-video capabilities.
Figure 1.2-3: In PowerPoint Recording mode, the user has access to an additional menu in presentation mode. Everything is recorded in real time, including the animations and narration.

Figure 1.2-4: In PowerPoint Recording mode, Camtasia offers the possibility of importing the notes as captions. This feature is very important in terms of accessibility.

Figure 1.2-5: In Screen Recording mode, the user can select a specific zone to record or a specific window.

Figure 1.2-6: The Lock to application feature lets the user decide the pixel size of the recording and snaps the application to the recorded area.

Figure 1.2-7: The Storyboard and the Timeline views (at the bottom) are easy to use and efficient when editing a clip.
Figure 1.2-7: Zooming and panning are good ways to focus the attention of the learner on a specific action.

Figure 1.2-8: Camtasia has a limited but useful quiz tool.

Figure 1.2-9: When publishing, the user can always adjust the output to one of the predefined settings.

Figure 1.2-10: Camtasia exports in most of the popular media formats.

Outputs:

- Possibility of exporting in multiple formats, including mobile device-ready formats.
- Usually Flash-based.
- Includes simple playback options.
- SCORM compliant.

Figure 1.2-11: A simple flash output.

Figure 1.2-12: A Flash output with an added iPod video download.

http://www.techsmith.com/camtasia.asp
1.3 Adobe Captivate
Adobe Captivate is primarily a tutorial development software. It captures screen shots, adds action description bubbles automatically and tracks mouse movement. Instead of capturing full motion movies of the screen, it captures key screen shots to use as a background scene and manages the mouse movements with vectors.

Key features:

- Records screenshots, mouse movements and keystrokes.
- Key screenshot recording or full motion recording modes.
- Branching scenario mode can bring some serious interaction with the user.
- Quizzing feature supported by a quizzing question pool.
- PowerPoint conversion tool available.
- Audio recording and synchronization.
- Rollover slidelets provide just-in-time information when a hotspot or a button is hovered.

Figure 1.3-1: Captivate is a very complete tool. It can be used very simply, but is not limited to basic features.

Figure 1.3-2: Captivate is a powerful software simulation tool.

Figure 1.3-3: The Branching Scenario project type is something quite unique to Captivate.
Figure 1.3-4: For PowerPoint conversion, Captivate offers the Import from PowerPoint option. There is also an Image Project available.

Figure 1.3-5: The PowerPoint slide import interface lets the user decide on the content and the pixel size of its project.

Figure 1.3-4: Captivate timeline-driven editing interface.

Figure 1.3-5: In Simulation mode, the user chooses the application to record and sets the pixel size. This information is saved in the project, so if a screen capture is missing or erroneous, it is very easily editable.

Figure 1.3-6: When importing an audio file, Captivate offers multiple timing options.
When publishing, the user can always adjust the output to one of the predefined settings. Captivate’s output can communicate with most of today’s Learning Management Systems through their reporting features.

Outputs:

- Flash-based portable learning object.
- Includes simple playback options.
- SCORM compliant.

The converted PowerPoint output has some flaws with PowerPoint 2007. The colors and some fonts did not keep their original settings.

http://www.adobe.com/products/captivate/
1.4  **FlashDemo**

FlashDemo is a full-motion screen recorder intended for software demonstration.

Key features:

- Easy user interface makes the screen capture experience very straightforward.
- Step-by-step configuration for each new recording.
- Editing tool is drag and drop based and uses a timeline.
- Capability to add labels.

![Figure 1.4-1: FlashDemo recording options.](image1)

![Figure 1.4-2: When capturing a single window, it is possible to select any active software or to use the finder tool to select a specific region.](image2)

![Figure 1.4-3: Hot Keys are used to start and stop recording.](image3)

![Figure 1.4-4: FlashDemo indicates that it is ready to record in the system tray.](image4)
Outputs:

- Flash-based portable learning object.
- Includes simple playback options.

http://www.flashdemo.net/flashDemo.html
1.5 FlashPoint

FlashPoint is a step-by-step PowerPoint-to-Flash converter. You can add an audio track for the entire presentation or slide by slide.

Key features:

- Very simple and straightforward PowerPoint converter.
- Turns any PowerPoint 97-2003 file into a single Flash file, multiple Flash files or a screensaver.
- Narration can be recorded within the software or imported.
- Animations can be synchronized with audio (recorded within the software only).

Figure 1.5-1: Depending on the type of project, a specific wizard is applied.

Figure 1.5-2: FlashPoint is a PowerPoint add-in which is accessible within the presentation software.

Figure 1.5-3: Through a simple step-by-step procedure, the user chooses the export options.

Figure 1.5-4: It is possible to redirect users to a web page when the clip is over.
Figure 1.5-5: Looping background music can be added through this interface.

Figure 1.5-6: Narration can be recorded or imported.

Outputs:

- Flash-based portable learning object.
- Includes simple playback options.

Figure 1.5-7: The output is a clean and light Flash object. Version 2.81 still has some issues with PowerPoint 2007 animations and fonts.

http://www.flashdemo.net/ppt2flash.html
1.6 Impatica for PowerPoint

Impatica for PowerPoint is literally a PowerPoint-to-Flash converter. You choose a file to convert, change the options, and export it to a Flash format. It is a great tool for web delivery of marketing content.

Key features:

- Transforms any kind of behavior (audio, video, animation, transition, timing, etc.) into a Flash-based object.
- The user doesn’t have to learn Impatica. Everything is done within PowerPoint.
- Reduces the file size for web delivery.
- Works on Macintosh.

![Figure 1.6-1: The simplicity of Impatica is one of its strength. You import, select and export.](image1)

![Figure 1.6-2: Compression settings make the output as light as possible.](image2)

![Figure 1.6-3: Impatica is SCORM compliant.](image3)

Outputs:

- Flash-based portable learning object.
- Includes simple playback options.
- Possibility of exporting for Blackberry and other mobile devices.
- SCORM compliant.
Figure 1.6-4: Even though Impatica doesn’t fully support all the new features of PowerPoint 2007, its Conversion Summary gives the user a log of the encountered issues.

Figure 1.6-4: The Flash-based output can be viewed in a web browser or full screen.

http://www.impatica.com/
1.7 **Speechi Standard**

Speechi is a PowerPoint add-in. Speechi Light, which is free, can export PowerPoint slides in a Flash format, reducing its size for web delivery. Speechi Standard enables you to add narration to your slides.

Key features:

- Simple narration recording modes: Conference (on-the-fly recording) and Studio (slide by slide recording).

![Figure 1.7-1: Speechi is a PowerPoint add-in that you can use in two different modes: Conference (continuous recording) and Studio (slide by slide narration).](image1)

![Figure 1.7-2: Speechi adds a series of quick access buttons in PowerPoint.](image2)

![Figure 1.7-3: Speechi is a PowerPoint add-in that you can use in two different modes: Conference (continuous recording) and Studio (slide by slide narration).](image3)

![Figure 1.7-4: Speechi adds a series of quick access buttons in PowerPoint.](image4)
Figure 1.7-5: Speechi is SCORM compliant and can report the score of one quiz per object.

Figure 1.7-6: Three different themes are available.

Figure 1.7-7: Speechi manages a lot of different types of resources.

Figure 1.7-8: Speechi resamples any imported MP3 or WAV file to reduce its size.
Outputs:

- Flash-based portable learning object.
- Includes a slide navigation bar.
- Includes simple playback options.
- SCORM compliant.

**Figure 1.7-9:** Speechi output is really complete, including a slide navigation bar at the left and access to other resources at the bottom, including slide notes imported from PowerPoint.

http://www.speechi.net/us/
1.8 CamStudio

CamStudio is an open-source screen and audio recorder. It produces full-motion uncompressed or compressed movies.

Key features:

- Possibility of choosing the area of the screen that will be recorded.
- Panning capability.
- Annotations and captions can be added for better accessibility.

![CamStudio](image1)

**Figure 1.8-1:** CamStudio’s really simple user interface makes it a software of choice when it comes to screen recording.

![CamStudio recording option](image2)

**Figure 1.8-2:** CamStudio recording option.

![Exporting options](image3)

**Figure 1.8-3:** Exporting options are easily customized.
Outputs:

- Uncompressed AVI can be imported to any video editing software, or uncompressed SWF can be edited in Flash.
- Compressed Flash file is small enough for web delivery.
- Includes simple playback options.

![Figure 1.8-4: CamStudio Flash-based output.](http://camstudio.org/)
1.9  Photo Story
Distributed for free to any Windows operating system owner, Microsoft Photo Story 3 offers a simple way to build an automated slide show with narration.

Key features:

- Really simple user interface.
- Import pictures or images.
- Add narration over pictures.
- Simple transition and title tools.

Figure 1.9-1: Photo Story is an easy step-by-step wizard that helps build a Windows Media Video (WMV) slideshow with audio. Since the only file types that can be imported are images, the PowerPoint presentation has been exported as jpeg images which have been imported in Photo Story.

Figure 1.9-2: Since the primary purpose of Photo Story is to share pictures, it has a titling feature.

Figure 1.9-3: Narration can be directly recorded for each slide.
Figure 1.9-4: Photo Story lets the user manage transition and timing for each slide.

Figure 1.9-5: Background music can be added to the narration (or narration for an audio file can be imported here for each slide).

Figure 1.9-6: When publishing, the user can always adjust the output to one of the predefined settings, including Microsoft supported mobile devices.

Figure 1.9-7: Export profiles are a quick way to select the kind of output that is relevant to the future usage.

Outputs:

- Windows Media Video format (WMV).
- Possibility of exporting for Windows-based mobile devices.

Figure 1.9-8: Photo Story output is a WMV format, which is very portable and readable by most computers.

http://www.microsoft.com/windowsxp/using/digitalphotography/photostory/default.mspx
1.10  Wink

Wink is a simple screen-capture software aimed at demonstrating simple software operations. It records narration and can display descriptive text and instructions.

Key features:

- Switch through three modes of screen capture:
  - Manual: the user chooses when to grab a screenshot.
  - Rifle: the user chooses the number of captures per second.
  - Smart mode: the software captures an image every time there is a mouse click or a key stroke.
- Narration can be recorded while doing the screen capture or in editing mode, frame by frame.

![Figure 1.10-1: Wink is a versatile screen capture tool that can be triggered manually or automatically.](image1)

![Figure 1.10-2: It is very easy to switch from one recording mode to the other while capturing.](image2)

![Figure 1.10-3: The user interface in editing mode is very easy to use.](image3)

![Figure 1.10-4: Wink offers the possibility to link to another frame by adding a button, which makes software simulation and quizzing available.](image4)

![Figure 1.10-4: The audio recording and editing capabilities of Wink are quite similar to its commercial competitors.](image5)

![Figure 1.10-5: The control the user gets over the output is impressive. A file can even be exported in an uncompressed format which can be edited in Flash.](image6)
Outputs:

- Flash-Based output (SWF file).
- Possibility of importing project in Flash to build more complex objects.
- Compressed Flash file is really small and is perfect for web delivery.
- Includes simple playback options.

Figure 1.10-6: Wink Flash-based output.

http://www.debugmode.com/wink/
1.11 LecShare Pro
LecShare Pro is a PowerPoint converter that can export in multiple formats, including .MOV for iPods. It has a strong focus on accessibility.

Key features:
- Very simple and straightforward process.
- Accessibility checking for each element of the original PowerPoint presentation; indicates missing text linked to images.

![Figure 1.11-1: LecShare has a very simple visual interface and is easy to use by anyone.](image)

![Figure 1.11-2: Audio can be recorded directly or imported.](image)

![Figure 1.11-3: To make sure that the final product is accessible, LecShare lets its users input their description of all visual elements.](image)

![Figure 1.11-4: Even though the product doesn’t keep the original animations in PowerPoint, this interface is intended to help the user synchronize the narration from one slide to another.](image)
Figure 1.11-5: Export options are very simple and let the user choose more than one right away, so all operations are treated in one batch process.

Figure 1.11-6: The trial version doesn’t allow to compress audio or to export directly for iPods.

Figure 1.11-7: Exporting in HTML is one of the best ways to make sure the content is accessible.

Figure 1.11-8: When exporting to HTML, the user can customize the look and feel of the web page.
Outputs:

- Four options to choose from in a single menu.
- HTML, Word, Quicktime or podcast ready output.
- All formats are accessible.

Figure 1.11-9: The HTML output is the most accessible of all.

Figure 1.11-10: The learner has access to every bit of text that was present in the original presentation.

Figure 1.11-11: The .MOV format allows the usage of the notes in PowerPoint as automatic captions.

http://www.lecshare.com/
2. Audio Recording Considerations

Most of the software products which are listed in section 1 have audio recording capabilities. In fact, most of them are pretty easy to use. One thing to consider before recording a narration in one of these embedded audio recorders is the need to extract that audio file for another purpose. For instance, if someone wants to export an audio only podcast in addition to a PowerPoint with narration Flash output, is it something that is possible?

Another thing to consider is the audio mixing features. Can the audio editor manage two or more tracks? Having access to a mixing track could add value to an object. For instance, it could be possible to add a sound effect over your voice or start a presentation with a little jingle.

Most of the time, recording the narration outside of the development tool does not hurt. It chunks the task in little recording bits, so if the software crashes, nobody loses all their work. Table 2 is a list of some of the most popular audio mixing software available.

*Table 2: Audio recording and mixing software*

<table>
<thead>
<tr>
<th>Software</th>
<th>Website</th>
<th>O.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audacity</td>
<td><a href="http://audacity.sourceforge.net/">http://audacity.sourceforge.net/</a></td>
<td>Windows/Mac/ Linux</td>
</tr>
<tr>
<td>Garage Band</td>
<td><a href="http://www.apple.com/ilife/garageband/">http://www.apple.com/ilife/garageband/</a></td>
<td>Mac</td>
</tr>
<tr>
<td>Sound Recorder</td>
<td><a href="http://www.microsoft.com">http://www.microsoft.com</a> (an accessory in Windows – limited to a one minute recording in WAV format)</td>
<td>Windows</td>
</tr>
</tbody>
</table>
3. A Conceptual Framework for Types of Learning Object Development

Now that the tools have been introduced, it is easy to see that they all have strengths, weaknesses, and most of all, overlap regarding their features. Selecting a tool out of thin air would not make sense; this section will provide a structure that will help determine the contexts in which the usage of screen and audio capture is useful, and the tools that can deliver the best return on investment for each category. Figure X presents these contexts for building learning objects using these tools.

![Figure 3: Conceptual framework of the usage of screen capture and audio.](image)

There are two opposite techniques for the development of learning objects: rapid development and complex development. When using rapid development, the developed learning object is usually rough, has a short lifespan, and is aimed primarily at a limited internal audience. The goal of rapid development is to beat the clock; information has to be delivered to the target audience immediately. The output is a cheap learning object that can easily be discarded and replaced if it becomes obsolete.

On the other hand, a complex learning object should engage the learner. It is usually polished (both visually and in terms of instructional design efficiency), has a medium to long lifespan, and is aimed at internal and/or external audiences. The learner usually will have to answer questions, make some choices, replicate a complex process, etc. Unless the user uses a development template, the development process is time-consuming and can require the involvement of multiple specialists and a project manager.

Even though creating engaging learning objects and activities should always be the primary target, one must realize that doing so requires a significant amount of time and creative energy. The next sub-sections will contextualize the difference between rapid and complex development for each one of the four categories presented in figure X.

3.1 Content and Presentation-Based Learning Objects

This kind of learning object is intended at presenting knowledge to an audience. The most common object of this type is a PowerPoint Presentation. In its most simple form, a PowerPoint presentation is a very linear lecture-hall-styled learning object, without the audio. The audio recording of a lecture is another way to deliver knowledge rapidly.
Combining these two objects into one produces a more complex and complete learning object, one for which the presenter can explain more subtle concepts using visual aids. These combined objects are usually built using a PowerPoint converting tool.

At the other end of the spectrum, PowerPoint files can be used very creatively to create powerful learning games and simulations, using animations, timed events and hyperlinks in a complex branching scenario learning object. Creating this kind of object usually implies that the subject matter expert will have to devote some time in designing the learning object and the support files (Gantt diagram, templates, scripts, branching scenarios, etc.).

3.2 Software Skill and Demonstration-Based Learning Objects
This kind of learning object is primarily aimed at showing a process within a software product or a web application. Instead of using a PowerPoint file, these learning objects are usually based on screen capture within the actual software or web application. Some of these objects can focus on the visual interface with added captions or help bubbles, while are built with a synchronized narration track.

Depending on the audience and the lifespan of the object, they can be very rough and sketchy, or they can be very professional looking. Some of the most polished products replicate the actual functions of a software product and can help guide the user in case or error in the use of it.

3.3 Schematic Tools Needed to Design Object
The more complex the development, the more time consuming it becomes. In order to cut down some of the production time, it becomes very useful to build job aids, especially when it comes to team projects. Some of the tools that could be used (and must be added to the amount of time spent of project) are the following:

- Scripts: Scripts can be built for both written text and narration. They help a lot when it comes to actually lecturing or going through the process, cutting the hesitations and the necessity to edit the learning object because of forgotten or erroneous information.
- Mind maps: When developing a complex scenario or a trying to determine the limits of your learning objects, working with a mind mapping software (a mind map is a visual organizer intended to link concepts together in a neuronal pattern) can help brainstorm and guide the development process.
- Gantt diagrams: A Gantt diagram is a timeline organizer. It helps make sure that each part of the process is optimized to cut down-time, especially with projects that require a lot of parts to be finished before to start others.
- Templates: When an activity or a process has to be reproduced in multiple learning objects, building a template can accelerate the development process. A template can be visual (graphic guideline), informational (navigation and information presentation guideline), behavioral (process guideline), etc.

3.4 Time Investment Ratio
The more complex, the more time someone will have to spend in order to deliver a learning object. For instance, a five minute troubleshooting job aid developed using Camtasia could end up consuming around 20 to 30 minutes before it is published or sent by email (so the ratio is between 4 and 6 to 1, meaning that somebody has to spend 4 times as much time building an object than its actual length). When it comes to more complex objects that require more attention to detail, this ratio may jump to 40 to 1, meaning that building a five minute engaging and visually polished learning object might end up requiring between 3 and 4 hours of work.

It is important, when assessing the needs of the learners and the learning objectives, to identify the level of formality and engagement that a learning object will require in order to be effective. Not enough time devoted to a learning object might leave it weak and ineffective; too much time spent might leave the instructor unsatisfied of the advancement of the project, set standards that are unrealistic for future object developments, and the content might end up becoming obsolete before the object will ever be used.
4. The Software Feature Comparison Chart

Now that every software product has been introduced and tested, and that the overall framework has been explained, this section will identify the most relevant features and compare the different products.

4.1 Common Issues

Whether a particular product is more suitable for software demonstration or PowerPoint conversion, the following points are important to consider.

4.1.1 Ease of use

Since the goal of this report is to evaluate which software product would be the most largely supported on campus, the selected product should not generate too much technical support from our helpdesk. It has to be really easy to use and a Faculty member needing to build a simple object should not have to spend a lot of time trying to learn the way the software works.

4.1.2 Diverse operating systems support

Since Faculty members use a lot of different operating systems (OS), especially Windows and Macintosh. Any software product that can work on more than one operating system would be highly considered.

4.1.3 Web delivery

Two points are important to consider in that aspect: weight of the final object to be posted online, and file format. The most common file types are web pages (HTML), Flash (SWF), compressed audio files (MP3, AAC, WMA), and video files (MP4, WMV, RM, MOV, etc.).

4.1.4 Mobile learning

Since more and more students have access to rich multimedia portable players (iPod, Zune, etc.), new generation cell phones (with web access and video playback), and handheld game consoles (PSP, Nintendo DS), they are prone to use these devices for learning. The concept of mobile devices is to push the content to the user through a subscription instead of having the user download the resource himself and waiting for the end of the transfer.

4.1.5 Reporting

Learning objects developed with some tools are SCORM (Sharable Content Object Reference Model) compliant, meaning that learning management systems (LMS) can keep track of learners using the objects (report quiz results in the LMS grade book, keep track of time spent or page viewed, etc.). Even though this feature is not presently supported in University of Delaware current LMS (WebCT), the next generation LMS should feature a SCORM engine.

4.1.6 Accessibility

Since learning objects developed with the tools that are featured in this report are usually Flash-based, there is a concern with accessibility for people with disabilities. Having access to a text script for the deaf or visually impaired learners is usually a good start.

4.2 Most Relevant Features for PowerPoint Conversion

Out of the ten evaluated software products, five are strictly considered PowerPoint converters and two others have add-ins in PowerPoint but are not specifically considered to be PowerPoint converters. Here is a list of what should be considered important when choosing a PowerPoint converter.

4.2.1 Import audio

Most PowerPoint converters have built-in audio recording capabilities, but the possibility of importing an audio file is important for the following reasons:

- Most built-in audio recorders don’t have a mixing track to add sound effects or music;
• Narration doesn’t have to be recorded from the same device where the software is installed. For instance, an instructor might want to print out his/her presentation and narrate it on an MP3 recorder or its iPod.

4.2.2 Slide by slide audio recording
Instead of recording an entire lecture as a one shot deal, the user might want to record the narration slide by slide to be able to pause and focus, and to be able to edit quickly one slide instead of redoing the whole presentation all over again.

4.2.3 Animation synchronization
If animation has been used in a particular presentation, it is probably there for a reason. Some PowerPoint converters can easily synchronize audio with animations, while others don’t.

4.2.4 Slide pixel size
Usually, a PowerPoint presentation is viewed in full screen mode. It can be acceptable to reduce the pixel size of a presentation for weight management or to export to a mobile device, but the learner’s experience might be somewhat different.

4.2.5 Playback options
The most basic playback option should be to be able to pause and restart a presentation. Skipping from one slide to the other should also be a basic feature.

4.2.6 PowerPoint 2007 support
Office 2007 is growing in popularity and most of the PowerPoint converters are not still fine-tuned to the new features of PowerPoint. There can be a little mistake here and there, but some issues are more apparent and might make users somewhat angry.

4.2.7 Quizzing capability
In order to get the learner to be active, PowerPoint converters must have some kind of quizzing feature to help the learner self-assess their own comprehension, or a reporting capability that can trigger some kind of feedback.

4.2.8 Hyperlinks
A PowerPoint converter should allow the user to maintain hyperlinks active within the learning object. These hyperlinks can be external, pointing to a web page, or internal, pointing to another slide.

4.3 Most Relevant Features for Screen Capture
The biggest difference between screen capture software products is recording mode. Some are full-motion, meaning that they act as a camera, capturing a number of frame per second, while other capture key frames triggered by an action (a mouse click or a keystroke) and generate the mouse movement over fixed pictures. Both recording modes can be very useful, but basically, the following points are more relevant when choosing a product.

4.3.1 Recording area setting
One must be able to choose the area to be recorded. Some products offer very precise tools to target an application or a particular area of the screen.

4.3.2 Synchronization of images and narration
Usually, full-motion screen recorders are built to record narration while the user is doing the process that has to be recorded. On the other hand, key frame recorders can do both, letting the user decide to record its narration on-the-fly while doing the process or afterwards in post-production.

4.3.3 Post editing capabilities
In addition to recording what is on a computer screen and narration, the software should allow the user to edit the recording easily. For instance, it should let the user delete unwanted parts, add a transition or a title slide,
reshoot a segment that is not appropriate without rebuilding from scratch, add a caption or highlight a section of the screen to focus the attention of the learner, etc.

4.3.4 Quizzing and Simulation

To build more complex and engaging objects, a screen recorder should have a way to prompt the learner to become active. This can be accomplished by asking simple multiple choice questions, or by letting a user go through an entire software simulation with or without hints and help.

4.3.5 Output pixel size

Capturing a full-size screen and reducing it to an iPod ready video can be hazardous because most learners will not be able to read any of the menus demonstrated in the video.

Sometimes, it might be worth to just reduce the screen capture pixel size or to zoom and pan on specific areas, if the product allows it...

4.4 Software Comparison Chart

In order to bring some sense in evaluating these software products, a grid has been developed. Each product has been given a score from zero to five (five being the highest grade) for each criterion (see figure 4.4). The overall score at the bottom has been calculated by adding all the individual scores and dividing by the number of criteria. Since some products are PowerPoint converters, other screen capturers and some are both, the overall score includes the common issues section and one of the two sections, meaning that the PowerPoint conversion total is divided by 14 and the screen capture total is divided by 11.

<table>
<thead>
<tr>
<th>Software Products</th>
<th>Articulate Presenter Pro 5.3</th>
<th>Camtasia Studio 4.1</th>
<th>Adobe Captivate 3</th>
<th>FlashDemo 1.14</th>
<th>FlashPoint 2.81</th>
<th>Impatica for PowerPoint 4</th>
<th>Speechi Standard 3.1</th>
<th>LeShare 1.30</th>
<th>CamStudio 2.5.1</th>
<th>Photo Story 3</th>
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Figure 4.4: Screen and audio capture software comparison score sheet.
4.5 Interpretation of the Scores

All scores were weighted equal in the grid. Its main purpose was to get an overview to get a better sense for comparison. A more complete grid, including comments for most individual scores, is available as an Excel spreadsheet.

4.5.1 PowerPoint Conversion

PowerPoint conversion is a crucial task that has been identified by the higher education community. According to the grid, Articulate Presenter Pro 5.3 is the most complete PowerPoint converter, followed by LecShare 1.30, Speechi 3.1 and Impatica for PowerPoint 4. Articulate is definitely a robust product, and it is the one that supports PowerPoint 2007 the best out of the three. But at $699 a license, it might be worth the effort to look at the other products...

Speechi’s lack of PowerPoint 2007 animation support is a real turn-off. Nobody knows if the company is solid and here to stay, so until a fix is released, the product should not be considered.

Impatica has been around for a while and some faculty members at UD Online have been using it for some years now. At $499 per individual license, it’s a little cheaper than Articulate, but definitely a tradeoff. But, it works on Mac...

LecShare is the best product to build accessible learning object, works on Mac and is definitely cheaper that the others, so even if another products has been bought, it might be worth to buy individual licenses for interested faculty members.

If somebody needs something free, Photo Story is definitely a good alternative. Mac owners can always use iMovie to get a similar result.

4.5.2 Screen Capture

As for screen capture, it is still the eternal struggle between Camtasia and Captivate that rages. While Camtasia scores higher in common issues and ease of use, Captivate offers a lot of value adding advanced features. And both of them don’t do too great with PowerPoint conversion, even though they both offer the feature to do so.

Both products have their strengths and weaknesses, and it all comes down to the usage and the desired output. To build a quick software demonstration, Camtasia is the best. The user records its actions and narration at the same time, Camtasia encodes it, and the object is published online. But for more complex software demonstrations that have a longer life cycle, Captivate builds small file sized professional looking learning objects.

Wink is definitely a worthy alternative for budget restricted individuals who are looking for a free tool. Its feature list is comparable to Captivate and it is very easy to use.
5. Observations

Here is a list of observations which are beyond the technical aspects of the evaluation of the software products targeted in this report.

Observation 1: Windows Leads the Way
Out of all the evaluated software, only two have a Macintosh version (Impatica and LecShare) and two are Linux compatible (CamStudio and Wink). Over the years, statistics have demonstrated the popularity of Windows as an operating system. As of September 2007, all Windows operating systems (98, 2000, XP and Vista) represent more than 90% of the market shares in personal computing.¹ Even though academia has always been more favorable to Macintosh than the general population, its presence is still very marginal and it is easy to assume that every Mac or Linux user has, in one way or another, access to a Windows-based computer (whether they will want to use it or not is another debate). Furthermore, new Intel-based Mac can now run Windows.

Observation 2: Lots of Software; Same Basic Features
Any PowerPoint can be converted by any screen capture software, and any software simulation can be built with a PowerPoint Converter that supports hyperlinks. Even though one specific software product has been designed to act a certain way, there are always workarounds that can be used to repurpose it, especially with templates, training, and job aids.

Observation 3: Learning Object Development on a Shoestring Budget
Lots of open source and free software products are available to anybody who wants to look for them. If someone want to record a software operation once and has no further use of a screen recorder, CamStudio might be the best solution out there. Need to do some basic video editing? iMovie, Windows Movie Maker, Photo Story, those are all good products for video editing. Need to build a quick audio podcast? Download Audacity! Wink will let you build a sharp and clean Flash-based software demonstration or web tour... And the best thing, they are all FREE!!!

Observation 4: Faculty Autonomy: How Far Are We Willing to (Let) Go?
Even though it would be great if every faculty member would develop engaging learning objects, let’s be realistic: most faculty members would need a screen capture product or a PowerPoint converter to present information to students. If they tech in class, they can use that time to interact and engage, and that’s when they usually do it if they have a limited attendance. Or they can use the learning management system’s collaboration tools, like discussion board, quizzes, wikis, blogs, email services, live chat rooms, videoconferencing, shared document spaces, etc.

So basically, do we want our faculty members to use the tool on their own, or do we want to teach them a way to use a product in the most basic and standardized way, and fully support it as an institution?

Observation 5: Mobile Learning
Whether we like it or not, more and more people are expecting that higher education institutions will build their content in a mobile-ready format. Do learners actually use their mobile devices to learn? We don’t know... But we do know that they can use their computer to watch a video podcast (or vodcast), and that most of them will do it that way.

By making content mobile device-ready, we simply add life to content for the Net Generation, who is used to learning by watching moving pictures and sounds (they are visually literate), instead of reading for hours. Most of the next generation of screen capture and PowerPoint conversion tools will have that multiple export capability... And that MULTIPLE export is very important, because nobody wants to deteriorate a learning object that worked just fine in its whole full-screen-pixel-glory, for the sake of a poor mobile device (basically, who wants to learn how to use a complex application, like Dreamweaver or Premiere for instance, using a 320 by 240 pixels screen?).

6. Conclusion

The purpose of this report is to determine which product would serve the best our faculty as a screen capture-based learning development tool. Even though we did not assess faculty needs in term of a screen-capture tool, we assume, from our experience, that the usage of this tool would be minimal in terms of functionality (mostly to deliver content to learners).

We have determined that there were two specific types of learning objects that could be developed using screen-capture tools: PowerPoint conversions and software demonstrations.

- The most complete PowerPoint converter is Articulate Presenter Pro, but since a lot of people on campus are already using Impatica and that it is available on Macs, it should not be discarded. LecShare is a much cheaper alternative that should also be considered.

- As feared, it is very difficult to give an edge to Camtasia or to Captivate. They both have their strengths and weaknesses; they work in a different way... Camtasia should be used for very rapid development. The objects that are built with Camtasia look a little bit less professional than those built with Captivate, which is a more complete software product that should be used by more advanced users who need to build longer lasting learning objects, online tutorial, or communicational and marketing material.

The best way to promote the use of any of these products would be to give access to anybody for free by signing a campus agreement with a vendor. If a faculty member has to spend $700 on Articulate, the chances are he/she might not buy it.

The other alternative would be to develop internally the expertise to support open source and free products. By offering training, job aids and templates, we could easily accommodate the majority of faculty needs regarding screen capture and PowerPoint conversion.
<table>
<thead>
<tr>
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### Screen Capture

**Recording area setting**
- **3** of 4
- Useful for making movies of areas that you can or want to control.
- **3** out of 4
- Provides good control over the recording area.
- **2** out of 4
- Provides a good tool to use for recording areas.
- **1** out of 4
- Provides a tool that is useful.

**Functionality of image and video**
- **4** out of 4
- Provides good control over the recording area.
- **3** out of 4
- Provides a good tool to use for recording areas.
- **2** out of 4
- Provides a tool that is useful.

**Pan/Tilt/Zoom/Rotation**
- **2** out of 4
- Provides good control over the recording area.
- **3** out of 4
- Provides a good tool to use for recording areas.
- **1** out of 4
- Provides a tool that is useful.

**Quitting and Stopping**
- **2** out of 4
- Provides good control over the recording area.
- **2** out of 4
- Provides a good tool to use for recording areas.
- **2** out of 4
- Provides a tool that is useful.

**Output path**
- **2** out of 4
- Provides good control over the recording area.
- **3** out of 4
- Provides a good tool to use for recording areas.
- **1** out of 4
- Provides a tool that is useful.

### Interface Rating

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### Summary

- *Screen and Audio Capture Software*