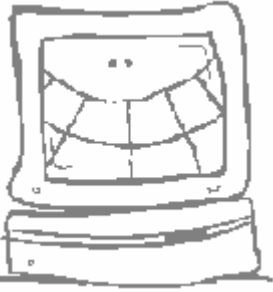


Evaluation of Distance Learning

Christina Steiner

4 May 2005

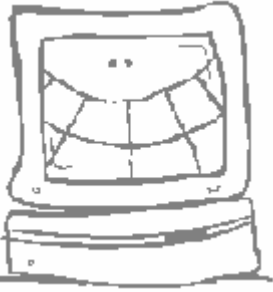
SE Technology Enhanced Learning:
Psychological Foundations and Current Trends



What is distance learning?

- any type of education that occurs while location, time, or both separate the participants
- the electronic delivery of courses or entire academic programs
 - internet, computer software, e-mail, television, video/audiotapes, video/audioconferencing



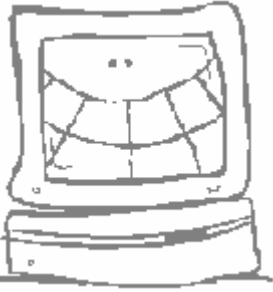


What is distance learning?

- distance learning includes
 - synchronous communication
 - ◆ teacher and student are present at the same time during instruction, even if they are in different places
 - asynchronous communication
 - ◆ student and teacher do not have a person-to-person direct interaction at the same time or place

- distance learning is used in
 - school education
 - higher education
 - adult education
 - organisations – for employee training

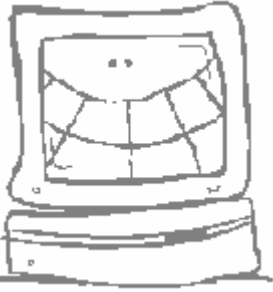




What is evaluation?

- the process by which people make judgements about value and worth
 - context of learning technology
 - ◆ examining the learning opportunities and experiences
 - ◆ judgements about effectiveness and value
 - ◆ educational value
 - ◆ pragmatics of introducing new teaching techniques and resources
 - ◆ judgements about the costs of such innovations

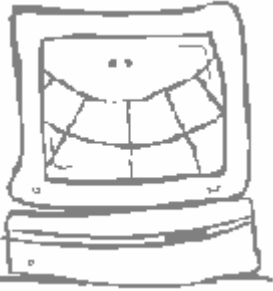




Why evaluate?

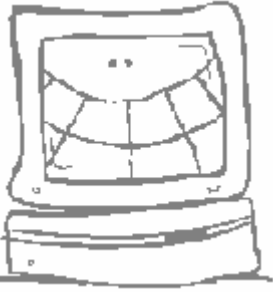
- provide information for future course design, planning and implementation
 - ensuring quality of distance learning
 - demonstrate educational effectiveness
 - e-learning involves high levels of investment that need to be justified
 - demonstrate cost effectiveness
- purposes of evaluation
- development
 - educational value
 - accountability and justification





Evaluation framework

- Kirkpatrick model
 - four level process for determining the effectiveness of training
 - ◆ Level 1: Reaction
 - ◆ measuring how participants react to or feel about a training program
 - ◆ Level 2: Learning
 - ◆ measuring the extent to which participants' knowledge, skills, and attitudes change as a result of training
 - ◆ Level 3: Behaviour
 - ◆ examining the extent to which change in behaviour occurred because of attending a training program
 - ◆ Level 4: Results
 - ◆ deriving final results that occurred because of attending a training program

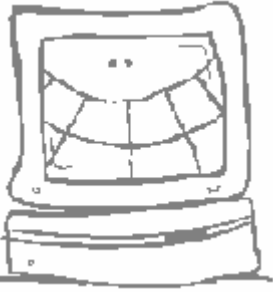


Planning an evaluation

1. identifying the purpose of the evaluation

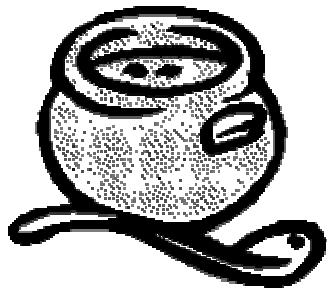
- purpose of the resource that is to be evaluated
 - ♦ e.g. „to establish whether a particular online course on maths would be an effective way of providing students with opportunities for extended practice in the subject“





Planning an evaluation

- identifying the type of evaluation
 - ◆ differentiated by timing and purpose
 - ◆ formative evaluation
 - collecting information about a prototype resource in order to improve usability, refine content, etc.
 - ◆ summative evaluation
 - takes place at the end of the development cycle, in order to demonstrate the effectiveness of the resulting resource

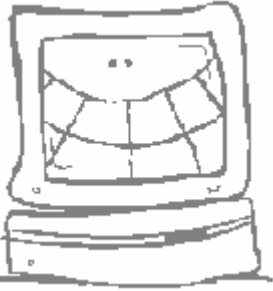


„When the cook tastes the soup,
it is formative evaluation;

when the dinner guest tastes the soup,
it is summative evaluation.“

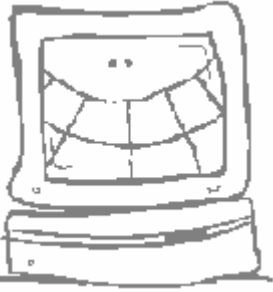
(Harvey, 1998)





Planning an evaluation

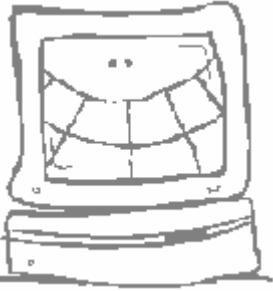
- ◆ other types of evaluation
 - ◆ diagnostic evaluation (needs analysis)
 - assessment of the current situation and how the resource may help
 - ◆ integrative evaluation
 - looks at how the resource can best be integrated with other resources
- ◆ evaluation paradigm
 - ◆ quantitative evaluation
 - focuses on measurement, is externally directed and value-free
 - e.g. student pass rates, student retention
 - ◆ qualitative evaluation
 - focuses on the educational process, is directed by the user and takes account of values
 - e.g. students comments
 - ◆ many current evaluations use a combination



Planning an evaluation

2. identifying stakeholders and their concerns
 - evaluation will depend on who it is being carried out for
 - ♦ e.g. students, teachers, developers, lecturers, managers

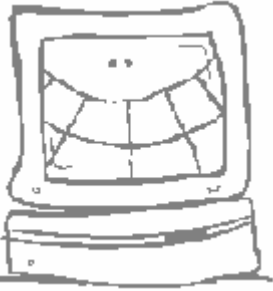
3. considering the budget
 - planning how much can be done within the available budget
 - key factors in determining time and costs
 - ♦ instruments to collect data
 - ♦ methods to analyse data



Planning an evaluation

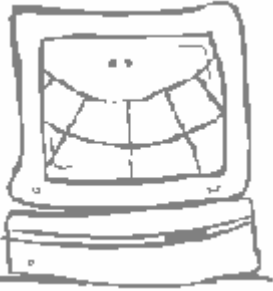
4. choosing the evaluation questions

- break down an overarching question into more detailed questions
- common questions
 - ♦ evaluating the pedagogical effectiveness of technology
 - ♦ comparing traditional and e-learning methods
 - ♦ evaluating the use of technology
 - ♦ evaluating cost-effectiveness



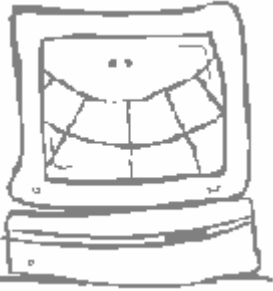
Planning an evaluation

- e.g. „Is the given online course on maths an effective way of giving students further practice in this subject?“
 - ♦ Do users learn from this resource?
 - ♦ Do users like using the resource?
 - ♦ Given a choice, do users make use of the resource?
 - ♦ How easy is it to use?
 - ♦ Is the content of high quality?
 - ♦ What hardware is required and is this available to the intended users?
 - ♦ Do the intended users have the necessary level of computer skills?
 - ♦ What are the costs of running the course?



Carrying out an evaluation

- having decided the ,what‘ of an evaluation, the next step will be to decide on the ,how‘
5. choosing evaluation instruments
 - suitable for the established evaluation questions
 - a well-designed evaluation will incorporate a mix of techniques
 - ◆ quantitative and qualitative methods
 - ◆ build up a coherent picture
 6. applying evaluation instruments
 - collecting data

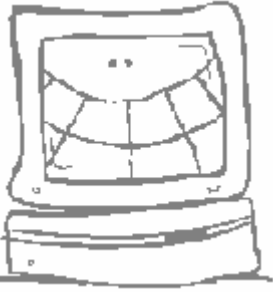


Evaluation instruments

a) interviews

- ◆ „interviews are conversations where the outcome is a coproduction of the interviewer and the interviewee" (*Kvale, 1996*)
- ◆ get perspectives on the evaluation targets from a sample of 'users' representing different stakeholder groups
- ◆ for gathering in-depth data from small numbers of people
- ◆ best used to collect opinion rather than fact

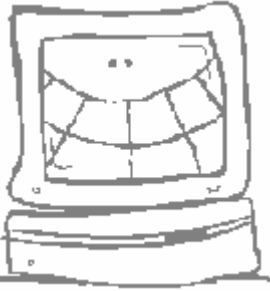




Evaluation instruments

- ♦ vary according to how structured they are
 - ♦ structured
 - easier to record parallel data from all interviewees
 - ♦ unstructured
 - possible to catch responses that were not anticipated by the evaluators
- ♦ collecting issues which can later be measured with a questionnaire
- ♦ clarification about ambiguous replies to questionnaires





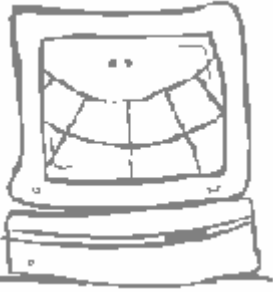
Evaluation instruments

- ♦ example for an evaluation interview protocol



Name: _____ Interviewer: _____ Date: _____

- Please describe your use of the XYZ since the "XYZ Training" IMM course?
- Please describe your present opinions of "XYZ" IMM course.
- Do you need additional training for the "XYZ"?
- What would you tell another person about to take the "XYZ" IMM course for the first time?
- What kinds of successes have you experienced with the "XYZ" since the training?
- What kinds of problems have you experienced with the "XYZ" since the training?
- What improvements would you recommend for the "XYZ Training" IMM course overall?
- ...

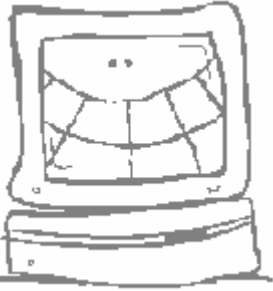


Evaluation instruments

b) focus groups

- ◆ moderated meetings of ,involved' people discussing their experience of an educational intervention
- ◆ can elicit a wider range of views than individual interviews
- ◆ obtaining large amount of interactive information
 - ◆ easily
 - ◆ within a short time



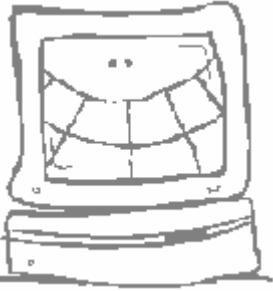


Evaluation instruments

c) questionnaire

- ◆ most frequently used type of evaluation instrument
- ◆ suitable for inquiring large numbers of people
- ◆ data can be gathered within a short time
- ◆ question formats
 - ◆ closed questions
 - allow limited range of answers
 - require the designers to anticipate the likely responses
 - ◆ open questions
 - require more thinking and time on the part of the respondent
 - are less likely to be answered
- ◆ limited in the kind of data they can gather



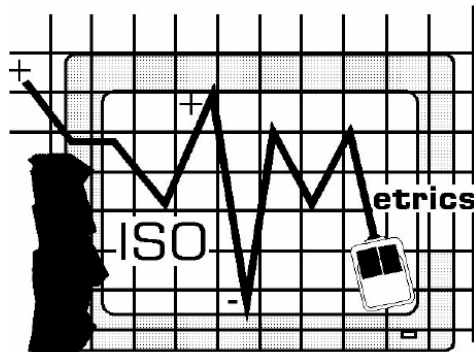


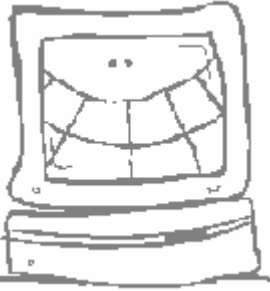
Evaluation instruments

- ♦ example

- ♦ IsoMetrics

- questionnaire for the evaluation of graphical user interfaces
 - based on ISO 9241/10: Ergonomic Requirements for Office Work with Visual Display Terminals – Part 10: Dialogue Principles
 - * suitability for the task
 - * self descriptiveness
 - * conformity with user expectations
 - * error tolerance
 - * suitability for individualisation
 - * suitability for learning



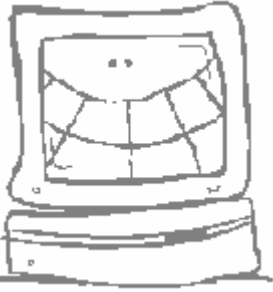


Evaluation instruments

- ♦ example
 - ♦ IsoMetrics



		Pre-dominantly disagree		So - so		Pre-dominantly agree	
Index	suitability for the task	1	2	3	4	5	No opinion
A.1	The software forces me to perform tasks that are not related to my actual work.						
A.3	The software lets me completely perform entire work routines.						
A.4	The functions implemented in the software support me in performing my work.						
A.6	The way in which data is entered is suited to the tasks I want to perform with the software.						
A.7	I perceive the arrangement of the fields on-screen as sensible for the work I do with the software.						



Evaluation instruments

- ♦ example
 - ♦ questionnaire with ,open‘ questions

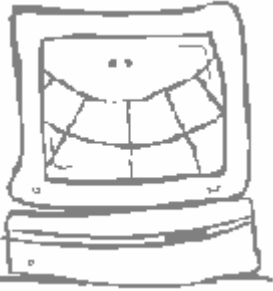


Finally, please give us your views on using CBL packages to learn mathematics

a) What drawbacks do you see in using CBL?

b) Can you suggest ways of overcoming these drawbacks?

c) What benefits do you see for using CBL?

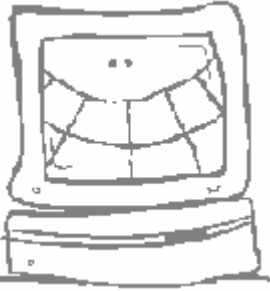


Evaluation instruments

d) observation

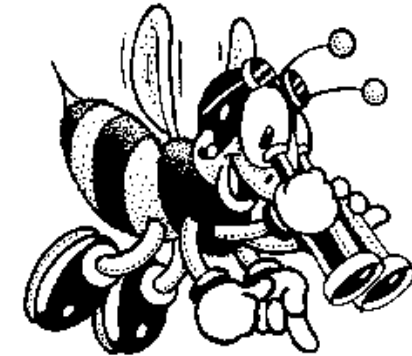
- ◆ evaluators observe users at work with the resource
- ◆ deriving information regarding
 - ◆ navigation
 - ◆ anomalies in the content
 - ◆ impact on behaviour
- ◆ helpful: checklist or structured observation sheet
 - ◆ increase likelihood of receiving specific and valuable feedback



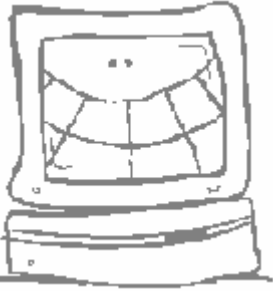


Evaluation instruments

- ♦ example of an observation sheet



<u>Evaluation Exercise</u>			
Date:		Institution:	
Lecturer:		Evaluator:	
Hardware:		Program:	
Student Name(s):		Time:	
<u>Observation Log</u>			
CODE for interactions:			
TS	=	Teacher to Student	SS = Student to Student
GD	=	Group Discussion	SC = Student to Computer
GC	=	Group to Computer	SI = Student Individually
#	Time	Code	Comment

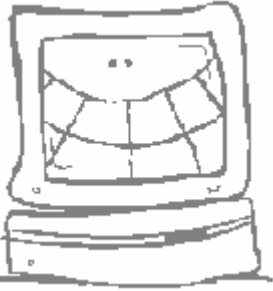


Evaluation instruments

e) think-alouds

- ◆ closely related to observations
- ◆ users are asked to describe their thought processes while using the resource

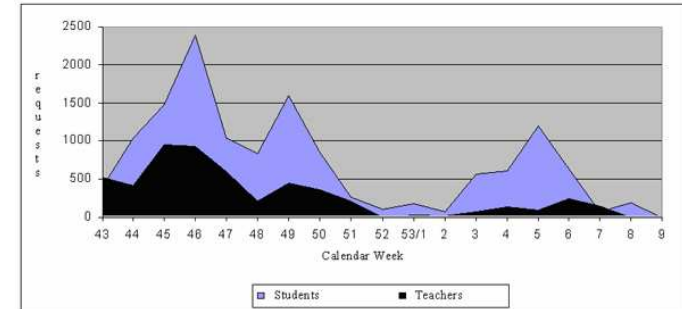


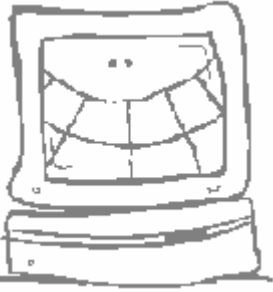


Evaluation instruments

f) system log data

- ◆ recording of user interaction with a particular resource
- ◆ information regarding
 - ◆ user preferences
 - ◆ navigational choices
- ◆ log data
 - ◆ objective measure
 - ◆ use patterns, usability, integration strategies, perceived usefulness of courseware
 - ◆ does not answer ,why‘ questions

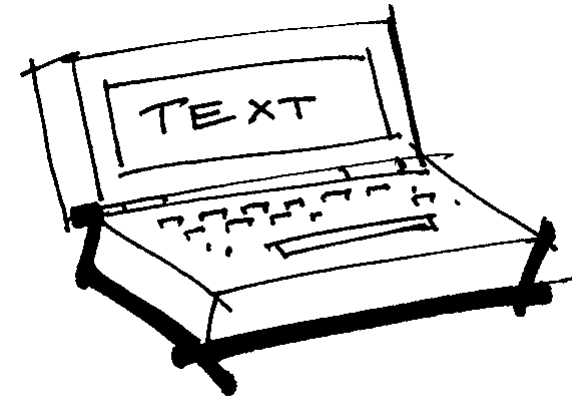


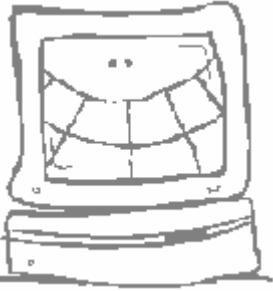


Evaluation instruments

g) textual data

- ◆ analysis of text resulting from learning activities, e.g. email
- ◆ information regarding
 - ◆ student participation
 - ◆ student interaction
 - ◆ effect on learner's thinking of a given intervention

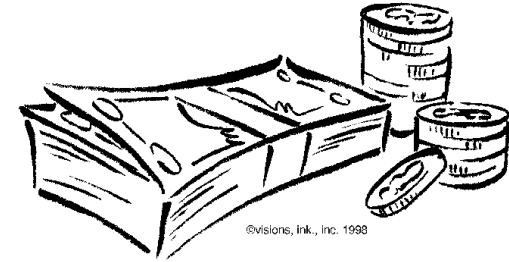




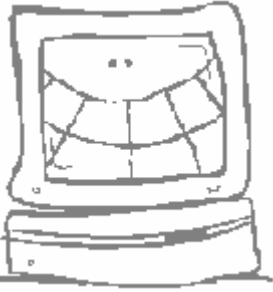
Evaluation instruments

h) cost analysis

- ♦ assessing costs of creating, implementing or using the resource
- ♦ any educational intervention has an outcome and a cost
 - ♦ a measure of the cost effectiveness is obtained by measuring costs against outcomes
 - ♦ example for a commonly used financial tool to determine the cost effectiveness of a training program
 - cost-to-benefit ratio (CBR)

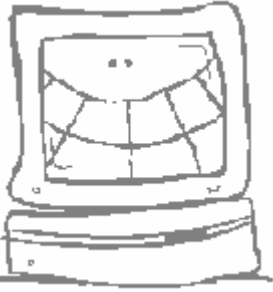


$$\text{CBR} = \frac{\text{program benefits}}{\text{programm costs}}$$



Working with the results

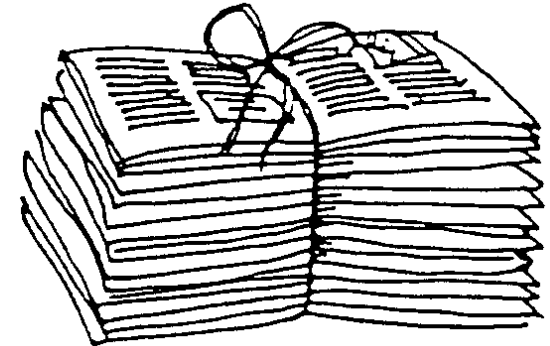
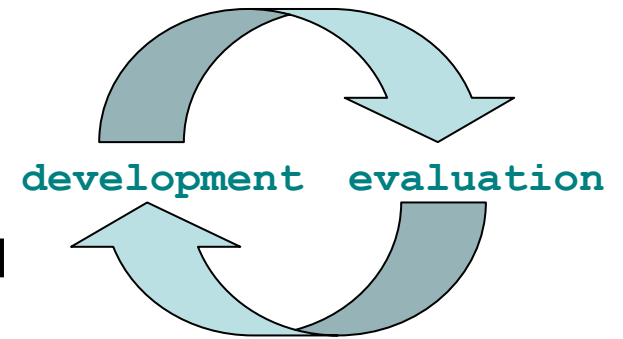
7. choosing data analysis method and
8. analysing the data
 - quantitative data analysis
 - ♦ statistical outputs
 - ♦ e.g. t-tests, analysis of variance, chi square...
 - qualitative data analysis
 - ♦ qualitative data may include transcripts from interviews or focus groups
 - ♦ on a small scale, the data can be reviewed manually
 - blending qualitative and quantitative data
 - ♦ synergy effects

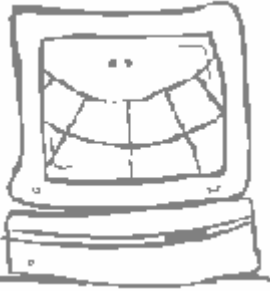


Working with the results

9. using and presenting the results

- evaluation in the developmental cycle
 - ◆ to ensure that evaluation data is used effectively, it needs to be fed into the developmental process
- dissemination of the results
 - ◆ results of evaluations will frequently be of interest to others using or developing similar resources





Summary: stages of an evaluation process

1. Identify the purpose of the evaluation



2. Identify stakeholders and their interests



3. Consider your budget



4. Choose eval. questions



5. Choose evaluation instruments



6. Apply instruments /
Collect data



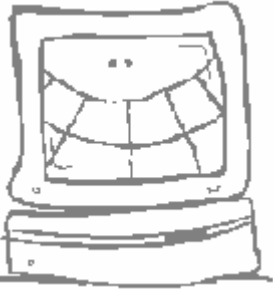
7. Choose data analysis method



8. Analyse the data

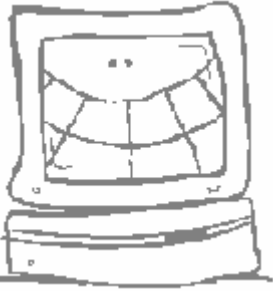


9. Use and present the results



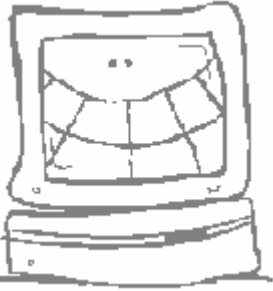
Help for planning an evaluation

- a range of resources to help with the planning of evaluations is available
 - toolkits
 - ◆ advice about how to approach the process
 - ◆ pros and cons of various methods
 - ◆ do not decide on the best approach
 - ◆ examples
 - ◆ LTDI Evaluation Cookbook
 - ◆ Online Evaluation Toolkit
- notice: every evaluation is different and there is no universally applicable method



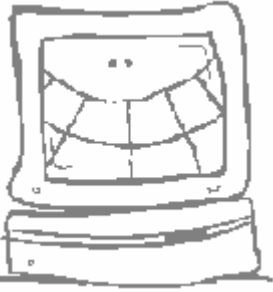
Educational effectiveness of distance learning

- extensive amount of articles and studies on educational effectiveness
- No Significant Difference Phenomenon Web Site (*Russell & IDECC*)
 - research bibliography on distance education
 - No Significant Difference Phenomenon
 - ◆ e.g. Effective Student Outcomes: A Comparison of Online and Face-to-Face Delivery Modes (*Carey, 2001*)
 - ◆ „analysis of the data suggests that online students are gaining knowledge comparable to the face-to-face students and that online students are as satisfied on most dimensions as the face-to-face students“



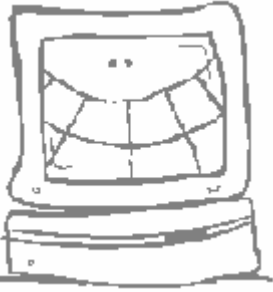
Educational effectiveness of distance learning

- Significant Difference Phenomenon
 - ◆ examples
 - ◆ Effect of Computer-Based Instruction on Performance in Physics (*Thomas, 2001*)
 - „analysis ... revealed significantly higher performance for the experimental group (computer/traditional instruction) than for the control group (traditional instruction only)“
 - ◆ Investigating Computer Mediated Instruction in a Greek State Lykeio (*Hartzoulakis, 2002*)
 - „the study found statistically significant differences favouring traditional teaching methods...“



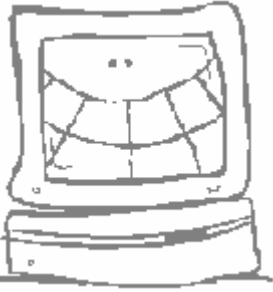
Educational effectiveness of distance learning

- The Institute for Higher Education Policy (1999)
 - review of contemporary research on the effectiveness of distance learning in higher education
 - ◆ reviewing the findings of research
 - ◆ identifying the gaps in research
 - ◆ discussing implications for research
 - review focused on original research
 - ◆ experimental, descriptive, correlational and case studies



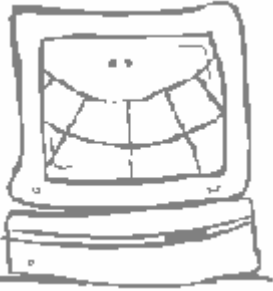
What does the research say about the effectiveness of distance learning?

- measures of effectiveness of distance education
 - student outcomes
 - ◆ grades, test scores
 - student attitudes about learning through distance education
 - overall student satisfaction toward distance learning
- findings
 - learning outcomes of distance learning are similar to that of conventional classroom instruction
 - attitudes and satisfaction of students using distance learning are generally positive



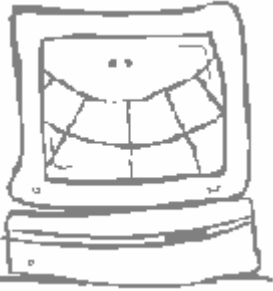
What are the shortcomings of the research?

- overall quality of research is questionable
- findings of the research must be read with some caution
- several key shortcomings could be identified



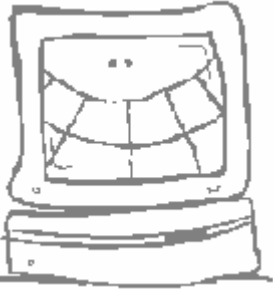
What are the shortcomings of the research?

1. much of the research does not control for extraneous variables and therefore cannot show cause and effect
 - experimental research, where the outcomes of a control group are compared with the outcomes of an experimental group
 - specific technology → cause
impact on learning outcome / attitude → effect
 - most studies: inadequate control of extraneous variables
2. most of the studies do not use randomly selected subjects
 - use of intact groups for comparison purposes



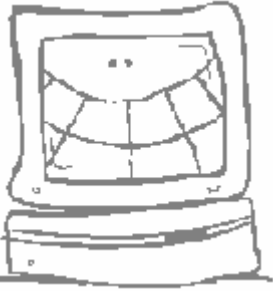
What are the shortcomings of the research?

3. the validity and reliability of the instruments used to measure student outcomes and attitudes are questionable
 - important component of good educational research: proper measurement of learning outcomes and/or students attitudes
 - in almost all of the studies information regarding reliability and validity of the instruments was lacking
4. many studies do not adequately control for the feelings and attitudes of the students and faculty
 - ,reactive effects‘
 - Novelty Effect
 - John Henry Effect



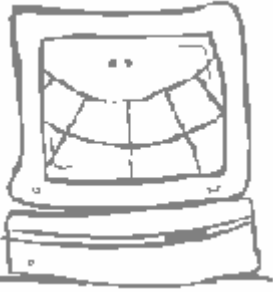
What are the gaps in research?

- important issues that require further investigation and information
 1. the research has tended to emphasize student outcomes for individual courses rather than for a total academic program
 - lack of studies dedicated to measuring the effectiveness of total academic programs taught using distance learning
 2. the research does not take into account differences among students
 - there is a wide variance in achievement and attitudes within groups



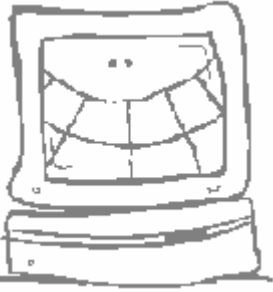
What are the gaps in research?

3. the research does not adequately explain why the drop-out rates of distance learners are higher
 - evidence that a higher percentage of students participating in a distance learning course tend to drop out before the course was completed compared to conventional classroom courses
4. the research does not take into consideration how the different learning styles of students relate to the use of particular technologies
 - information regarding students' preferred learning style would influence course design and type of technology to be used



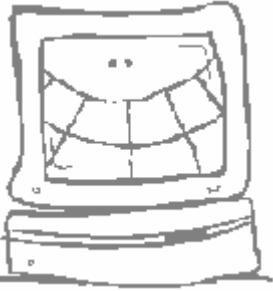
What are the gaps in research?

5. the research focuses mostly on the impact of individual technologies rather than on the interaction of multiple technologies
 - few studies examine more than one technology and synergistic effects
6. the research does not include a theoretical or conceptual framework
 - need of a more integrated, coherent, and sophisticated program of research based on theory
7. the research does not adequately address the effectiveness of digital libraries



What are the implications for further research?

- implications that can be derived from the review
 - future research needs to take into account
 - ◆ shortcomings
 - ◆ gaps
 - of current research on the educational effectiveness of distance learning
 - technology cannot replace the human factor in higher education
 - many of the results seem to indicate that technology is not nearly as important as other factors, such as learning tasks, learner characteristics, student motivation, and the instructor

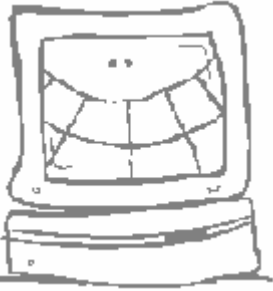


What are the conclusions that can be drawn from the review?

- research on distance learning has still a long way to go
- technology has helped to focus on the essential goals of teaching and learning
- the key question that needs to be asked

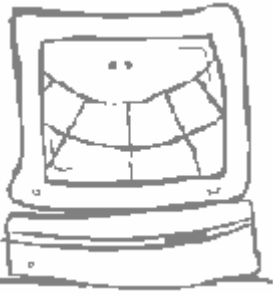
What is the best way to teach students?





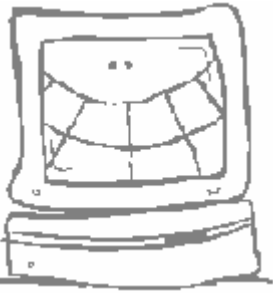
Quality in e-learning from a learner's perspective

- „e-learning has to be based on the learner“
(*Ehlers, 2004*)
 - needs of the learners have to be determined
 - future quality development in e-learning has to be oriented at the learners' needs and situation
 - ◆ no general criteria or same guidelines for all learners
 - ◆ individual learning services according to a learner's subjective preference profile

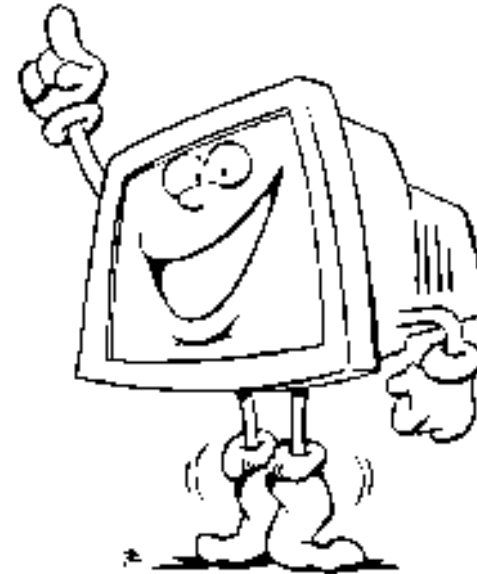


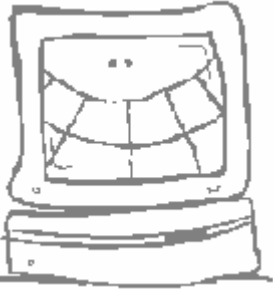
“distance education
is just like any other form of education;
it can be done well or badly”





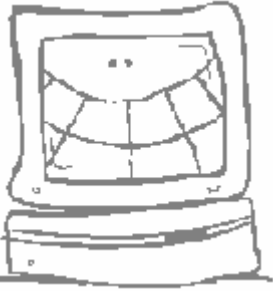
**THANK YOU FOR
YOUR ATTENTION!**





References

- Cook, J. (2002). Evaluating Learning Technology Resources. LTSN Generic Centre.
available at: <http://www.alt.ac.uk/docs/eln014.pdf>
- Dempster, J. (2004). *Evaluating E-Learning*. Centre for Academic Practice, University of Warwick.
available at:
http://www2.warwick.ac.uk/services/cap/resources/eguides/printing/g1_print.pdf
- Ehlers, U.-D. (2004). Quality in e-Learning from a Learner's Perspective. In: Proceedings of 3. EDEN Research Workshop 03/2004, Oldenburg.
available at:
http://www.euodl.org/materials/contrib/2004/Online_Master_COPs.html
- Harvey, J. (1998). *LTDI Evaluation Cookbook*. Learning Technology Dissemination Initiative.
available at: <http://www.icbl.hw.ac.uk/ltdi/cookbook/cookbook.pdf>
- Harvey, J., Higgison, C., & Gunn, C. (2000). Evaluation. In C.A. Higgison (Ed.) *Online Tutoring e-book*. Heriot-Watt University and The Robert Gordon University.
available at: <http://otis.scotcit.ac.uk/onlinebook/>
<http://otis.scotcit.ac.uk/onlinebook/otis-t5.htm> (Chapter 5 - Evaluation)



References

- Oliver, M. (2000). An introduction to the Evaluation of Learning Technology. *Educational Technology & Society*, 3, 20-30.
available at: http://ifets.ieee.org/periodical/vol_4_2000/intro.zip
- The Institute for Higher Education Policy (1999). What's the Difference? A Review of Contemporary Research on the Effectiveness of Distance Learning in Higher Education.
available at: <http://www.ihep.org/Pubs/PDF/Difference.pdf>
- Wentling, T.L., Waight, C., Gallaher, J., La Fleur, J., Wang, C., & Kanfer, A. (2000). *e-learning – A Review of Literature*. Knowledge and Learning Systems Group, University of Illinois.
available at: <http://learning.ncsa.uiuc.edu/papers/elearnlit.pdf>
- Russell, T.L. & International Distance Education Certification Center. No Significant Difference Phenomenon Web Site.
<http://www.nosignificantdifference.org>
- Willumeit, H., Hamborg, K.C. & Gediga, G. *IsoMetrics Questionnaires* a back issue (version 2.01) is available at: <http://www.isometrics.uni-osnabrueck.de/qn.htm>
- Online Evaluation Toolkit <http://www.ltss.bris.ac.uk/jcalt/>