



*As simple as **1**-record, **2**-playback, **3**-collaborate*

# The Ultimate Lecture

*It's about time...*

<http://www.lecture123.com>

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## INTRODUCTION AND USE

## Table of Contents

Introducing Lecture123.....	3
Why Lecture123?.....	3
A Lecture123 Overview.....	4
It's the questions, stupid.....	4
It's about time.....	5
Content Repurposing.....	5
It's seamless to produce.....	5
The Knowledge Community.....	6
Results.....	6
The Lecture123 Architecture.....	7
Lecture123 Tour.....	8
Red Brick College.....	8
Motivating Scenarios.....	13
Global Pharmaceuticals.....	13
FunTime PreSchool.....	13
Zephyr Public Library.....	13
MoonRise Enterprises.....	14
Berkeley Publishing.....	14
BPM Internet Service Provider.....	14
BlueStone High School.....	14
Mayor Jefferson.....	14

## Introducing Lecture123

Elearning tools must be easy to use and provide fundamental features with an eye toward extensibility. Lecture123 leverages emerging tablet technology to seamlessly manage the presentation of content (e.g. lecture slides) while recording your voice, pen annotations, and slide navigations. Content may be recorded in a live lecture environment using an LCD projector or outside class using just a tablet to produce supplemental content. The session can be immediately published to the web or removable media for playback. Lecture123 eliminates the need for costly pre and post production sessions. Additionally, the Lecture123 suite of tools are web based simplifying deployment and support.

Students may ask question while playing the fully synchronized content, voice, and annotation. These questions are made available to the instructor with complete context generated automatically by Lecture123. When a question is answered both the question and answer are automatically integrated back into the content for collaborative playback. Lecture123 represents the content captured in xml and thus facilitates searching and editing of content objects as well as the creation of new, dynamic content from an existing repository.

Lecture123 brings your content to a new dimension in a simple, natural environment.

### Why Lecture123?

## Why Lecture/23



- As **simple** as  
1-record, 2-playback, 3-collaborate
- **Quick learning curve** for all users:  
content producers and viewers
- **The Ultimate Lecture** (patent pending)
  - Multidimensional, evolving, and shared content
  - Reaching lifelong learners in the academic, corporate, government, public, and military
- **Any questions**
  - Patent pending Question and Answer (Q&A) integration
  - Q&A Feedback
- **Its about time**
  - Direct, time-based indexing to any point within captured content
  - Fully synchronized playback of voice, slides, annotations, Q&As
- **Easy URL Integration**
  - Send content links in email
  - Content links for course management systems
- **Content Repurposing**
  - Meet the diverse needs of all learners
  - Targeting disparate audiences throughout the lifecycle
  - Playback in a multitude of dimensions
  - Playback mobility on PCs, PDAs, audio players, cell phones
- **Search** lecture content including the Q&A repository
- **Usage monitoring for Continued Quality Improvement of content**
- **Web and Java based tools supporting all computer platforms**
- **Fast, simple content delivery**
  - Low production time
  - Nearly instant record-playback-collaborate cycle
  - Streaming
- **Designed by faculty**



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Lecture/23

10

## **A Lecture123 Overview**

Lecture123 provides tools to record knowledge content (lectures) and to playback the recorded sessions asynchronously. It provides an additional participant collaboration layer that facilitates asynchronous communication between participants. It is simple to use and allows immediate publication. The system's modular and extensible architecture is based on standard web interfaces, open standards, and Java. Lecture123 is intended to run on any computer, any place, any time. The intent is to support Windows, Mac, and Linux systems with an eye towards other devices in the future (e.g. PDAs, cell phones)

Imagine a PowerPoint presentation in which all slide content including the presenter's voice, annotations, and viewer questions and answers are fully synchronized on playback within a very natural setting. *Lecture123 your PowerPoint.*

You don't use PowerPoint? Not a problem. Lecture123 supports any content authoring application that can print. This is accomplished with an approach similar to producing Adobe PDF files. You want to create your content the old fashioned way with pencil and paper (chalk and blackboard). No worries. Lecture123 supports whiteboard sessions where your scribbles are recorded as *talking ink*.

Lecture123's *talking ink* takes content to a new level. The synchronized recording of pen strokes on a tablet PC along with the content author's voice engages viewer playback on any computer.

Although originally conceived for academic environments, Lecture123 has broad application reaching all levels of lifelong learners: K12 classes, universities, corporate and government training, public libraries, and www sessions.

Although tablet PCs offer a very convenient method for recording annotations, Lecture123 works with standard non tablet computers, SMART Boards, external low cost tablets, any device that serves as a mouse.

A team of well-seasoned computer scientists and faculty members has designed this system with special attention to ease of use, practical applications, and an eye toward maximizing the true asset of education – the content.

*Lecture123 – it's that simple*

### **It's the questions, stupid**

One key differentiator is the ability to integrate questions into the presentations and link answers to these questions precisely where they were asked seamlessly. During playback the viewer simply right clicks the mouse to pause the player and enter a question. The question includes full context including temporal and spatial context, i.e. the actual question along with the name of the lecture, the slide number within the lecture, the time within the lecture and the exact location on the slide where the click occurred. Location is a key: imagine a math slide with a graph that has several points with a value of 4. The student only asks "why is this 4?". Without location context the instructor has no way of knowing which 4 is in question.

The author (e.g. instructor) of a lecture is notified of submitted questions via email or a web interface along with all the context details. For example, the instructor clicks on a URL in the notification email to see a web page with the slide and can then easily answer the question. These questions are automatically integrated as QA spots on the slides in subsequent playback.

With the Ultimate Lecture the content continues to evolve each time it is played back as viewers post questions and they are answered. The final result is a lecture in which everything is clear. Where all questions have been answered by experienced instructors, where all possible confusions have been addressed.

Since Lecture123 uses XML as a key to the content repositories, knowledge management technology can easily be applied offering new methods of learning, e.g. searching for keyword topics in the QA repository allowing viewers to traverse through all lectures containing discussions on specific topics.

Lectures can be further extended by threading them together via hyperlecture links – *Lecture123 is to lectures as the www is to text.*

### ***It's about time***

Some ask how Lecture123 is different from using recording features made available in PowerPoint or other existing tablet PC applications. We've added the 4<sup>th</sup> dimension: time. Sessions recorded with and played back with the Lecture123 system possess a full timeline of all activities including the audio, pen annotation, slide navigations, and QAs. This provides a rich content that is played back similar to a movie.

PowerPoint and tablet PC applications enable users to present content and annotate (pen or mouse). However, the playback is flat – only the final state of the content is captured for playback. For example, the playback of an instructor using a tablet pen to present the solution to a mathematical problem would only show the content after all the equations were drawn. This is the equivalent of a still photo. Lecture123 offers the full experience in tempo as it occurred with all the numbers, variables, and operators being drawn along with the instructor's voice – the equivalent of a movie. It's this enrichment via the time dimension that engages the viewer.

Users have direct, time-based indexing to any point within the captured content. Playback navigation allows viewing the full session serially as it was recorded along with the ability to skip to any point of interest via slide thumbnail navigation, previous/next buttons, a time sidebar, or specified QAs. Additionally, content may be viewed in fast forward or scanned forward/back with a sidebar.

*Lecture123 the Ultimate Lecture, it's about time...*

### ***Content Repurposing***

Content can also be viewed in various ways to enable learner preferences and strengths. The layers within the Lecture123 environment can be selectively viewed, e.g. one may choose to only listen to the audio track, or view only the QAs, or only the slides with or without annotations, etc. This adaptability improves the viewers learning experience.

Repurposing Lecture123 content for playback mobility and viewer preferences exhibits the extensibility of the system.

### ***It's seamless to produce***

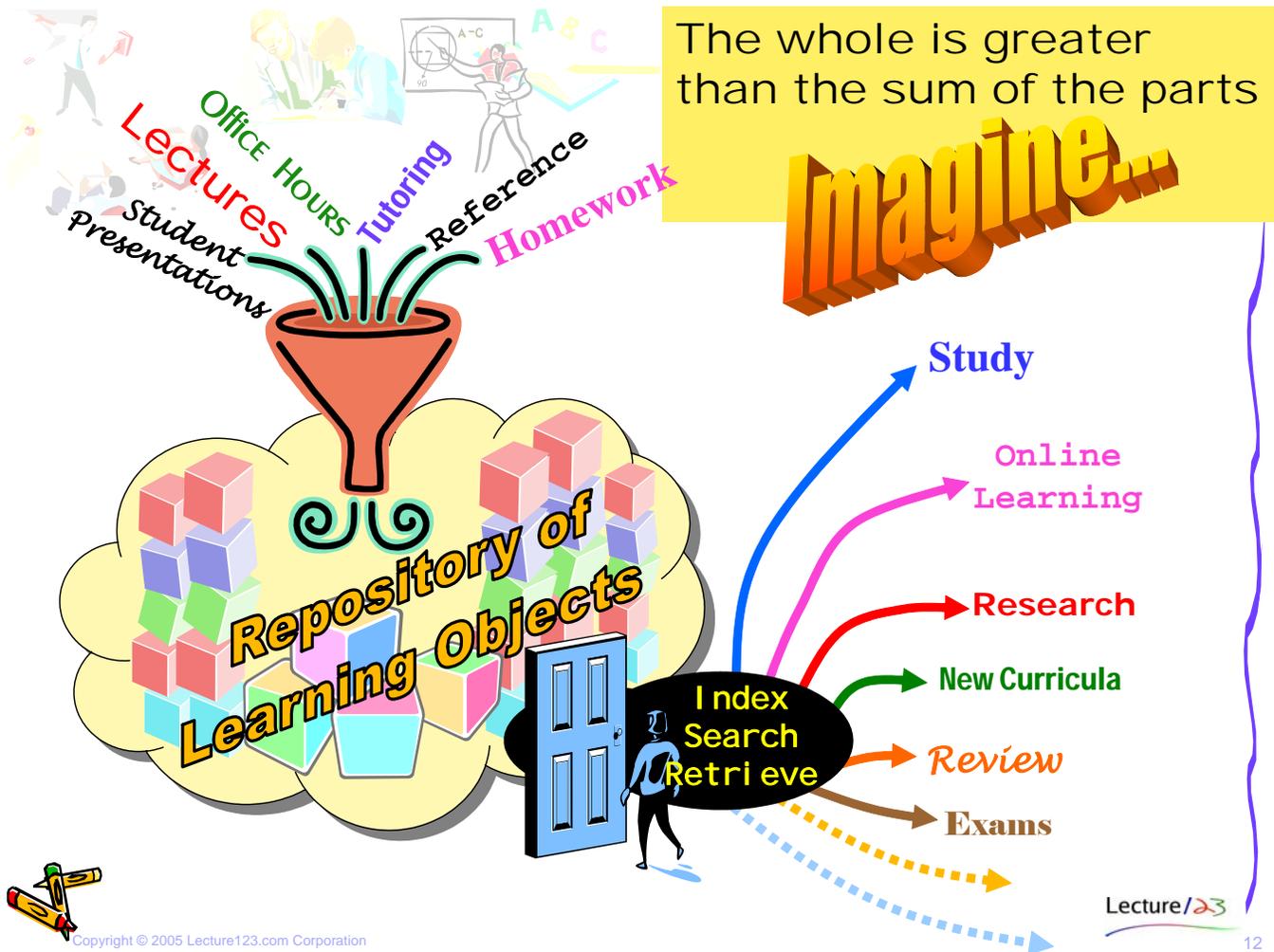
To record a session all that is needed is a computer with a microphone. A tablet PC facilitates annotations with a pen. Sessions recorded in a classroom require an LCD projector.

Tablet PCs facilitate the recording of pen strokes of text or diagrams. Sessions can be recorded on mouse-equipped computers, e.g. laptops or desktops, as long as only simple annotations like highlighting are needed.

Content playback works on any computer. No special hardware. The Lecture123 software merely requires a one-time installation of the Java Runtime Environment. This typically takes less than five minutes. Our software is automatically downloaded and updated without any user intervention. It works easier than Microsoft Windows Update.

## The Knowledge Community

The true power in the innovative architecture of Lecture123 is the ability to build an evolving repository of learning objects over time. Members of the Lecture123 community publish content which is then fully searchable and reusable with endless possibilities. Imagine a search engine retrieving learning content with slides, narration, annotation, questions and answers across the Lecture123 repository.



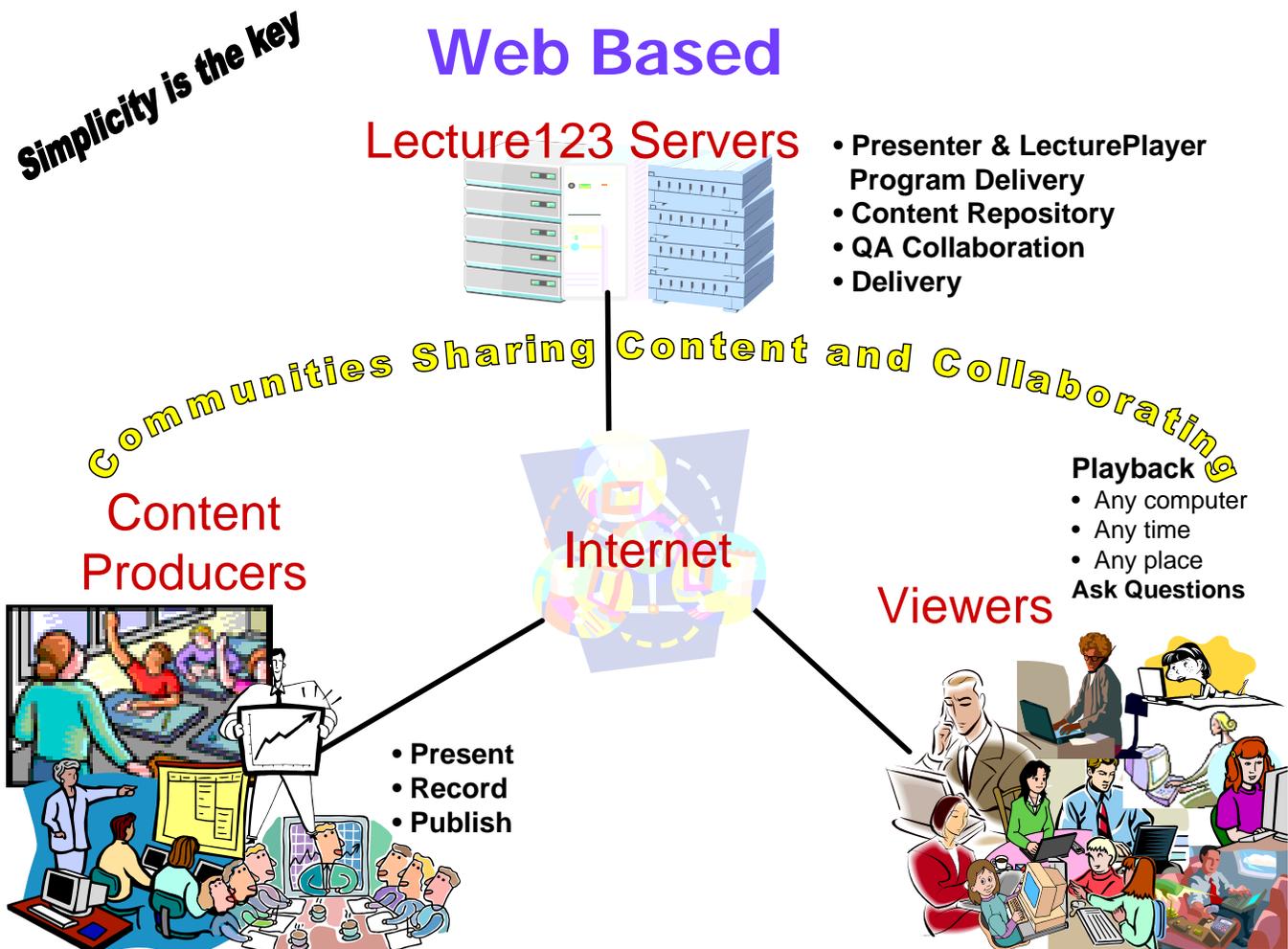
## Results

Ponder the following goals and consider the opportunities Lecture123 opens. Lecture123 is already showing results in meeting these objectives:

- Reduce office hours with students actually getting more out of the course.
- Identify and remediate areas of student confusion before giving the exam.
- Share good questions and answers with all students at any time.
- Have more time to explore selected topics in more depth with the class.
- Save valuable in-class lectures and reuse them next semester.
- Privately replay your presentations and improve your own lecture techniques.

- Continue to engage your students outside the classroom.
- Better connect with your students in their multitasking world of short attention spans.
- Have the time to share your revision comments on a writing assignment with every student individually as though you were sitting together.
- Maintain the course schedule independent of student absences or snow days.
- Offer all students the ability to learn at their own pace without changing your current teaching model.
- Develop new lectures and curricula by sharing best-in-class narrative, annotated, graphical, and text course content with your colleagues with the ease of copying/pasting PowerPoint slides.
- Provide google-like searches across a repository of rich content lectures weaving together topics individualized to meet all students' needs and abilities.
- Join a community of educators and students sharing knowledge via natural, easy to use technology.

## The Lecture123 Architecture



## Lecture123 Tour

Let's take a tour of Lecture123 in use at a fictitious college. We'll experience the system from the perspective of an instructor and students.

### Red Brick College

Red Brick College has a large population of working students. Student attendance is spotty; many cannot attend all the lectures, due to job and family pressures. Fortunately, Red Brick College has deployed Lecture123. Professor Smith, records each of his lectures using a simple tablet PC and microphone: this recording constitutes an audio track that is fully synchronized with the PowerPoint slides. In addition, questions that students asked during the lecture or after the lecture (through the web interface) are recorded and answered right at the relevant material.

## Present & Record

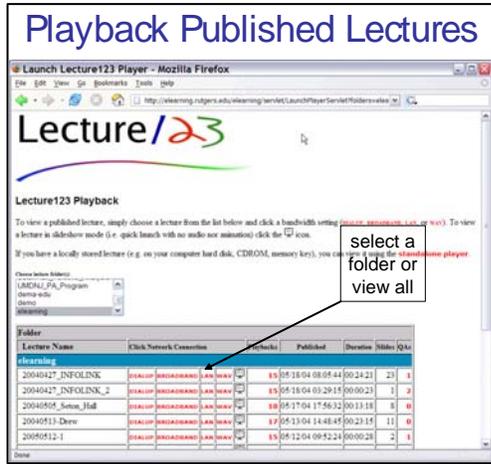
### Presenter Present & Record

- The Presenter presents your content while recording your voice, mouse or pen annotations, and slide navigation
- Presenter is designed to support content that can be printed (similar to the way Acrobat supports PDF from any application). Currently PowerPoint source content is supported.
- Once you are done recording, the Presenter allows you to publish the session for playback over the Internet.

The screenshot shows the Presenter Layout interface. At the top, there are thumbnails for slide navigation, 'Prev/Next' buttons, and 'pen tools'. Below these are a 'Click to mute your audio' button, an 'Audio volume meter', and a 'timer: shows elapsed recording time'. A 'Stop your recording and enter the publishing stage' button is also visible. The main content area displays a slide titled 'Welcome to BY 302' with 'Principles of Developmental Biology' below it. Red annotations (a line and dots) are shown on the slide, with a callout box stating 'annotate your content with the mouse or tablet pen'.

After each lecture is recorded Professor Smith simply posts it on the web and students can replay it at their convenience on any computer.

## Publish for Immediate Playback



### Lecture123 Player Navigation

- Once the player is displayed click "Play" to start.
- This slide shows the various way to navigate through the lecture:

Prev/Next: click to navigate

Play/Pause: click button or icon below

thumbnails: shows all slides; click to navigate

- Moving the sidebar while the lecture is paused shows the slides and annotations as fast forward or reverse.
- The player window may be resized. A non maximized window shows a time popup when the mouse is over the slider.

Move slider to play from any time point

speed

volume mute

Additionally, his students can post questions on the material at any time while playing back the lecture by simply right clicking the mouse on the location pertinent to the question. Professor Smith answers them asynchronously and at his own convenience (he prefers to do it in the morning before leaving for the college). All of this is as simple as answering email.

# Students Ask Questions, Instructors

## Questions/ Answers

- Patent pending technology allows viewers to easily ask a question at any time during playback.
- Questions carry full context including the lecture folder and name, the slide number, the time when it is asked, and the slide location where the Q click occurred.
- All QAs are stored in a server repository.
- The content owner is notified via email when a new Q is posted. This Q with full context is available so an appropriate answer can be made.
- These QAs are automatically integrated into the content for all subsequent viewers benefit.
- QAs may also be searched for specified text.
- Finally, content owners may view QA histograms and take appropriate action, e.g. by creating a new mini lecture with the Presenter to reinforce an aspect of the original content.

**1 Student Asks Question with Right Click in LecturePlayer**

**2 Email Notice to Student & Instructor**

**3 Link to QA details**

**4 QA Details**

**5 See Q location on slide**

**6 Answer the Q**

**7 QA marker inserted**

**8 Principles of Developmental Biology QA popup detail**

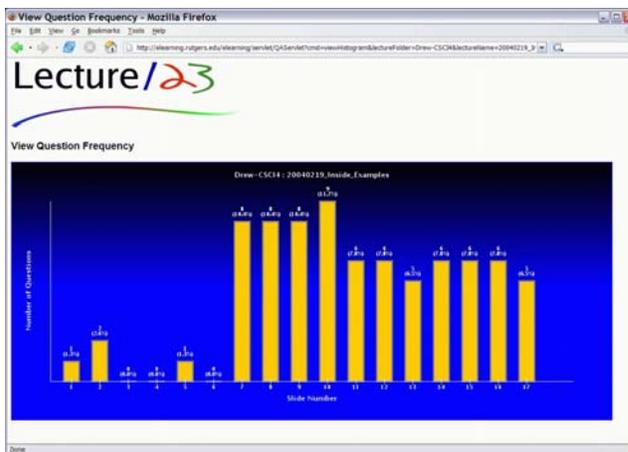
Different students have different needs. Not all students learn the same way. Jane is a history student, she listens to just the audio track of the lectures on her mp3 player while jogging or in the car while commuting to and from work. Tom uses only the audio track when reviewing his drum lesson. Stan uses his PDA and headphones in the coffee shop reviewing the psychology lectures that have a lightweight visual component in the form of simple PowerPoint slides that summarize the key ideas in the form of bullets and talking points. Kate, a business school student, uses PowerPoint in the pure visual form, reviewing slides made from the Professor's scribbles of math formulas describing derivation of the Black Scholes model. All of them use their preferred method of reviewing the material anywhere they go and at the devices of their choice ranging from the mp3 player to a laptop or a desktop. These lectures include not just the professor's lecture, but also questions and answers at the exact spatial/temporal point of the lecture where they were asked. They also provide the professor with much needed feedback even if only very few students are actually present in class. Eventually, there are very few questions left since they all have been answered. Good professors who have delivered the same lecture multiple times know the feeling - they have already anticipated all the questions and answered them before students ask.

Professor Smith monitors the Q&As from his students to discover areas that need further discussion by looking at histograms showing the distribution of Q&As across the slides of his lecture. He uses these histograms to meet the objectives of his Continuous Quality Improvement action plan.

## QA Statistics & Feedback

### Histogram: Qs per slide

- Click any bar to see slide with all QA marker locations
- Identify lecture **"hotspots"**:
  - + review topics
  - + refine slides
  - + record/share mini lecture



He might choose to start his next class with a review of topics for which there were many questions. In some cases he has recorded a 5 minute lecturette in his own office outside of class reinforcing the topic and integrating it into the content.

Rather than view an entire lecture, some students prefer to rather search and learn based on topic keywords within the lecture content. Mary searches for all slides with the word “Van Gogh” across all the lectures in her class and then simply plays only the slides with those references. Mary may also search across lectures of other classes in the college and sessions made publicly available from any Lecture123 participant, e.g. content published by Van Gogh Museum in Amsterdam.

## QA Searches

### QA Search

### Find QA text across lecture sets and view all relevant content

**Question: 48**

Asked at Time: 00:10:21  
 Asker's Email: [gnul@drew.edu](mailto:gnul@drew.edu)  
 Asker's IP: STU-GTRULL.ad.drew.edu (10.2.10.176)  
 Ask Date: Thu Feb 19 14:10:36 EST 2004

**Question: Grace 010010101**

Current Answer: null  
 Enter New Answer Text Below

The following semester Red Brick decides to roll out tablet PCs to all incoming freshman instead of laptops. Freshman now have the ability to show lecture slides as presented by Professor Smith during class and take notes directly on the tablet with their own pen.

## Motivating Scenarios

### ***Global Pharmaceuticals***

Global Pharmaceuticals largest selling medication is for patients suffering with diabetes. This represents 18M Americans. They have entered into an arrangement where they provide tablet PCs bundled with the Lecture123 system and content geared at diabetes education for patients. These systems along with the content material are branded with the Global logo and are deployed to physician offices free of charge nationwide. Drug reps commonly have free giveaways to physician office in order to promote their products.

The medical practitioners and educators use the Lecture123 tablet to record an educational one-on-one session with a patient using Global's content along with the *talking ink* from the professional. The patient leaves the office with a personalized healthcare plan on a CDROM for playback at home. Studies show typically low memory retention of typical doctor-patient educational sessions, resulting in potentially negative consequences.

Lecture123 provides a win-win-win scenario: patients learn and retain more empowering them to improve their own care, doctors improve patient care along with improving their practice image, Global sells more products. The following year Global along with participating doctors launches Global QA where patients get answers to their questions further improving medical compliance while providing valuable feedback to the doctors and Global.

### ***FunTime PreSchool***

Mrs. Murphy has six 4 year olds in her pre school class. Today she wishes to work on eye hand coordination in forming words along with team building skills. She points her 3 pound portable, wireless LCD projector at the wall and starts the Lecture123 recording tool and removes the tablet from the keyboard and passes it to the first child. Mrs. Murphy holds up a picture of a cat and asks each student to write each letter of the word CAT on the tablet. John, a fair haired boy, sounds out and scribbles the letter C while the rest of the class watches this on the projected image on the wall. Sarah takes the tablet and draws something close to the letter A. Seeing this, Mrs. Murphy asks Chris to help Sarah. The process continues until CAT is complete. Mrs. Murphy publishes the lecture and sends it via email to the parents so they can see how their children are doing in class in preparation for the parent-teacher conferences the next day. Lecture123 targets two audiences enhancing the preschoolers learning session during the recording and then provides insightful playback for parents.

### ***Zephyr Public Library***

George Jones has just moved into the community and is not familiar with how to use the computer system at the public library to search for book titles. The circulation librarian sits him at a PC near the reference desk, he slides on his headphones, and views a pre recorded 5 minute session from the library web site.

Roger, a junior at Red Brick College, is researching a term paper on biotech firms. He is not sure how to use the new online databases at the library. He asks Ms. Fedora, the reference librarian for help. She realizes that this is a good opportunity to capture some new content to publish for other library patrons. She opens her tablet and draws a diagram of the various databases that are available while talking Roger through all the steps he needs to know. In 8 minutes Roger is ready to start his research and Ms. Fedora has posted this learning session on the library web site. The next day 3 more patrons asked for help with these databases. Ms. Fedora simply points them to Lecture123 session that she had recorded with Roger.

### ***MoonRise Enterprises***

MoonRise, located in NJ, just received a new contract to develop a marketing plan for a new men's cologne. Ellen, VP Development, is on a business trip in Paris. Since time is of the essence, Larry and Jill, creative designers working for Ellen, record their initial concepts in a 30 minute brainstorming session and send an email to Ellen for her feedback. Ellen, wakes up the next morning in Paris (while it's still the middle of the night in NJ), sees their email and launches the Lecture123 player to review their session. She uses the Lecture123 Q&A layer to provide feedback and new ideas. Larry and Jill review Ellen's responses and by 4:00PM FedEx an initial proposal back to the client.

### ***Berkeley Publishing***

Berkeley Publishing is preparing to launch their new high school history textbook. They contact the 15 editors that reviewed the book and ask each one to record a 20 minute supplemental lecture for each chapter using Lecture123. The textbook is to be sold with the incentive that teachers will have these dynamic, engaging lectures to share with students. Additionally, Berkeley hires a team of several college history professors who will handle incoming questions from students all over the country and respond back. Sales of this new textbook are 20% higher than similar books in the past attributable directly to the value added with Lecture123 content and collaboration.

### ***BPM Internet Service Provider***

BPM is losing market share to AOL. Its market research shows that senior citizens, an expanding population in the US, is the fastest growing segment of new ISP subscribers. BPM launches a new program called Senior Sharing where any senior citizen member can create content with Lecture123 based on their area of interest or expertise. These sessions are then posted in the BPM Lecture123 repository. Seniors participating in Senior Share can search for topics, playback recorded sessions, post Q&As to collaborate with the author and create their own recorded sessions also. This new form of asynchronous sharing between seniors is successful in BPM generating a 10% market share gain in only 6 months.

### ***BlueStone High School***

Ms. Morris has assigned her 11<sup>th</sup> grade history students to write a 2 page analysis of the contributions Ronald Reagan made to the end of the cold war. The students submit the MS-Word files to her via email. Ms. Morris opens each student's paper in Lecture123 narrating changes and marking up the text appropriately. A typical review session takes about 5 minutes. Students are then asked to playback her suggestions with Lecture123, revise their papers, and hand in their final reports. Ms. Morris is happy to report that grades for this assignment are on average 4% higher than last year.

### ***Mayor Jefferson***

Taylor Township has initiated a referendum to fund the construction of a new library. Mayor Jefferson, who is known to use PowerPoint presentations at town meetings, decides to present his slides using Lecture123. The turnout on that rainy night at town hall was lower than expected. The mayor places a link to the recorded session on the town web site and publishes this in the town newsletter. The Lecture123 system registers 257 playbacks over a 2 week period. The referendum passes by 92 votes. The groundbreaking is next month.