



WHITE PAPER:

SUSTAINABLE CLASSROOM TECHNOLOGY

**Increasing student achievement with
the AVerMedia 300p document camera**



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Executive Summary

It's no secret that technology can breathe life into a classroom. With carefully selected solutions, lessons can easily and instantly become visually rich and interactive. Yet technology staff and other key decision-makers face several challenges as they make purchasing decisions. Which technology solutions will transform the teaching and learning environment and yield the highest results? Which solutions represent the best value for the dollar? And which technologies will teachers, professors and other educators incorporate into their daily lessons without too much resistance?

The data from Washington State's technology inventory of K-12 schools shows that as of the end of 2005, approximately 14,000 document cameras were being used for teaching and learning, a number that has taken digital cameras more than ten years to achieve. Teachers and decision-makers are embracing document cameras as a standard piece of classroom technology. At the heart of their popularity is **sustainability**, a key factor in identifying quality technology solutions for learning environments.

The **AVerMedia AverVision 300p** digital document camera (referred to as the AverMedia 300p from this point on in this article) has been selected as the recommended solution for classrooms in Washington's K-12 school districts, as well as higher education. This article presents the ways in which the 300p meet the criteria for **sustainability**, and discusses how it can be used in ways that transform learning.



Key Factors in Sustainability

Sustainable solutions will stand the test of time. In five to seven years (or more), they will still be doing what they were meant to do at the time of their original implementation. *This applies to both instructional practices and technological solutions.*

Sustainable Instruction

Instructionally, there are some sound, practical teaching strategies that are research-based and proven to increase student achievement. Nine of them are identified in the book *Classroom Instruction That Works* (Marzano, Pickering, and Pollock, 2001):

- Identifying similarities and differences
- Summarizing and note taking
- Reinforcing effort and providing recognition
- Incorporating homework and practice
- Using nonlinguistic representations
- Involving students in cooperative learning
- Setting objectives and providing feedback
- Generating and testing hypotheses
- Using questions, cues, and advance organizers

Teachers are already using several of the strategies above to some degree in their classrooms, and are likely to continue because they are familiar and because of the results they get with their use.

Sustainable Technology

Schools that invest in sustainable technology solutions maximize their technology budgets and reduce their budgets for replacement cycles. In talking to several district technology directors in the state of Washington, it was learned that collectively, they define "sustainability" by using the following criteria:

Broad in scope:

This is technology that can be used in a wide range of settings: general classrooms, professional development, board presentations, and general meetings, such as PTA, community and staff meetings.

Applicable to most classrooms:

Sustainable hardware can be used in most, if not all, content and subject areas: math & science, language arts, social studies, health, technology, etc.

Easy to use:

The ease with which a piece of technology can be connected to something else and set up is a major indicator of sustainability in a classroom. For instance, document cameras are easy to connect to a projector and computer, easy to switch between itself and the computer, easy to zoom focus and reposition, and easily achieve high end results!

Easy to integrate:

A technology solution that is easy to integrate into lessons and activities is very sustainable, as it is likely to be used more than a piece of equipment that takes preparation. Technologies that allow students and teachers to use actual documents and 3-D items and engage in real time learning are solutions that teachers will naturally embrace and use.

Minimal training and support:

Setup of a sustainable solution is less than an hour; training takes less than four hours; annual support takes less than an hour; and teachers can trouble-shoot easily.

Stands the test of time:

Five or more years from now, a sustainable solution will still be used to meet its original purpose, because it is intended to help achieve higher educational goals. Software upgrades can be downloaded off the Internet with ease.



Document Cameras as Sustainable Solutions

A document camera is simply a special kind of camera that allows the presenter or instructor to place a document or a 3-D object under the lens and display the image in a variety of ways for an audience. They are also referred to as *visualizers* and/or *visual presenters*.

Using a document camera helps an instructor or presenter show a single

document or item to an entire class or audience. Figure 1 shows the kinds of instructional materials that can be placed under the lens of a document camera and displayed for the students' view.



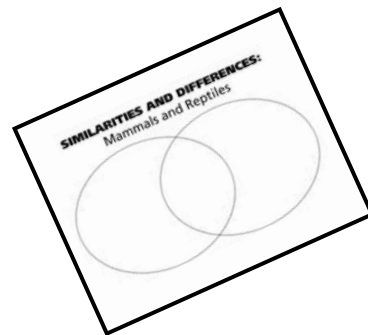
Figure 1. Examples of instructional materials that can be placed under the lens of a document camera, and ways in which the image can be displayed.



Document Cameras for Sustainable Instruction

Imagine a teacher using a document camera for each of the research-based instructional strategies that are identified in the book *Classroom Instruction That Works* and are proven to increase student achievement. Below are a few examples.

STRATEGY: Identifying Similarities and Differences



The teacher places this document under the lens of the document camera for the students to view, and writes on it in the appropriate spaces as the students compare and contrast the attributes of mammals and reptiles. Students view the recorded responses on the displayed image on the screen.

OR



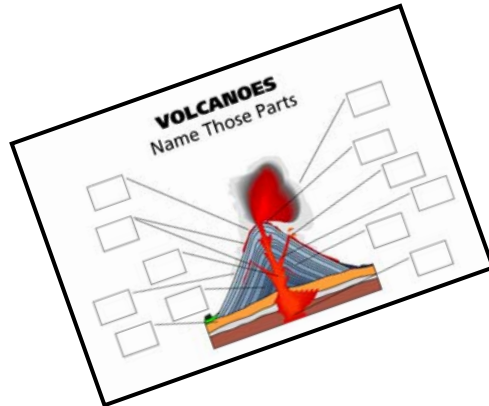
The teacher places two actual 3-D objects under the lens of the document camera, and has the students list their similarities and differences on a piece of paper.

STRATEGY: Summarizing and Note-Taking



The teacher places a document with narrative text under the lens of the document camera, and asks the students to identify the main ideas in each paragraph. S/He uses a highlighter pen to record their responses. All students are able to see the results displayed on the screen in the front of the room.

STRATEGY: Using Non-Linguistic Representations



The teacher places a document with a visual image under the lens of the document camera, and asks the students to name its parts, preparing them for a volcano-related field trip. Again, all students are able to see the results displayed on the screen.

STRATEGY: Cues, Questions and Advance Organizers



The teacher places this document under the lens of the document camera for the students to view, and reviews the notes from yesterday's discussion before embarking upon today's lesson.



Document Cameras as Sustainable Technology Classroom Solutions

Six key factors of sustainable technology solutions are listed on page 3. The document camera fits the criteria of sustainability in the following ways:

Broad in scope:

A document camera can be used in general classrooms, for professional development, general presentations and at meetings.

Applicable to most classrooms:

Lessons in math, science, language arts, social studies, health and other subject areas will be enhanced with a document camera.

Easy to use:

Most document cameras are fairly easy to operate. Teachers feel very comfortable using them right away.

Easy to integrate:

It is easy to achieve high-end results with the use of a document camera. Educators can use materials that they have on hand.

Minimal training and support:

Setting up a document camera goes very quickly. Teachers can be trained to use 95% of the features of the document camera within an hour. And most teachers can do their own troubleshooting.

Stands the test of time:

Several years after its purchase, educators will still be using their document camera to engage their students in visually rich, interactive lessons that support research-based instructional strategies.



Document Cameras and LCD Projectors

The most basic way to use a document camera for displaying instructional materials to a classroom full of students is to connect it to a display device such as an LCD projector or TV. Using an LCD projector produces the highest quality of image, as the clarity and size of the projected images surpass those that are displayed on a TV monitor. Typically, when an LCD projector is used, the document camera is connected to it with a VGA cable, whereas when a document camera is connected to a TV monitor, an RCA or an S-Video cable is used. See Figure 2 below.



Figure 2. The most basic use of a document camera for displaying instructional materials to an audience of students.



Document Cameras, Computers and LCD Projectors

Many teachers are already using a computer with an LCD projector to deliver PowerPoint presentations, display Internet web sites, and present other computer-based lessons. A document camera extends the use of a computer/projector combination by providing an additional method of conducting real-time lessons that are visually rich and interactive.

A computer and a document camera can be connected to an LCD projector at the same time very easily. A VGA cable connects the computer to the document camera, and another VGA cable connects the document camera to the LCD projector. A good document camera will have a well-labeled set of buttons on it to help the teacher switch the displayed image between the computer and document camera. For instance, the teacher can deliver a PowerPoint presentation one minute, and then press the "Camera" button on the document camera to display a 3-D object that is sitting under the lens of the document camera. After rotating the 3-D object so the students can see all sides of the object, the instructor can press the "PC" button on the document camera to return to the PowerPoint slideshow. See Figure 3 on the next page.



Figure 3. The manner in which the document camera “sits between” the computer and the projector, allowing the presenter to switch image sources by simply pressing a button on the document camera.



Recommended Document Camera Solution for K-20 Schools

After a rigorous comparison and analysis of several document camera models by a committee of District Technology Directors from all geographic regions in the Washington State, the **AVerMedia 300p** document camera was selected as the best value for the dollar. The criteria used for comparison and selection included:



- Description of all Inputs and Outputs
- Pixel Count
- LED Light Module
- Interactive with Computer
- Active VGA Pass-Through
- Digital Zoom and Pan
- Rotating and Pivotal head
- Weighted Base
- Image Freeze
- Image Capture and Playback
- Video Capture
- Microscope Adapter Available
- Light Box Available
- Other Key Features
- Warranty
- Price Point

*Multimedia
Features of the
AverMedia 300p
Document Camera*

General Description of the AVerMedia 300p Document Camera

The AVerVision300p will make all teachers, even those with a technology phobia, able to deliver rich, visual lessons. The AVerVision 300p is a 3 megapixel resolution portable document camera that features a 2X optical zoom and an 8X digital zoom. It is designed to display documents, 3D objects, transparencies, negative/x-ray film, and microscopic images (with optional microscopic adapters) with the ability to clearly display tiny 6pt text. With its ability to capture video at rates of up to 24 frames per second, this document camera combines versatility with ease of use.

Other highlights include the ability to capture and store up to 80 images, image transfer to a PC via USB, PC Cam applications, mirror, negative to positive, rotation and freeze functions all controlled by the unit panel or the remote control. Connecting to any LCD/DLP monitor or projector, the AVerVision 300p combines high quality and innovative technology with extensive functionality at an affordable price. The purchase of an AVerMedia 300p is backed by a five year warranty and one year inclusion in the AVERCPR program, making this investment sound for years to come.



Several of the research-based strategies that are identified in the book *Classroom Instruction That Works* promote the use of visual aids as a way to enhance linguistic-based learning in the classroom.

- Identifying similarities and differences
- Using nonlinguistic representations
- Using questions, cues, and advance organizers

The multimedia features of the AVerMedia 300p support these highly visual approaches to teaching by sending an image to the projection screen for all students to see. But its capabilities do not stop there. This document camera is truly a camera that can capture images and store them for use in other projects later on.



Imagine a teacher of environmental science beginning an ecology unit by placing a frog under the document camera's lens, and discussing the features of a normal, healthy frog with the students. The teacher decides to *capture* (take a picture) of the frog, and store it for later use. S/He can use the picture in Microsoft PowerPoint slideshows, Word documents, and on his/her class web site.

The document camera can store up to 80 images in its memory. And a USB cable can be used to connect the document camera to the computer so that the images can be saved on the computer's hard drive for multimedia projects. See Figure 4.

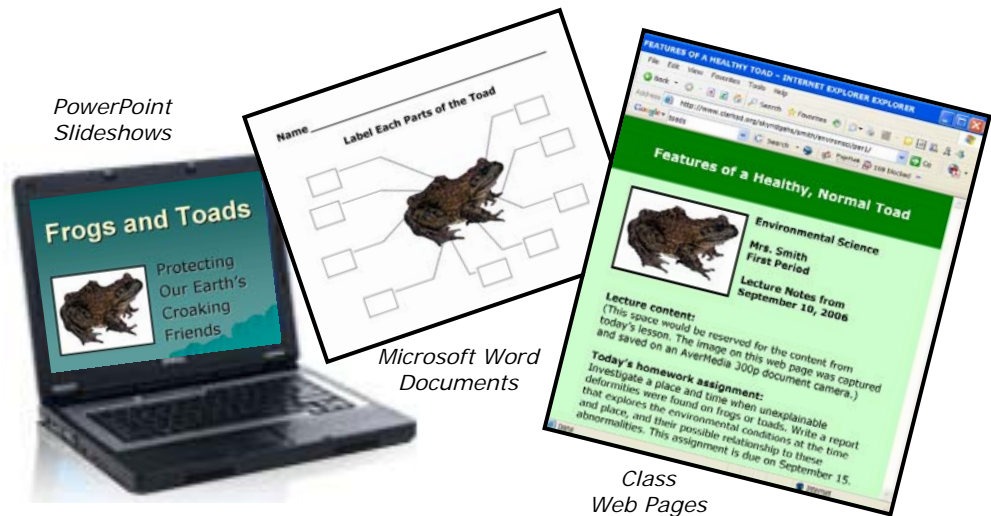


Figure 4. Ways in which the images captured from a document camera can be used in computer-based multimedia projects and documents, including presentation software, word-processed documents, and web pages.

Video of realtime activity that takes place under the document camera's lens can also be captured and saved at rates of up to 24 frames per second for use in other multimedia projects.



Cost of Ownership

As with most document cameras, the AVerMedia 300p replaces the overhead projector for displaying real-time lessons. The advantages that it has over the overhead projector translate to a lower cost of ownership:

- Easy setup and maintenance
- Minimal training
- No need to purchase transparencies, special marking pens or overhead bulb replacements
- Can use materials that already exist
- No need for a scanner to digitize documents
- No need for a digital camera to take pictures of 3-D objects
- No LED light replacement
- Uses existing projector or television for display device

In addition, the features of the AVerMedia 300p are easy to use and straightforward to troubleshoot. The average end user (in this case, a classroom teacher) can solve most problems to emerge during a lesson, eliminating the need to call in the tech support staff at a school or district.

Other advantages of a document camera over an overhead projector include its ability to display 3-D objects, negative/x-ray film and microscopic images; use special effects; and freeze the image while changing the object under the lens.

Summary

Document cameras are sustainable solutions. They support research-based instructional strategies that teachers are already using in their classrooms. In addition, their versatility and ease of use make them sure winners. Key decision-makers for educational organizations and institutions should consider the document camera as a standard technology solution that will provide visually-rich learning experiences for their students.

When compared against its competitors, the AVerMedia 300p digital document camera is superior in performance, durability, features and warranty. Its high-resolution lens, as well as its ability to capture, store and play back images, make it a useful multimedia tool for any classroom. Teachers will become comfortable using it in a very short period of time, and it will become the piece of equipment in their classroom that they simply can not live without.

On the Internet

For more information about the AVerMedia AVerVision 300p digital document camera, go to <http://aver.com/ppd/v300p.html>

This white paper can be downloaded from the Internet at <http://edtech.esd112.org/whitepapers/>

About the Author

Debbie Tschirgi is the Director of Educational Technology Programs at Educational Service District 112 in Vancouver, Washington. Every year, she convenes and facilitates a committee of technology decision-makers from school districts in the state of Washington for the purpose of comparing and evaluating classroom technology solutions, using well thought-out criteria. The goal of the committee is to select the solutions that will meet the needs of 85% of the educational organizations in the state of Washington, and that represent the *best value for the dollar*.

For more information about the ESD 112 Educational Technology Support Center, visit its web site at <http://edtech.esd112.org>

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