



Where Are You?

Assessing Technology Integration

TechToon

Mr. Wilkins, may I turn on the computer?



After months of hard work, Mr. Wilkins saw the first sign of technology integration.

Technology Workshops

ROOM ASSIGNMENTS

"Technology Literate" →

"Somewhat Technology Literate" →

"Willing to Learn" →

← "Rather Have a Root Canal"



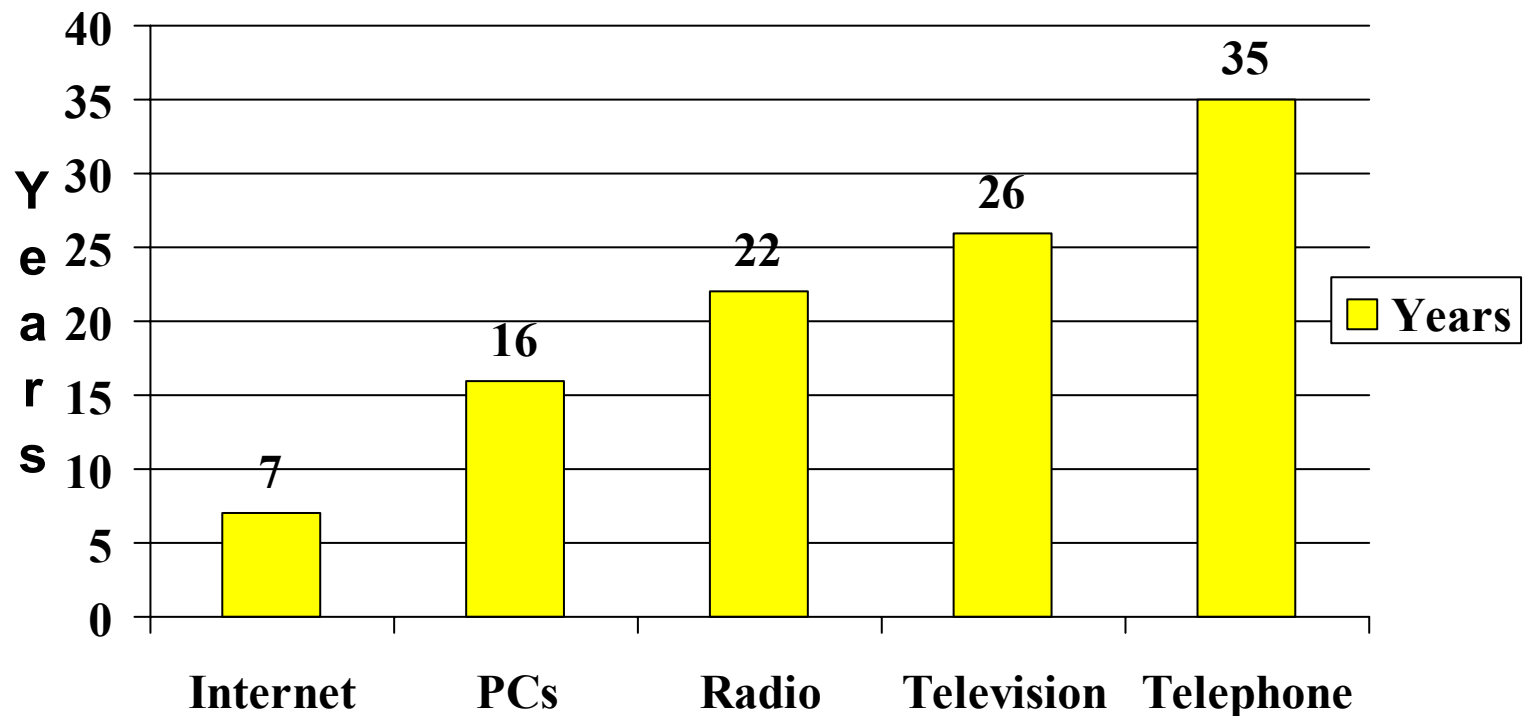
TechToon

"Hey, check this out!
K-mart's Web page
has free lesson plans
online!"



The Reason You Feel Breathless...

Number of Years to Reach 25% of Households



Moore's Law

Twice the power for half the price every 18 months

Year	1979
RAM	16K
Hard Drive	128K
Speed	2MHZ
Cost	\$5000

Moore's Law

Twice the power for half the price every 18 months

Year	1979	1984
RAM	16K	128K
Hard Drive	128K	400K
Speed	2MHZ	10MHZ
Cost	\$5000	\$3900

Moore's Law

Twice the power for half the price every 18 months

Year	1979	1984	2002
RAM	16K	128K	256MB
Hard Drive	128K	400K	20GB
Speed	2MHZ	10MHZ	1000MHZ
Cost	\$5000	\$3900	\$900

Moore's Law

Twice the power for half the price every 18 months

Year	1979	1984	2002	2015
RAM	16K	128K	256MB	104,032MB
Hard Drive	128K	400K	20GB	8,127GB
Speed	2MHZ	10MHZ	1000MHZ	406,375GHZ
Cost	\$5000	\$3900	\$900	\$9



Thoughts from Teachers

- 84 percent of teachers in the US say that computers and Internet access improve the quality of education.

http://www.netday.org/news_survey.htm

[NetDay](#), March 29, 2001



But...

- Two-thirds say the Internet and computers are *not* well integrated into their classroom.

http://www.netday.org/news_survey.htm

[NetDay](#), March 29, 2001

The Best You Have Ever Seen . .

- Take a minute a write down a short description of the best use of technology you have ever seen in a classroom.





The Best Technology Lesson You Have Ever Seen

- What did the teacher do?
- What did the students do?
- What did the students learn?

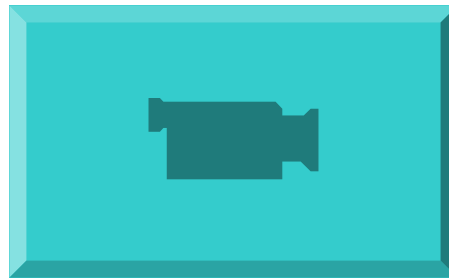
Is this the best?

- Newsome Park Elementary School uses a project-based approach to learning that integrates technology for higher level tasks.



Is this the best?


- The Union City schools were failing. They had to do something drastic. Did they do the right thing?





Technology Integration

- Integration is a slow process
- Set personal goals
- Changes in teaching



“Technology will not have a significant impact on student learning until teachers change the way they teach.”

Larry Cuban, 1986



Apple Classrooms of Tomorrow

- Research began in 1985
- First large study of teachers and students using computers. (pre-internet).
- ACOT study was published in 1988.
- Still stands up today.



ACOT Research Questions

“What happens to students and teachers when they have access to technology whenever they need it.”*

*Changing the Conversation about Teaching Learning and Technology: A Report on 10 years of ACOT Research

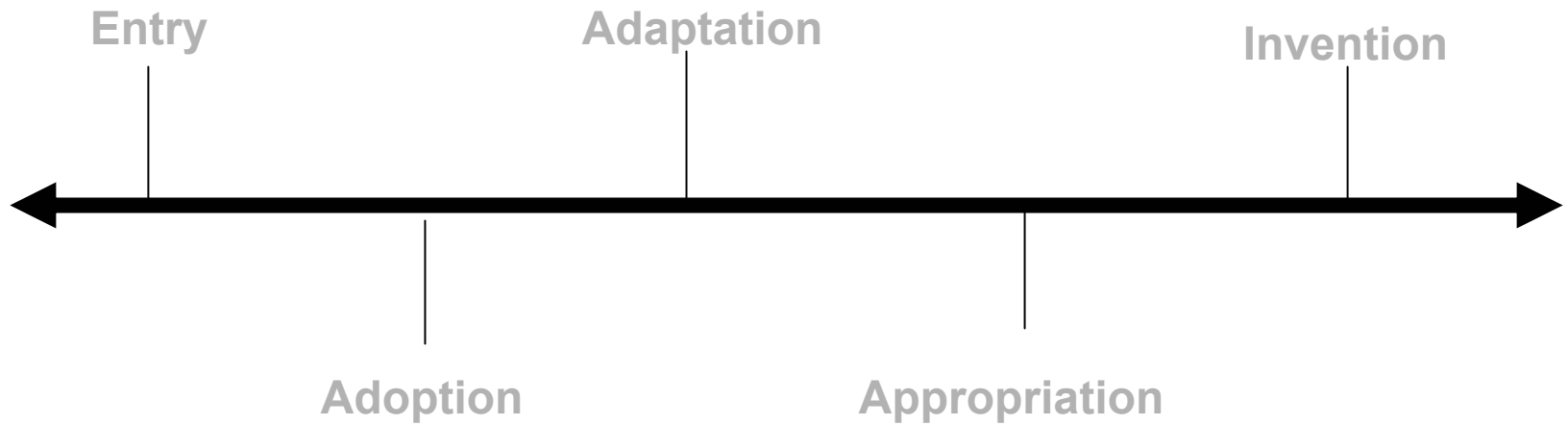
<http://www.apple.com/education/k12/leadership/acot/library.html>

ACOT Research Findings

- Teachers pass through phases on a continuum as they learn to integrate technology.



ACOT Continuum



ACOT Stages: the long version

Entry	Teacher is learning the basics of a technology, e.g., how to set up equipment and operate it.
Adoption	Teacher begins to use the technology in management areas, e.g., computer generated quizzes or worksheets, gradebooks.
Adaptation	Teacher begins to use software to support instruction, e.g., a commercially produced content area program or productivity tools (word processor, data base)
Appropriation	Teacher begins to focus on collaborative, project-based technology use and technology becomes one of several instructional tools.
Invention	Teacher begins to develop different uses for technology, e.g., creates projects that combine two or more technologies.



ACOT Stages: quick and dirty

1. Entry	New tools, no tasks
2. Adoption	New tools, same tasks
3. Adaptation	More complex tools
4. Appropriation	New tools, different tasks
5. Invention	More complex tasks

Apple Education Library

<http://www.apple.com/education/k12/leadership/acot/library.html>

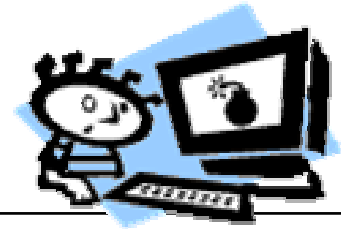


Entry Phase

- Teachers use traditional print-based media.
- Learning activities center around seat-based work.
- Teachers are most concerned about the basic operation of computers.
- “I just don’t have time!”

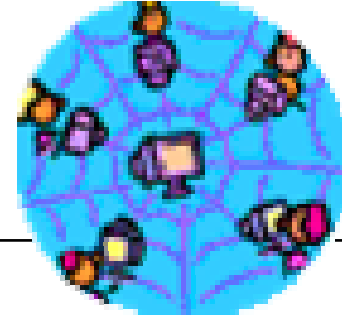


Adoption Phase



- Classroom instruction still depends heavily upon chalkboards, textbooks,
- Teachers use word processors for writing activities.
- Teachers use educational software, including rudimentary drill-and-practice software to develop low-level skills.

Adaptation Phase



- Students use word processors, databases, some graphics applications, and many computer-assisted instruction packages.
- With the support of technology, student productivity increases and
- Students' basic computer skills improve. The basic operation of the computer does not hinder or delay instructional tasks.
- Students are allowed to progress at their own paces.

Appropriation Phase



- Teachers and students demonstrate highly developed skills with technology.
- Teachers are comfortable with technology and solve many of their own problems.
- Teachers develop new instructional strategies and experiment with interdisciplinary projects.
- Emphasis shifts to collaborative learning.
- Students move away from competitive work patterns and toward collaborative ones.

Invention Phase



- Teachers facilitate the construction of student knowledge.
- Classrooms promote social interaction, encouraging students to question and share their own knowledge and experiences.
- Teachers implement a curriculum integrated with technology but balanced between direct teaching and project-based teaching.
- Teachers employ a variety of student assessment activities,



ACOT Focus Areas

	Entry...	...Invention
Resources	Print-based Traditional	Variety of media
Teacher	Front of room	P-S with students
Instruction	Task-oriented goals	Learning goals
Students	Rote recall	Higher level processing

LoTi

<http://www.Learning-quest.Com/LoTi/>





LoTi

- In 1994, Dr. Christopher Moersch developed the Level of Technology Implementation (LoTi) scale in a effort to accurately measure authentic classroom technology use.
- This scale focuses on the use of technology as an interactive learning medium.

LoTi Breakdown

- Level 0 **Non-Use**
- Level 1 **Awareness**
- Level 2 **Exploration**
- Level 3 **Infusion**
- Level 4a **Integration (Mechanical)**
- Level 4b **Integration (Routine)**
- Level 5 **Expansion**
- Level 6 **Refinement**

How do we measure progress?



Nonuse – Level 0

- A perceived lack of access to technology-based tools or a lack of time to pursue electronic technology implementation.
- Existing technology is predominately text-based (e.g., ditto sheets, chalkboard, overhead project



Level 0 – Classroom Observations

- No visible evidence of computer access in the classroom
- Classroom computers sit idle during the instructional day



Level 0 - Teacher Comments:

- **"I really don't have the time to deal with computers anyway."**
- **"Using computers is the least of my problems this semester. Have you seen my class enrollment?"**
- **"Using computers gets in the way of what I am supposed to be doing."**
- **"My computer crashed and burned on me a few years ago. I am still waiting for someone to fix it."**
- [LoTi Breakdown](#)



Level 1 – Awareness

- The use of technology consist of Integrated Learning Systems.
- Technology is used by the teacher for management tasks like taking attendance.
- Technology is used to embellish a teacher directed lesson



Level 1 Classroom Observations

- Available classroom computers are used exclusively for teacher productivity.
- Multimedia applications are used to embellish classroom lectures or teacher presentations
- Curriculum management tools are used extensively to generate standards-driven lesson



Level 1 - Teacher Comments:

- "This grading program is fabulous. I can generate an average for each student or print out any outstanding assignment. Computers are great!"
- "I basically send my kids to the computer lab where they learn how to use it. The kids love it."
- "I designed my own web-page so that students can view their weekly assignments."
- "My students go to the lab each Tuesday. This frees me to catch up on my grades or meet with parents."

[LoTi Breakdown](#)



Level 2 - Exploration

- Technology-based tools supplement the existing instructional program
- The electronic technology is employed as an extension activity.

Level 2 Classroom Observations:

- Student projects focus on lower levels of student cognition (e.g., creating a web page to learn more about whale species)
- There is greater emphasis on the technology rather than on the critical content (e.g., "My students' project was to create a WebQuest using Inspiration and HyperStudio).
- Computer use serves as a reward station or as a digital babysitter

Level 2 - Teacher Comments:

- "When students finish their packets early, they often go back to the computers and practice their computer skills."
- "My students created our school's web page."
- "My kids graphed some data from an AIMS activity last week. They love the way the graphs look on the screen."
- "We are running a school-wide contest on the best HyperStudio presentation this month."

LoTi Breakdown



Level 3 - Infusion

Technology-based tools including databases, spreadsheet and graphing packages, multimedia and desktop publishing applications, and internet use complement selected instructional events.



Level 3 Classroom Observations:

- Student use of tool-based applications such as spreadsheets/graphing, concept mapping, and databases is used primarily for analyzing data.
- Students are involved with different forms of "WebQuest" projects that require students to research information, draw conclusions from their research.

Level 3 -Teacher Comments:

- "My students just completed a research project investigating why many middle school students never use the school's drinking fountains."
- "I designed a culminating performance task for my 4th grade students that required them to conduct web-based research and related data gathering to support their predictions for the upcoming Presidential election."
- "My students created a multimedia presentation that analyzed the issue of poverty among 18-25 year old adults."

[LoTi Breakdown](#)



Level 4A Integration Mechanical

- Technology-based tools are integrated in a mechanical manner that provides rich context for students' understanding of the pertinent concepts, themes, and processes.
- Heavy reliance is placed on prepackaged materials and/or outside resources and/or interventions that aid the teacher in the daily management of their operational curriculum



Level 4A -Classroom Observations:

- Students designed a school-based information kiosk to assist their classmates with various "safety" issues including map directions to school based on the time of day, neighborhood watch sites, and "just-say-no" strategies to use with strangers.
- Students organized a school fund-raiser to raise money for one of the international "solar cooker" societies based on their research, experimentation, and data gathering with homemade solar cookers.

Level 4A -Teacher Comments:

- "The creation of the information kiosk idea was based on an existing unit that I borrowed from one of the 5th grade teachers."
- "I used an existing unit design published by a software company that provided an easy way to design my culminating performance task and the student experiences leading up to the fund-raiser."
- "The travel brochure which we used as a part of the culminating performance task was developed by a consultant with assistance from the 4th grade teachers."

[LoTi Breakdown](#)



Level 4B – Integration – Routine

- Technology-based tools are integrated in a routine manner that provides rich context for students' understanding of the pertinent concepts, themes, and processes.
- At this level, teachers can readily design and implement learning experiences that empower students to identify and solve authentic problems relating to an overall theme/concept using the available technology
- Emphasis is again placed on student action and on issues resolution that require higher levels of student cognitive processing and in-depth examination of the content.

Level 4B- Classroom Observations

- Based on the rise in student violence on campus, students prepared a multimedia presentation highlighting their recommended mediation strategies using data synthesized from school-wide surveys and from the internet.
- Students created a web site devoted to exploring solutions to the steady increase in solid wastes entering the local landfill.
- Students prepared a multimedia presentation highlighting the misconceptions and omissions in history text books concerning the contributions of their specific ethnic group.



Level 4B – Teacher Comments

- "Our student mediation unit was prompted by the recent rise in fights on campus. Many students expressed concern for their personal safety and the safety of others at school."
- "I first converted several digital images into a Power Point presentation to get my students thinking about the waste disposal issue and asking questions."
- ""We took the students on a field trip to a local fish pond to investigate the potential impact of the proposed housing development on the preservation of this ancient site."

LoTi Breakdown



Level 5 - Expansion

- Technology access is extended beyond the classroom.
- Classroom teachers actively elicit technology applications and networking from other schools, business enterprises, governmental agencies research institutions, and universities to expand student experiences directed at problem-solving.



Level 5 – Classroom Observations

- Students started their online consumer awareness clearinghouse that provided up-to-date information on "best prices" for travel, goods and merchandise, and services based on data collected from their research and online.
- Using video cameras, NASA and NOAA images, and related weather and mapping data, students assisted a hiker in his goal to conquer the Continental Divide Trail from Mexico to Canada. Communicating via email, students were able to provide daily information on the best routes.



Level 5 – Teacher Comments

- Students got the idea for starting a business venture online after they read a series of articles discussing the pros and cons of online businesses and their success rates."
- "Assisting their hiker friend was the highlight of the day. Since we were limited on time in class, students did the majority of their research online at home."

[LoTi Breakdown](#)



Level 6 - Refinement

- Technology is perceived as a process, product and/or tool for students to find solutions to "real-world" problems.
- There is no longer a division between instruction and technology use in the classroom.
- Students have ready access to and a complete understanding of a vast array of technology-based tools.



Level 6 – Classroom Observations

- Students designed an interactive web site for bilingual children to expedite their English language proficiency. The site included options for real-time conversations, tutorial sessions, and bilingual online bulletin boards.
- Students created a new type of housing design using some sophisticated CAD programs to improve the amount of heat transfer in future homes.



Level 6 – Teacher Comments

- "Every student has access to computers, video cameras, scanners, Internet, and any other technology-based application at any time during the instructional day. Doesn't everyone?"
- "We have computers embedded in every desk and in every classroom on campus. Students can use them at any time."

[LoTi Breakdown](#)



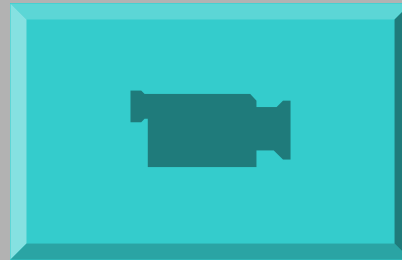
How do we measure progress?

- Student Access?
- Student Achievement?
- Teacher Access?
- Teacher Use?
- Boxes & Wires?
- Operational Skills?
- Integration Skills?

Practice Evaluating Technology Integration

- View the video and rate it on the ACOT and LoTi scales.

Lesson Plan: Boil, Boil, Toil and Trouble



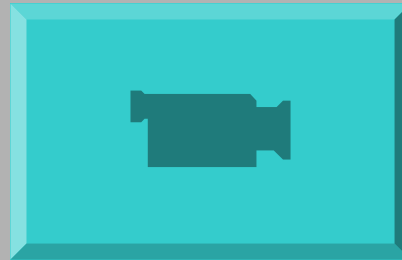
ACOT: Entry, Adoption, Adaptation, Appropriation, Invention

LoTi: No Use, Awareness, Exploration, Infusion, Integration (Mechanical), Integration (Routine), Expansion, Refinement

Practice Evaluating Technology Integration

- View the video and rate it on the ACOT and LoTi scales.

Lesson Plan: Dandy Candy



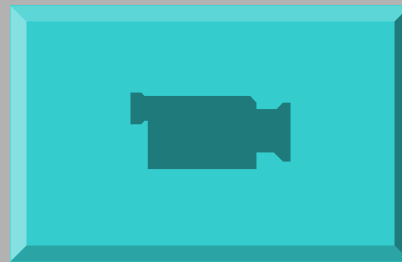
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Practice Evaluating Technology Integration

- View the video and rate it on the ACOT and LoTi scales.

Lesson Plan: History Review



ACOT: Entry, Adoption, Adaptation, Appropriation, Invention

LoTi: No Use, Awareness, Exploration, Infusion, Integration (Mechanical), Integration (Routine), Expansion, Refinement

LoTi Rated Lessons

- All these elementary lessons fall on the same LoTi level according to the LoTi Lounge. What level is it?
- http://ali.apple.com/ali_sites/ali/lessonideas/alphabook.html
- http://ali.apple.com/ali_sites/ali/lessonideas/idioms.html
- http://ali.apple.com/ali_sites/ali/lessonideas/learndo.html
- http://ali.apple.com/ali_sites/ali/lessonideas/miwok.html



LoTi Rated Lessons

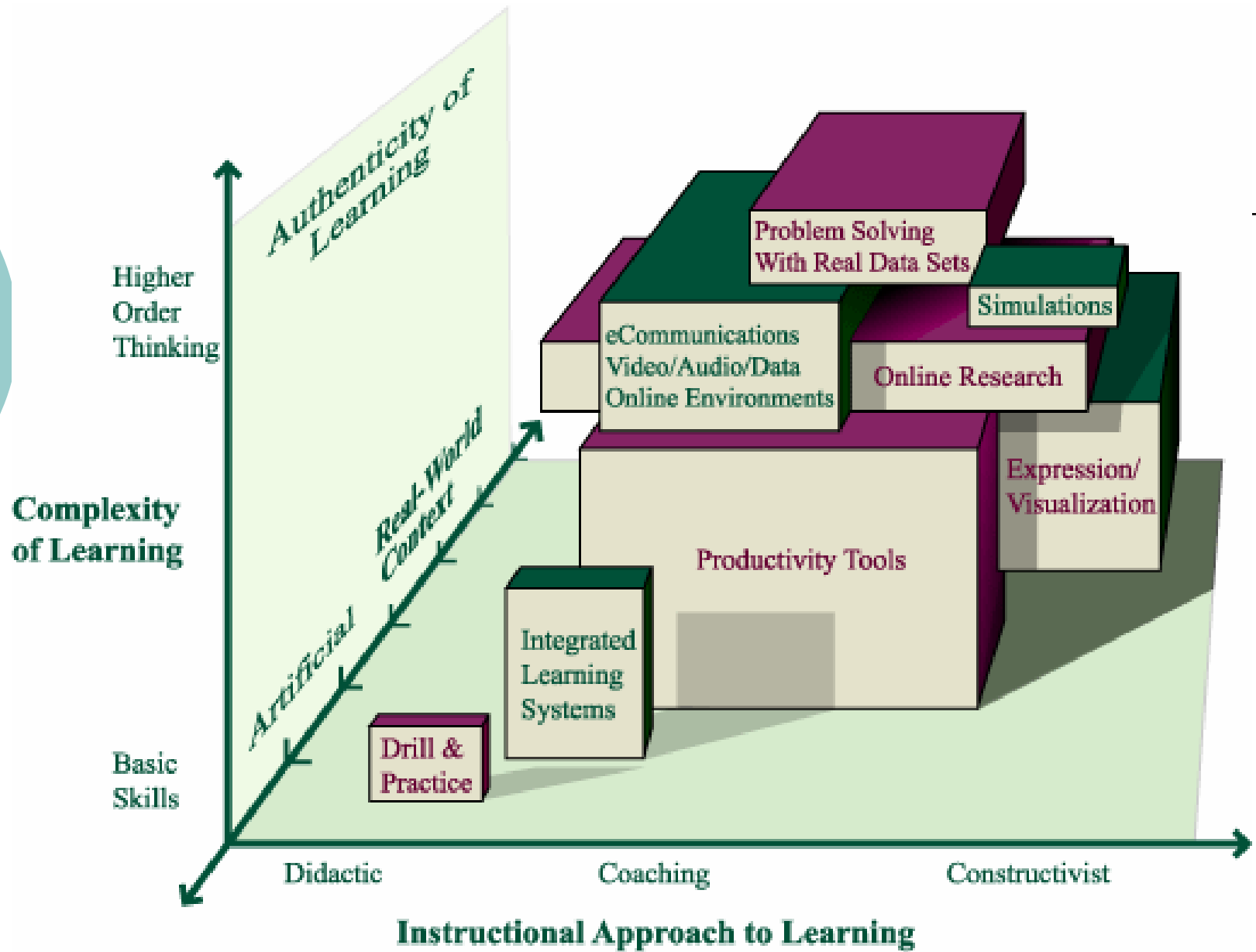
- All these secondary lessons fall on the same LoTi level according to the LoTi Lounge. What level is it?
- http://ali.apple.com/ali_sites/ali/lesonideas/bookads.html
- http://ali.apple.com/ali_sites/ali/lesonideas/fluency.html





LoTi Website

- <http://www.learning-quest.com/technologyassessment.html>





Instructional Resources

- LoTi Website
 - <http://www.learning-quest.com/instructionalmaterials.html>
- Marco Polo Site
 - <http://www.marcopolo-education.org/>
- Video Classroom
 - <http://www.videoclassroom.org/>
- classrooms@work
 - <http://www.netc.org/classrooms@work/>