Using ICT to Fasilitate the Student Active Learning

Through Web-Based Course

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Objectives

Audiances will:

- *Realize the availability of new technology (ICT) to support learning and teaching*
- *Understand the Student Active Learning concept*
- *Understand the e-learning concept and its pedagogical aspects*
- *Understand how to use ICT to support the Student Active Learning through web-based course (e-learning) within the framework of long life learning.*
- *Understand the role of assessment to evaluate the teaching and learning process.*

What is ICT?

- *Information technology refers to the processes, applications and equipment by which we access, organize, analyze, evaluate and present information.*

- *ICT isn't just about computers, it's calculators, PDAs, digital cameras, scanners, video cameras, MP3 players, the internet, digital data logging…*

Information and Communication Technology

- *ICT includes all forms of telecommunication systems such as telephones, the Internet, and the Web.*

- *ICT includes calculators, computers, digital cameras, digital music devices.*

- *ICT includes the field of Computer and Information Science.*

New Available Technology for Teaching & Learning

- PC (including Notebook)
- Mobile devices (Mobile Phone, PDA)
- Networking Technology (including Wireless Technology)
- Internet Application (E-mail, HTML, XML, MathML, PHP, JavaScript, Java Applet, Flash, Discussion Forum, Instant Messangers, CMS, LMS, Weblog, etc.)
- Multimedia Technology (Digital Camera, Digital Video Camera, Digital Audio Converter/Player, etc.)

Laptops for Learning

- Mobile computing with wireless LAN
- Promote computer use and literacy of students
- Integrate privately owned and operated computing equipment into campus infrastructure
- Create infrastructure for new methods in teaching and learning
 - → A large number of new student workplaces

Student experiences of laptops

- 67% say owning a laptop has facilitated their studies
- 46% use their laptops for group work regularly or frequently
- Problems are primarily solved with the help of friends (44%) or on one's own (34%)
- 42% wish an increased use of laptops in the teaching

(Anders Hagström: Project Manager, *ETH World* Swiss Federal Institute of echnology, ETH Zurich)

Growth – Hypothetical Model of ICT in Education ©
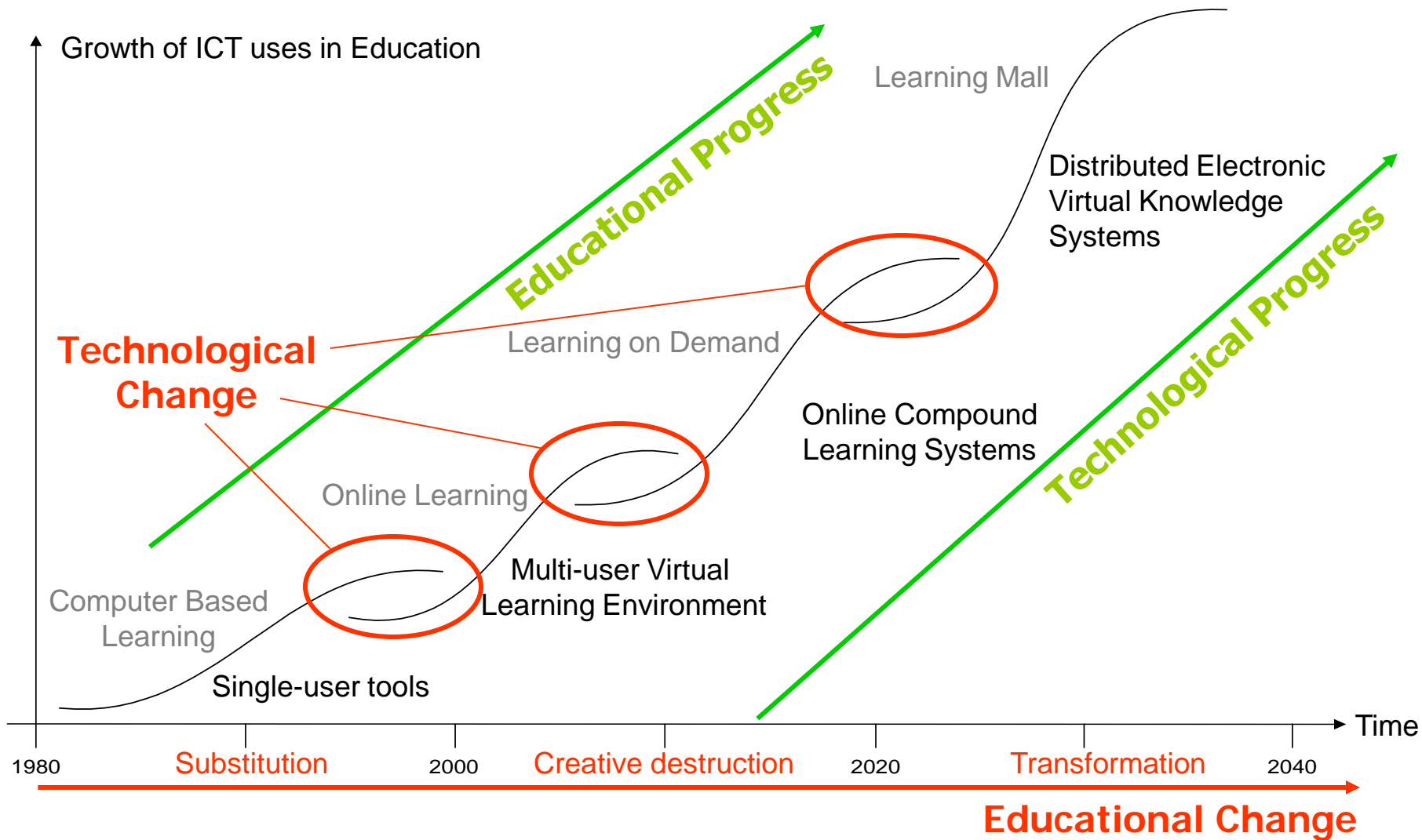
Why ICT?

- *Technology → a major factor in the transition to a knowledge economy & information society*

- *ICT is increasingly used in education and in the business and leisure industries.*

- *Application of ICT to manage information and solve problems → important set of skills*

- *Needs to provide students a wide variety of opportunities to explore how the technology can support them in their learning*

Curriculum Changes in the Knowledge Economy and Information Society

- Life long learning skills
- Metacognition skills (the ability to set student's own goals, planning their own learning and evaluating their success)
- Transfer of knowledge/skills → more active involvement of students

The Power of ICT in Learning

- **Connectivity** – access to global information & world full of learning resources
- **Flexibility** – any time, any place, independent learner, self-paced learning
- **Interactivity** – assessment, feedback, across time and place
- **Collaboration** – support collaborative learning (develop learning community, shared experiences)
- **Extended opportunities** – e-content can reinforce and extend classroom-based learning; networked communication provides virtual communities for students/teachers to practice advanced tools
- **Motivation** – multimedia resources can make learning fun (ICT can simulate authentic problem situations)

**Increased efficiency of tracking and monitoring learners' progress**

ICT & Curriculum

- ICT as a Subject Content
  - Within Specialized Subjects (*e.g. Computer Science, Information Technology Management*)
  - Integrated with Other Subjects (*e.g. Computer applications for mathematics, engineering, economics, etc.*)
- ICT as a Tool
  - For Academic Information Management
  - As Learning Tool
  - As Teaching Tool

Learning Paradigm Change

Teacher is
... a sage on the stage
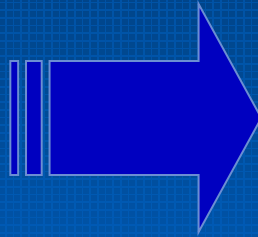
Teacher is
... a guide on my side

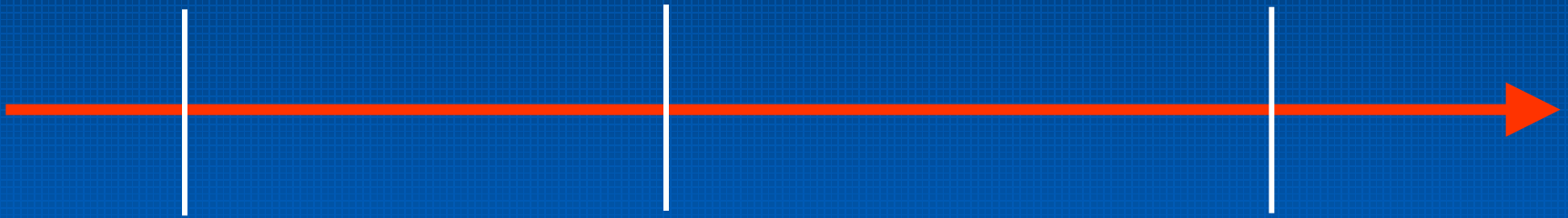# Goals of Education (David Perkins)

Cognitive Scale

Low Order   **Medium Order**   **High Order**
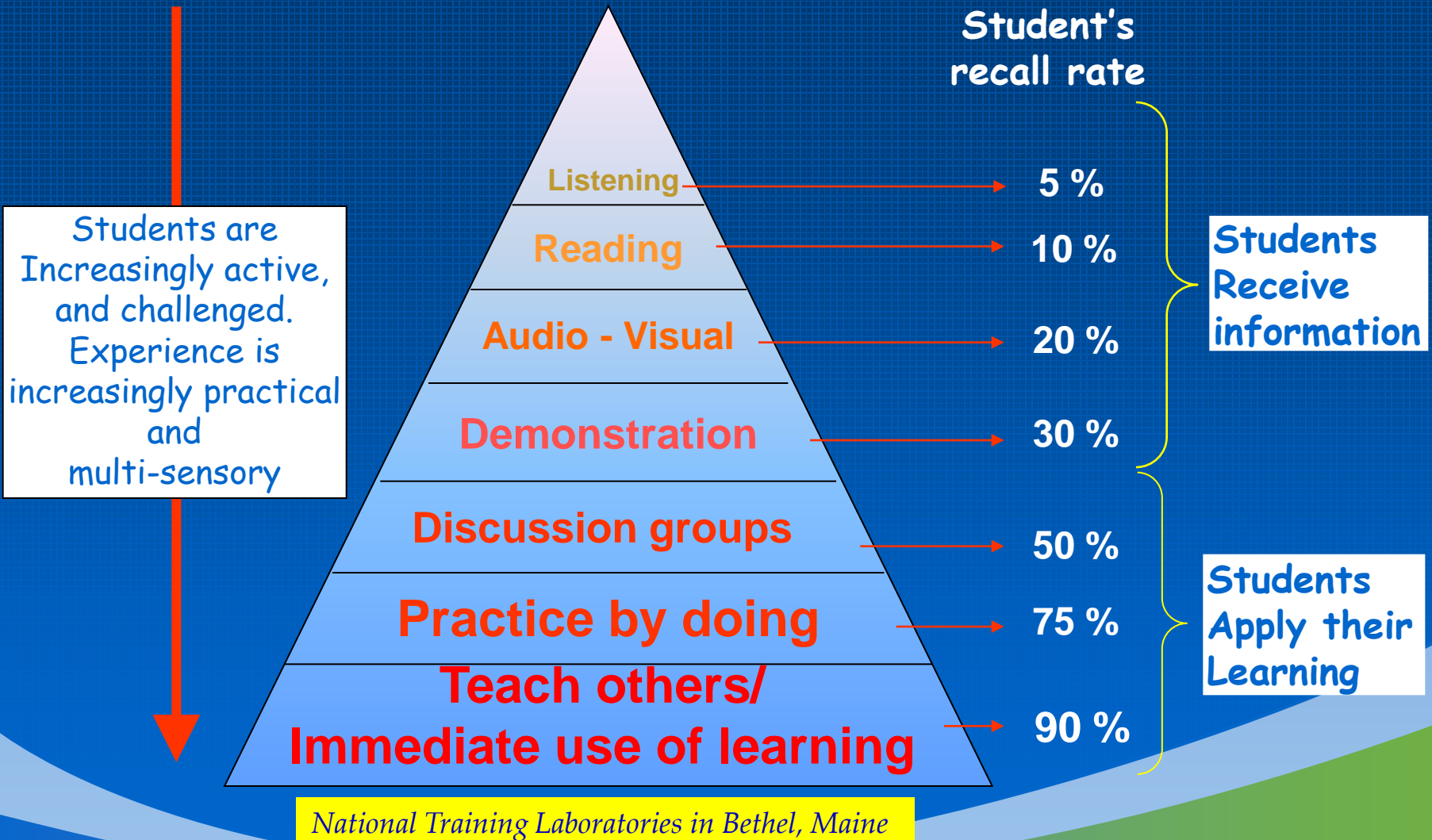
Acquisition and retention of knowledge and skills

Understanding of one's acquired knowledge and skills

Active use of one's acquired knowledge and skills. (Transfer of learning. Ability to apply one's learning to new settings. Ability to analyze and solve novel problems.)

Learning Pyramid

Students are Increasingly active, and challenged. Experience is increasingly practical and multi-sensory

Student's recall rate

Level	Recall rate
Listening	5 %
Reading	10 %
Audio - Visual	20 %
Demonstration	30 %
Discussion groups	50 %
Practice by doing	75 %
Teach others/ Immediate use of learning	90 %

Students Receive information

Students Apply their Learning

National Training Laboratories in Bethel, Maine

The Dale's Cone of Learning

AFTER TWO WEEKS WE
TEND
TO REMEMBER ...

10% of what we read   READING

20% of what we hear   HEARING WORDS

30% of what we see   LOOKING AT PICTURES   **PASSIVE**

WATCHING A MOVIE/VIDEOTAPE

50% of what we see and hear   LOOKING AT AN EXHIBIT

WATCHING A DEMONSTRATION

SEEING IT DONE ON LOCATION

70% of what we say   PARTICIPATING IN A DISCUSSION

GIVING A TALK

90% of what we say and do   DOING A DRAMATIC PRESENTATION   **ACTIVE**

SIMULATING THE REAL EXPERIENCE

DOING THE REAL THING

Adapted from: Edgar Dale *Audio-Visual Methods in Teaching*, Holt, Rinehart and Winston.

The Seven Principles for Good Practice in Undergraduate Education

1. Encourages Student-Faculty Contact
2. Develops Reciprocity & Cooperation Among Students
3. Uses Active Learning Techicques
4. Gives Prompt Feedback
5. Emphasizes Time on Task
6. Communicates High Expectations
7. Respects Diverse Talents and Ways of Learning

(Chickering & Gamson 1987)

How can ICT support it?

What is Active Learning?

- **Involving students** directly and actively in the learning process itself

- Involving students **practicing important skills and in applying new knowledge**.

- Students are given the opportunity to take a **more interactive relationship** with the subject matter of a course, encouraging them to **generate** rather than simply to receive knowledge.
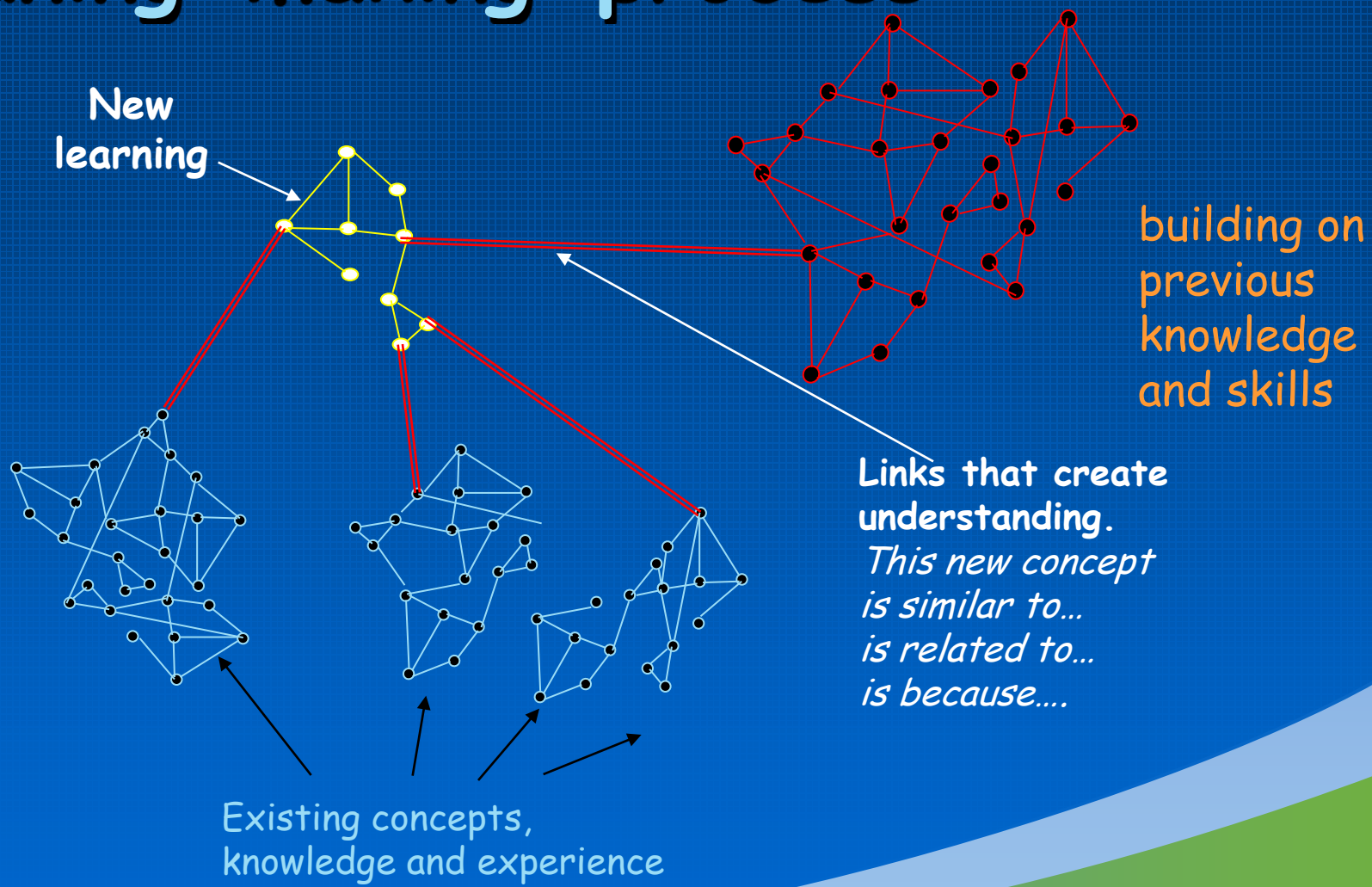
What is Active Learning?

- Emphazing more on developing students' higher order thinking skills
- Greater emphasis is placed on students' exploration of attitudes and values
- Teachers facilitate rather than dictate the students' learning.

Active Learning

Engaging students in doing something besides listening to a lecture and taking notes to help them learn and apply course material. Students may be involved in talking and listening to one another, or writing, reading and reflecting individually.

Active Learning occurs when teaching provides students with opportunities to learn independently and from one from one another another

Constructivism: Learning is a 'meaning-making' process

New learning

building on previous knowledge and skills

Links that create understanding.
This new concept is similar to… is related to… is because….

Existing concepts, knowledge and experience

Active Learning
=
Activity-based Learning

- Reading, Writing, Sketching, Drawing
- Solving problems, Trubleshooting
- Answering questions
- Formulating questions of their own
- Discussing
- Explaining, Interpreting, Critiquing
- Debating, Brainstorming
- Group working
- Case studies
- …

How can ICT support it?

Students are making their own choices and taking up responsibility of their learning process.

Collaborative Learning:

- *a subset of active learning activities that engage students in interacting with one another while learning and applying the course material.*

- *Usually it involves breaking the class into small groups (of 2 or 3 students) and teacher posing a question, often of a conceptual nature, and allowing each group to discuss a possible answer for a period of a minute or two. He/she then seeks answers at random.*

Benefits of Active and Collaborative Learning

In addition to the obvious advantages of **information retention**,

- Interaction: student-faculty, student-student
- Academic achievement (i.e., grades, more material learned, mastery learning)
- Communication skills
- Higher-level thinking skills
- Teamwork
- Attitude towards the subject and motivation to learn, enjoy the class more

Why it works?

- Individual students may get stuck on a problem and give up, whereas groups of students tend to keep going,
- Students become exposed to alternative problem-solving strategies,
- Students are much less fearful of generating and answering questions among themselves than individually and directly to the instructor in class,
- As McKeachie says, students learn best what *they* teach!

The best answer to the question, "What is the most effective method of teaching?" is that it depends on the goal, the student, the content, and the teacher. But the next best answer is, "students teaching other students."

Wilbert J. McKeachie
Author of *Teaching tips: Strategies, research and theory for for college and university teachers,* Houghton-Mifflin (1998).

Implementation of Active Learening

- PBL (Problem-Based Learning)

- PBL (Project-Based Learning)

- Peer Instruction

- Web-based Simulations

Problem Solving Includes:

- Posing, clarifying, and answering questions

- Posing, clarifying, and solving problems

- Posing, clarifying, and accomplishing tasks

- Posing, clarifying, and making decisions

- Using higher-order, critical, and wise thinking to do all of the above

Project-Based Learning (PBL)

- Students work individually or in teams over a period of time.

- Students produce a product, performance, or presentation.

- PBL is learner centered:

  - Teacher is "guide on the side."

  - Teacher **is not** "sage on the stage."

ICT-Based PBL Empowers Students and Teachers

- Teacher is immersed in an exciting learning environment designed to actively engage students.

- Teacher, as a "guide on the side," is both a teacher and learner, learning from and sharing with students.

- Students engage in projects that they help to define, are intrinsically motivated, and do activities where they can see the results.

E-Learning: Using Web in Learning

➤ **Resourceful:** Links to other web sites that are relevant to the course topic(s)

➤ **Instructional:** A combination of contents and learning activities

➤ **Integral:** Using Web for classroom teaching and learning functions.

– Posting syllabus online

– Posting lecture notes online

– Including additional resources

– Using Web-based conferencing for discussion or other activities

➤ **Fully online:** Using the Web to delivery a course

Why use the Web?

- Expand classroom boundaries
  - More information
  - Higher accessibility
  - Enhanced interactivity and interaction
- New teaching paradigm
  - Student-centred approach
  - Constructivist approach
  - Active, authentic cooperative learning
- Individualization of Instruction: Students have widely varying interests, abilities, talents, and rates of learning
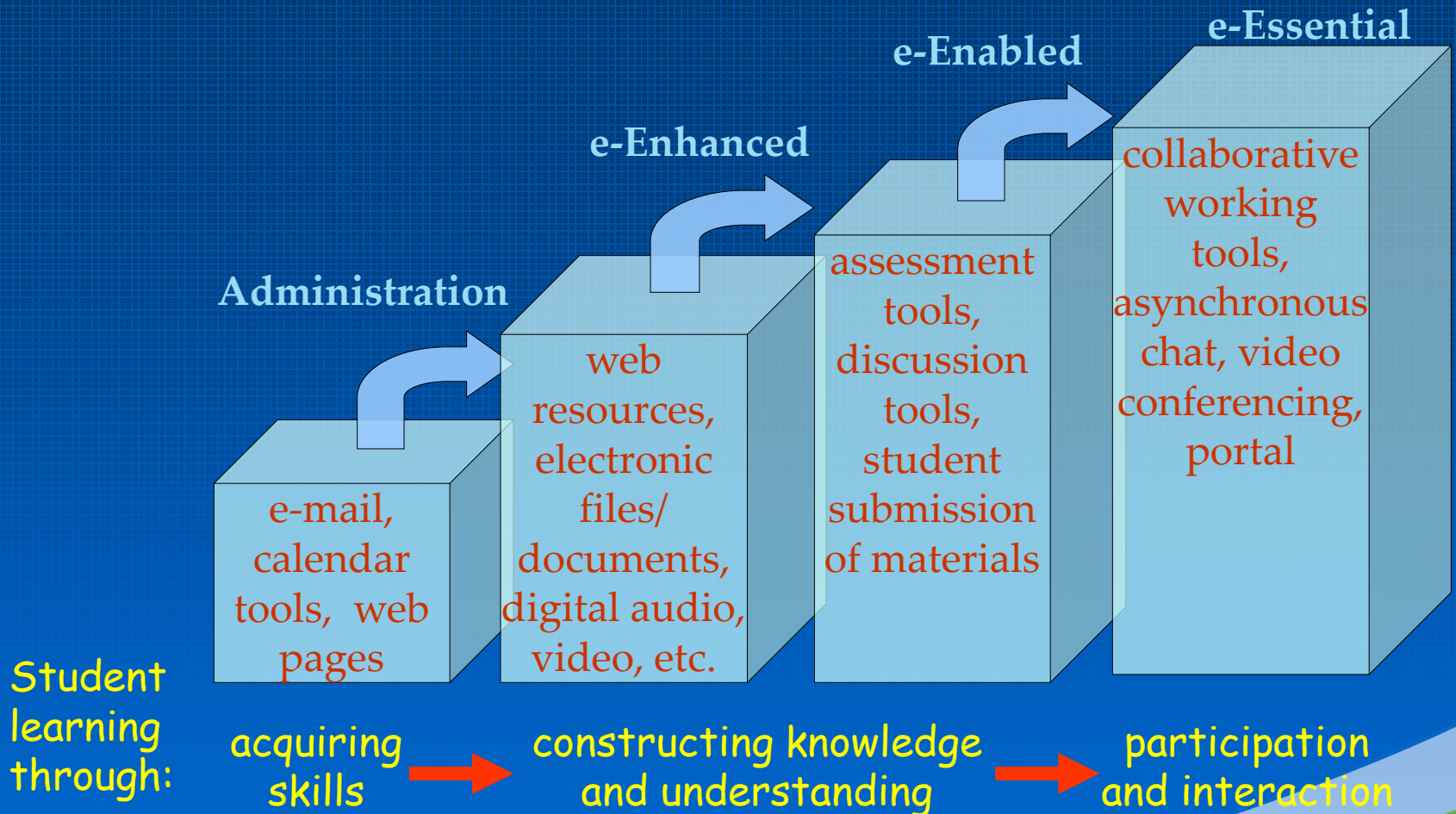- Bonus: Your teaching portfolio

What is E-Learning?

- Learning that use ICT (Web)
- The focus is on *learning activity*

"e-Learning exploits interactive technologies and communication systems to improve the learning experience. It has the potential to transform the way we teach and learn across the board. It can raise standards, and widen participation in lifelong learning. It cannot replace teachers and lecturers, but alongside existing methods it can enhance the quality and reach of their teaching."

(Towards a Unified e-Learning Strategy, DfES 2003)

E-Learning Framework

e-Essential

e-Enabled

e-Enhanced

Administration

collaborative working tools, asynchronous chat, video conferencing, portal

assessment tools, discussion tools, student submission of materials

web resources, electronic files/ documents, digital audio, video, etc.

e-mail, calendar tools, web pages

Student learning through:

acquiring skills → constructing knowledge and understanding → participation and interaction

(Center for Learning and Teaching, 2003 http://www.wlv.ac.uk/celt/oltips/3what.html)
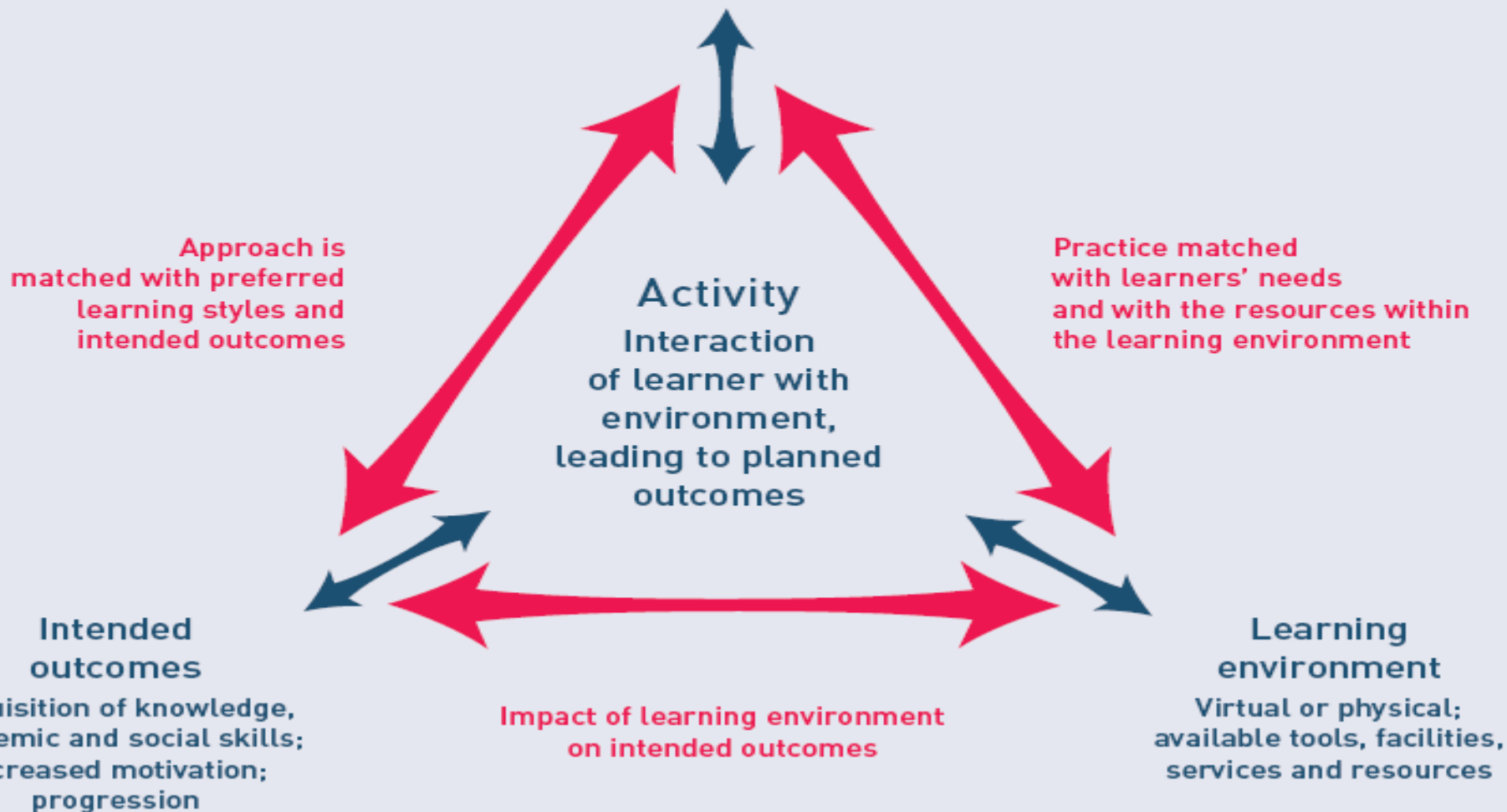
A model of learning activity design
(*JISC's Effective Practice with e-Learning Guide, 2004, p.15*)
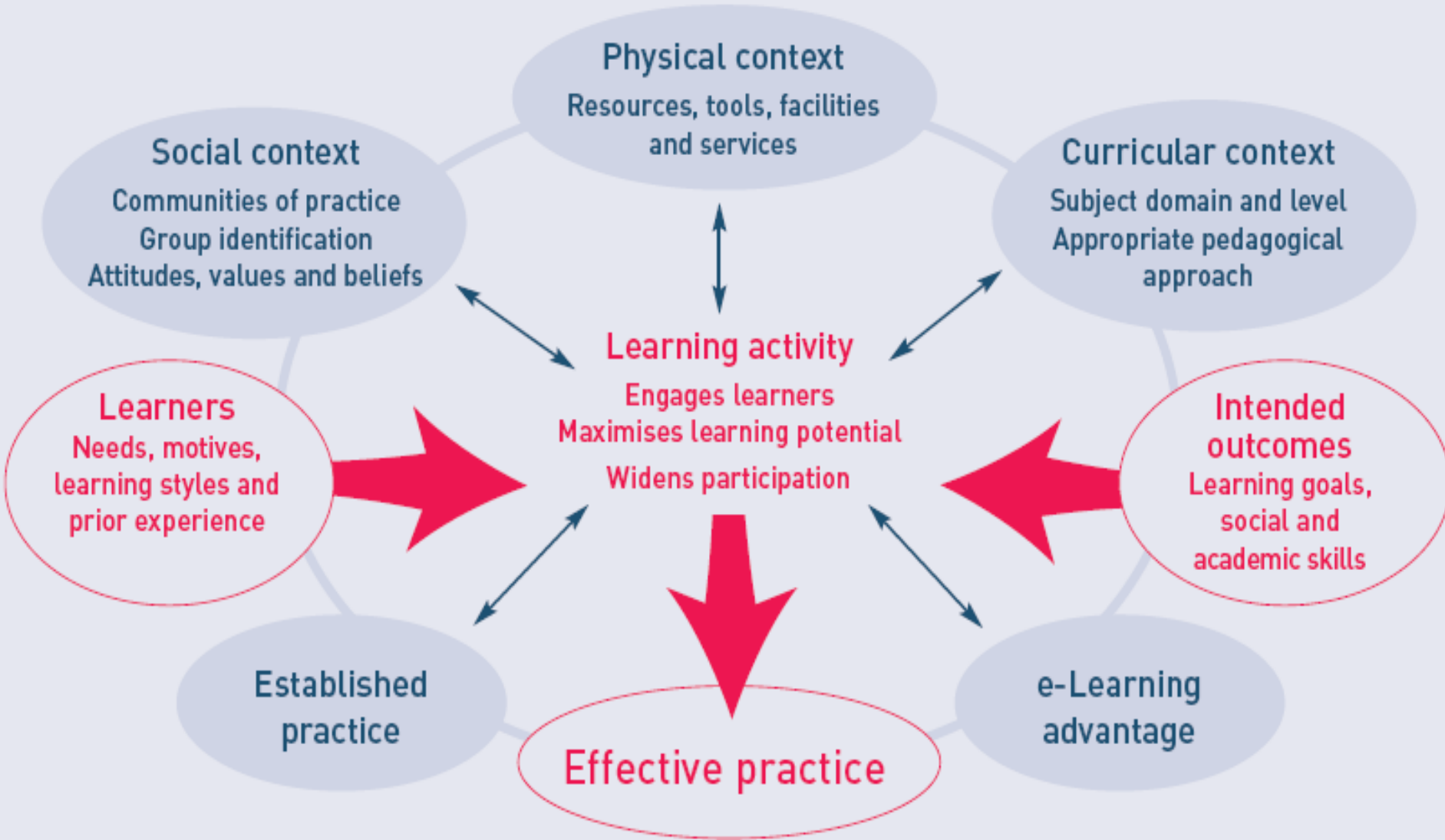
A model of effective practice with e-learning

(*JISC's Effective Practice with e-Learning Guide, 2004, p.49*)

Students need learning that is efficient and enjoyable, in a supportive environment:

- media are well matched to learning objectives
- active learning is supported through feedback
- an appropriate balance is achieved across the range
- methods are matched to study logistics and resources

Media forms	Methods/technologies
Narrative	Lecture, video, book, CD, Web
Interactive	Tutorial, Library, CD, Web
Communicative	Seminar, group, online conference
Adaptive	Laboratory, field trip, simulation
Productive	Essay, product, animation, Weblogs, Wiki

Adapted from Diana Laurillard, Open University, UK

Media & Effectiveness of Learning
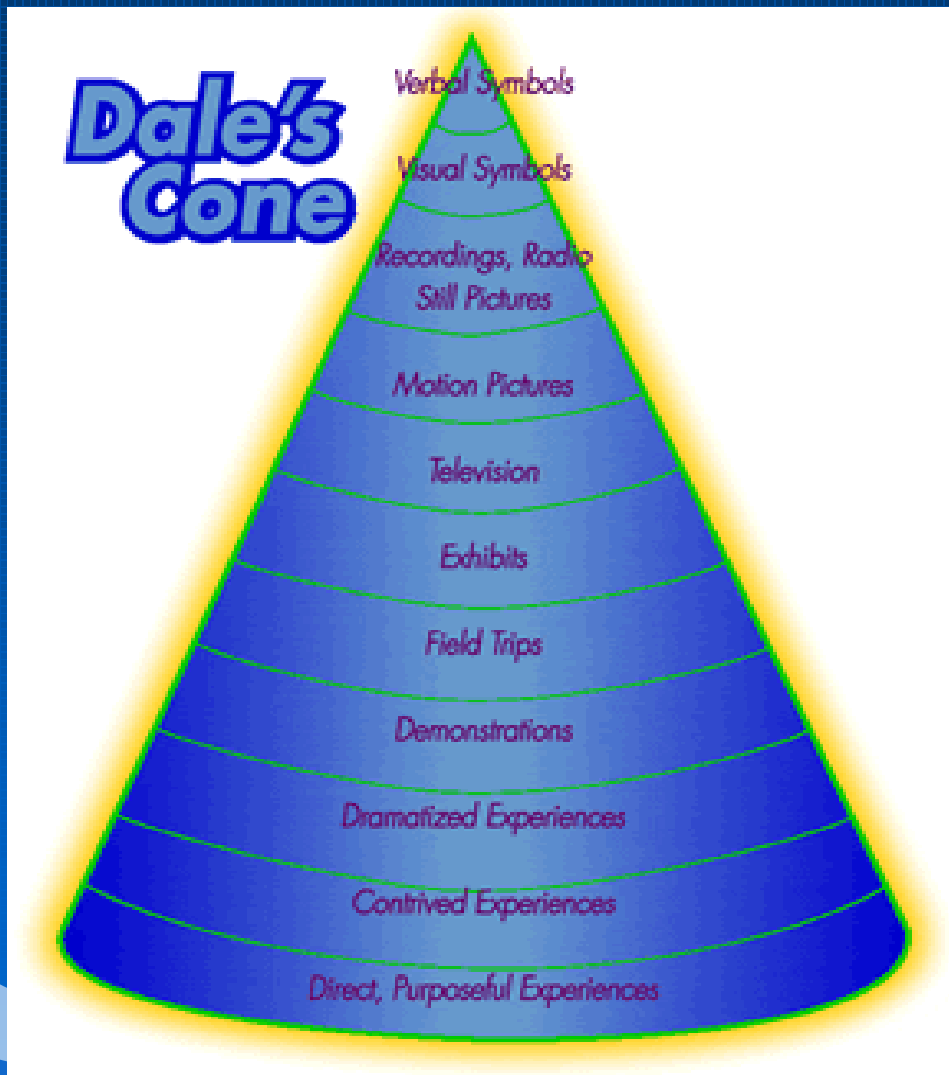
Based on research conducted by Edgar Dale in the 1960s:

The least effective method, the top of the cone, involves learning from information presented through verbal symbols, i.e., listening to spoken words.

The most effective method, the bottom of the cone, involves direct, purposeful learning experiences, such as hands-on or field experiences.

What is the 'appropriate balance'?

How best to distribute study time by guided, collaborative, individual modes, and across the five media forms?

Learning Activity	Media Forms	Lecturer		Student		Self		Total
		Normal	ICT	Normal	ICT	Normal	ICT	
Attend, Passive	Narrative							
Attend, Active	Interactive							
Discuss	Communicative							
Practice	Adaptive							
Articulate	Productive							
	Sub-total							
	Total							100

Consider efficiency of study time!

How can we build E-Learning system?

- Plan instructional activities
- Design a web site
- Use Learning Management System (LMS) – choose Commercial or Free?
  - Pay: WebCT, BlackBoard, etc.
  - Free: Moodle, Manhattan, Claroline, Dokeos, LON-CAPA, etc.
- Use some authoring tools: MS Word, LaTeX, PDF Maker, MS FrontPage, MS Power Point, Dreamweaver, etc.
- Use some assessment/survey software: Hot Potatoes, PHPSurvey, etc.

Designing a web site

- Analyze the audience
- Analyze the content
- Define objectives
- Storyboard it
- Use a tool (or tools) to develop the site (e.g. HTML editor, web-based conferencing)
- Testing and evaluation
- Revise the objective, content

Flowchart of Developing Web-based Course

```
Apply for              Instructional Analysis
Web-based Class
    |                           |
    v                           v
Log in                 Developing & Preparing
to the Class           Learning Object Materials (LOMs)
    |                           |
    v                           v
Configuring    <------   Program Mapping
the Class Tools
```

Managing Class Calendars | Uploading LOMs | Managing Students | Managing Communications | Managing Assignments/ Assessment

Arranging LOMs

Monitoring & Evaluation
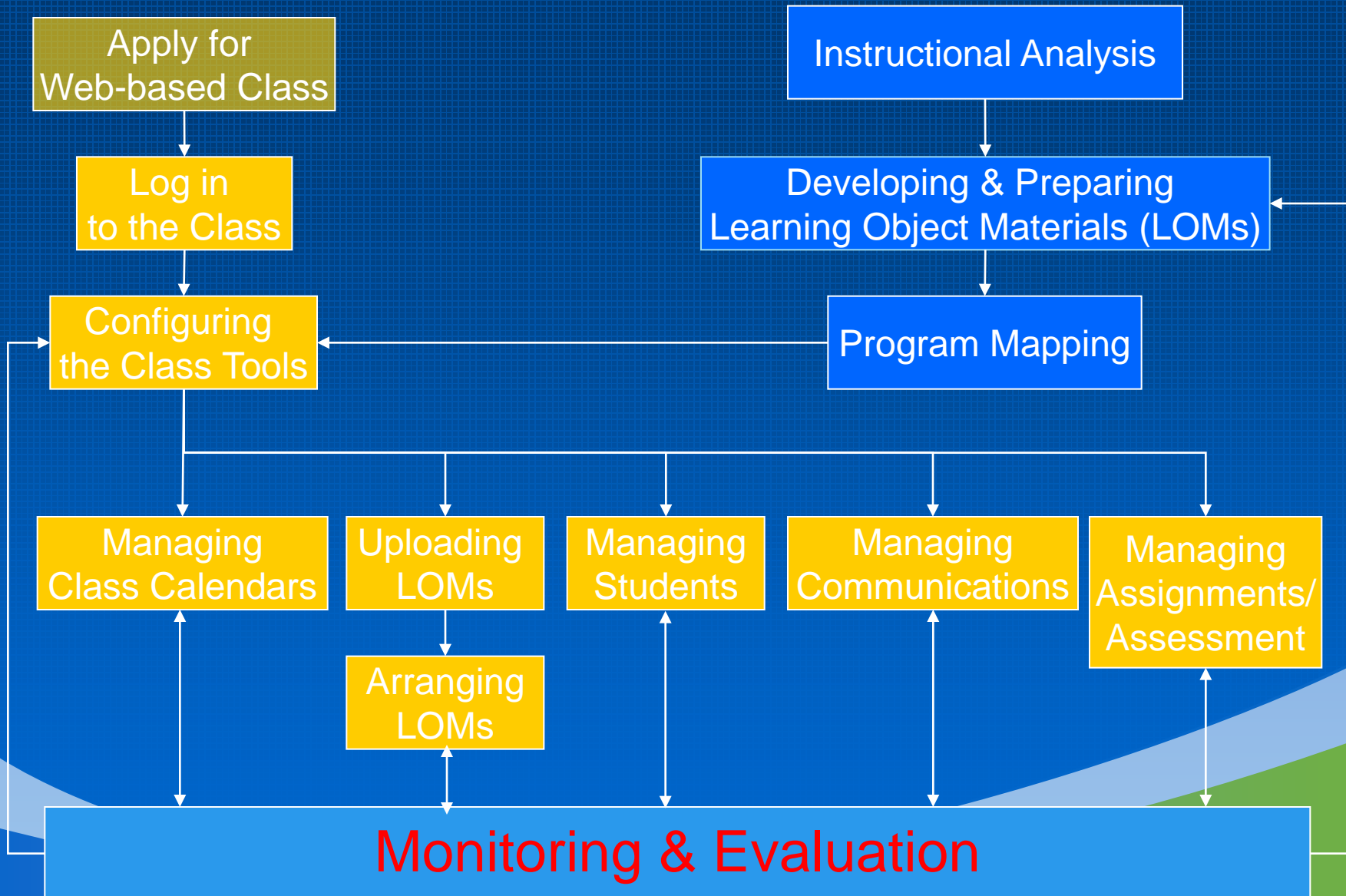
Selecting of E-Learning Tool

- Quality of product
- Extent and complexity of multimedia design ie use of media
- Interactivity
- Overall ease of use - navigation, aesthetics
- Collaborative capabilities
- Content delivery - tone of program
- Implementation costs
- Administration and management structure
- Security and monitoring facilities
- Open-standards based
- Scalable
- Application sharing

What do you need?

- Time and effort to plan a course
- Online teaching skills: coaching
- Instructional technology support

Resources available on campus

- Units
  - Academic Technologies for Learning (ATL)
  - Faculty-based Centers (e.g. Engineering TLC)
  - Technical Resource Group
- Technical Support
- Consultation on project planning, instructional design and evaluation

Resources available on campus

- Tools for building an educational web site
  - WebCT, WebBoard, FirstClass, etc. (pay)
  - Moodle, Manhattan, Claroline, Dokeos, etc. (free)
  - Web authoring programs (e.g. DreamWeaver, FrontPage, Netscape Composer, LaTeX)
- Why do you need these tools?
  - Use web conferencing
  - Create online interactive materials

Action Plan

- Case Scenario
- State the **rationales**
- List the **instructional objectives**
- Identify the **ways** to use the Web
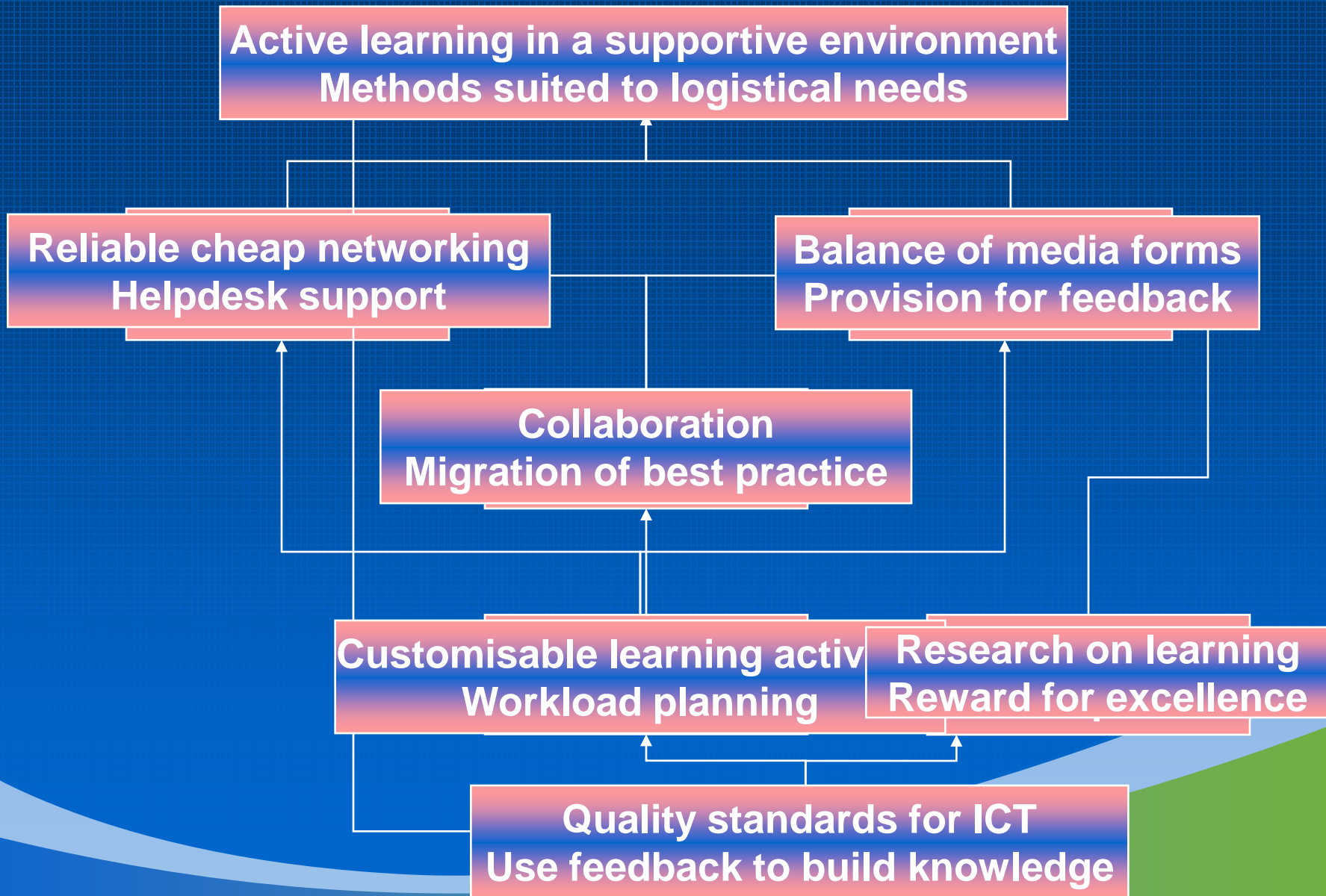
Don't forget...

- The Web is just one of the instructional technologies
- Follow the good teaching principles as guidelines for using the Web in your teaching
- Be clear about your objectives, be creative when planning your course
- Acquire necessary skills
- Resources for further information

Strategic Planning Overview

Where are we now?

(Audit, Analysis, Research)

The Strategic Gap

Too big to jump?

The Plan is the Bridge Over the Gap

Where do we want to be?
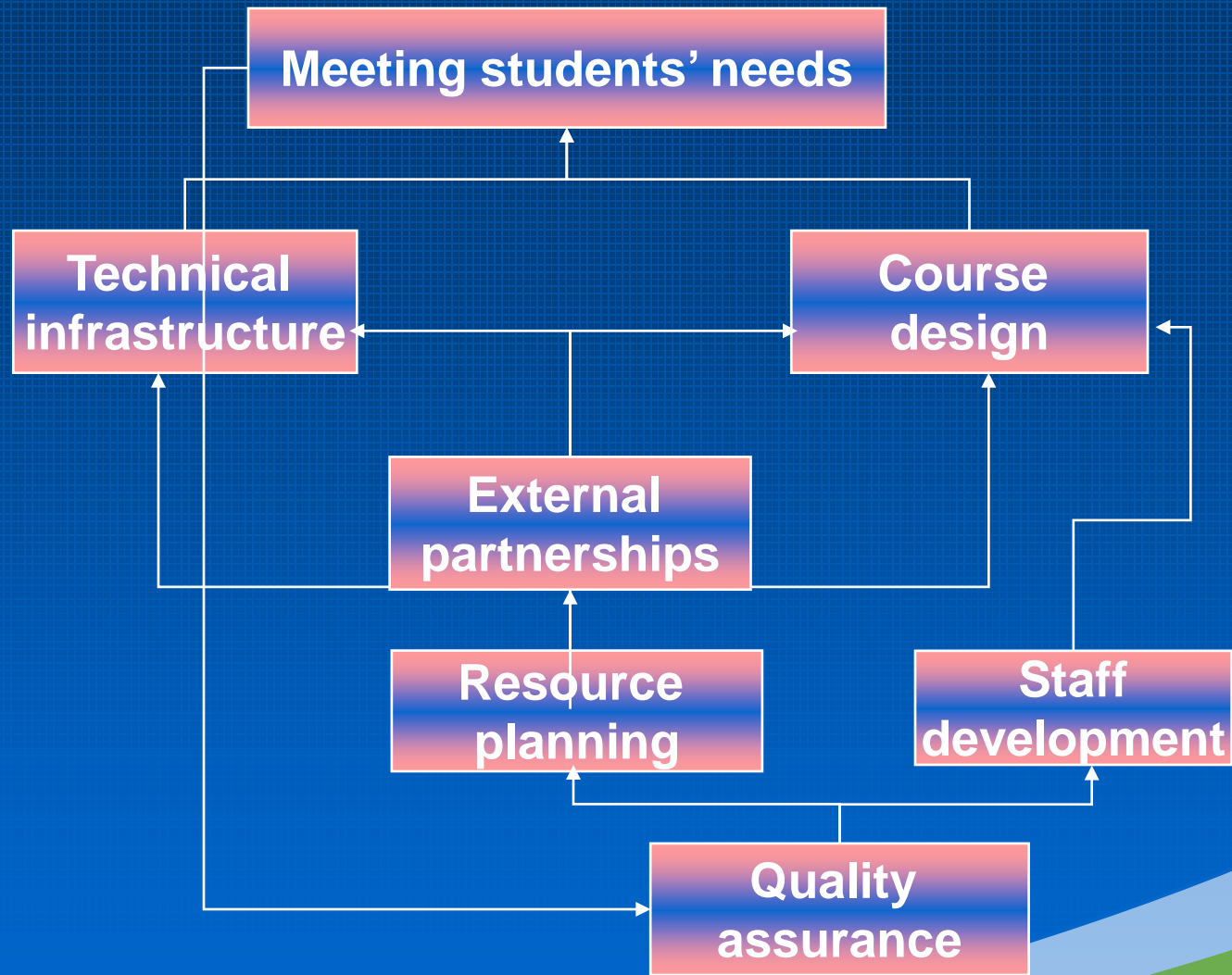
(Vision, Strategic Targets)

The Plan is made up of Projects in Stages over 3 to 5 years.
The Projects are assessed against Strategic Targets, prioritized and budgeted.
The Plan is regularly evaluated and refined.

Planning for learning technologies

**Active learning in a supportive environment
Methods suited to logistical needs**

**Reliable cheap networking
Helpdesk support**

**Balance of media forms
Provision for feedback**

**Collaboration
Migration of best practice**

Customisable learning activ
Workload planning

**Research on learning
Reward for excellence**

**Quality standards for ICT
Use feedback to build knowledge**

Planning for learning technologies

How to measure new learning results?

- New assessment methods
- Measure ability of knowledge reproduction → measure ability to apply knowledge in realistic settings.
- Closed format → Open formats (portfolio, performance assessment, etc.)
- Summative assessment → Formative assessment

Authentic Instruction and Authentic Assessment

- Instruction is authentic when it closely conforms to what we want students to learn to do

- Assessment is authentic when it closely conforms to having students do what we are preparing them to do

Authentic Instruction and Authentic Assessment for:

- Agricultural Age: *Hands-on, informal, learn by doing*

- Industrial Age: *Factory-like educational systems*

- Information Age

  - *Learning in and being assessed in an open computer, high connectivity environment*

  - *Learning to learn, to take responsibility for one's own learning, and to become a lifelong learner*

Assessment
(Authentic Assessment)

- Formative Assessment providing feedback to help improve quality of a project.

- Summative assessment after project is completed.

- Long term "residual impact" assessment and use in one's portfolio.

- Use of rubrics

- Intermediate goals: milestones.

- Self assessment.

- Peer assessment.

Formative assessment methods and Bloom's taxonomy.

Bloom's Taxonomy	Learning Skill	Learning Tool (Assessment Method)					
		Concep-test	Venn Diagram	Image Analysis	Concept Map	Open-ended Question	Evaluation Rubric
Knowledge	memorization and recall	•	•	•	•	•	•
Compre-hension	understanding	•	•	•	•	•	•
Application	using knowledge	•	•	•	•	•	•
Analysis	taking apart information		•	•	•	•	•
Synthesis	reorganizing information				•	•	•
Evaluation	making judgements					•	•

David A. McConnell, David N. Steer, Kathie D. Owens (2003)

Critical thinking question stems

Bloom's Taxonomy	Question Stems
Knowledge	What is...?
Comprehension	What would happen if...? What does...illustrate about...? What is analogous to...?
Application	How could...be used to...? What is another example of...?
Analysis	How does...affect...? What are the differences (similarities) between...? What causes...?
Synthesis	What is a possible solution for the problem of...? How does...relate to what we learned before about...?
Evalution	Why is...important? What is the best...and why? Do you agree/disagree that...?

Good teaching is ....

....good teaching.

However…

> "Good <u>technology</u> in the hands of poor teachers can do more harm than good!"

Good teaching may overcome a poor choice in the use of technology, but technology will never save bad teaching; usually it makes it worse.

A.W. Bates (1995), Technology, Open Learning and Distance Education

Thank You!

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