

APPROACHES TO THE EVALUATION OF eLEARNING

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ABSTRACT

The development of eLearning is a rapidly expanding area of education and it has become a phenomenon in the learning and knowledge society of the 21st century. Many schools – from basic to universities have adopted some learning management systems and have gained much experience with this way of learning. But there are currently not reported many results of studies in the area of evaluation. There exist some results from the research evaluating the effectiveness of study by means of eLearning in comparison with classical method of study. According to our understanding it is necessary to accept a system approach and attempt to evaluate eLearning study. In the paper we determine major subsystems and prepare their analysis.

KEYWORDS

eLearning, evaluation of eLearning, Kirkpatrick's model of evaluation, information and communication technology (ICT), system approach

INTRODUCTION

As the landscape of eLearning continues to change we are faced with the challenge of balancing the chaos of creativity with the power of analytics to develop quality solutions on-time and under budget.

George Nikaronov

Many eLearning courses and programmes have been developed at the University of Ostrava since the year 2000. They can be described from various views:

- different study level: graduate, postgraduate;
- different length of duration: short-term, long-term;
- different ages: compulsory education, universities, long life learning;
- different specialisations: natural science, humanistic, social science;
- different types of learning: full-time, distance, blended;
- different proportion of classical and eLearning part of learning

but particularly different quality of courses and different efforts with preparation of these courses. We can specify many other “differents”, of course.

The number of courses, study materials, ways of management, experiments and finished solutions were considerable. There evolved a general understanding that there is no single optimum method for an effective eLearning course. The development and testing of these courses were not only at the University of Ostrava but at many high school in the Czech Republic as well.

We gained lots of experience both positive and negative:

- how to get ready and how to work with eLearning study text;
- how to train tutors;
- how to work with students;
- how to manage study process;
- how to choose Learning Management System (LMS) etc.

A large number of enthusiastic teachers spent much effort and they produced many study texts. We can find a lot of duplicity in titles. Recently the digital database of learning objects DILLEO was created and now the metadata about developed study materials are stored there (DILLEO, 2004). Those interested in new educational texts may find out if the demanded texts already exist or not by accessing the DILLEO site.

We have not only generated many different courses for different types of study, we have tested many Learning Management Systems as well: WebCT, Click 2 learn, Learning Space, eLearn, Working Place and Moodle. We bought them, we learned how to handle them and we filled them with information. Much money, time and enthusiasm was expended and to no use. The positive result from our efforts may be our understanding that “there is no best way”.

The amount of students in eLearning courses will increase both in the absolute number (the life long learning) and in the relative number to those in classical forms of learning. Many of the eLearning elements we can now find not only in distance learning but in full-time traditional courses as well.

We have experience with many eLearning courses, programmes and students, which were both positive and negative. Many of them were presented and described at conferences. Some of them can be found in the conference proceedings “From programmed instruction to eLearning” (Kapounová, ed., 2005).

We accepted the philosophy ADDIE (Analysis–Design–Development–Implementation–Evaluation) in instructional system design (Clark, 2000). The situation for the development and use is favourable at present and eLearning enjoys a great interest from official posts. It is very important not to lose a starting point and to find the way of creating effective courses of good quality.

We presume that the best way to prepare the methodology for evaluation of eLearning should be a system approach. We review many theoretical studies and examples of good practice. For our purposes we prefer the following theoretical works:

- Kirkpatrick’s Four Levels of Evaluation (Winfrey, 1999)
- A Framework for the Evaluation of eLearning (Huges, Attwell, 2002)

THEORETICAL BASIS

Kirkpatrick’s Four Levels of Evaluation – reviews

Donald Kirkpatrick’s four-level model of evaluation can be applied to technology-based training as well as to more traditional forms of learning. In Kirkpatrick’s four-level model, each successive evaluation level is built on information provided by the lower level. According to this model, evaluation should always begin with level one, and then, as time and budget allows, should move sequentially through levels two, three, and four. Information from each prior level serves as a base for the next level’s evaluation.

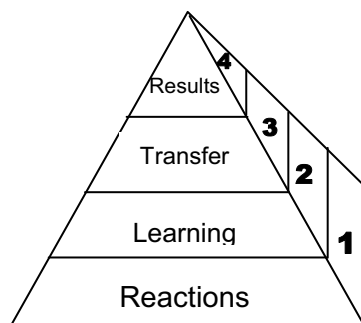


Figure 1. Kirkpatrick’s Four Levels of Evaluation

Level 1 Evaluation – Reactions

Evaluation at this level measures how participants in a training program react to it. It attempts to answer questions regarding the participants' perceptions – Did they like it? Was the material relevant to their work? This type of evaluation is often called a “smilesheet”. According to Kirkpatrick, every program should at least be evaluated at this level to provide for the improvement of a training program.

Level 2 Evaluation – Learning

Assessment at this level measures the amount of learning that has occurred due to a training program, evaluations often use tests conducted before training (pre test) and after training (post test). Methods range from formal to informal testing to team assessment and self-assessment.

Level 3 Evaluation – Transfer

Evaluation at this level measures the transfer that has occurred in the learners' behaviour due to the training program. Evaluating at this level attempts to answer the question – Are the newly acquired skills, knowledge, or attitude being used in the everyday environment of the learner? For many trainers this level represents the truest assessment of a program's effectiveness.

Level 4 Evaluation – Results

Evaluation at this level assesses training in terms of business results, measures the success of the program in terms that managers and executives seek: increased production, improved quality, decreased costs, reduced frequency of accidents, increased sales, and even higher profits or return on investment. Return On Investment (ROI) is sometimes mentioned as a possible fifth level or can be included in original 4th level Results.

A Framework for the Evaluation of eLearning

A New Framework

J. Hughes and G. Attwell presented a new framework for the evaluation of eLearning.

They tried to arrange the number of variables, which potentially impact on the effectiveness of the programme and to decide what constitutes dependent, independent and irrelevant variables in a given situation.

Five major clusters of variables have emerged:

- individual learner variables:
physical characteristics, learning history, learner attitude, learner motivation, familiarity with the technology;
- environmental variables:
immediate (physical) learning environment, institutional environment, subject environment;
- contextual variables:
socio-economic factors, the political context, cultural background, geographic location;
- technology variables:
hardware, software, connectivity, the media, mode of delivery;
- pedagogic variables:
level and nature of learner support systems, accessibility issues, methodologies, flexibility, learner autonomy, selection and recruitment, assessment and examination, accreditation and certification.

Each of these can be disaggregated into more precise groups and further disaggregated until individual variables can be identified and isolated.

Hughes and Attwell were seeking to build a robust classification system with clearly identified levels of aggregation, for mapping and coding existing work into the effectiveness, efficiency and economy of eLearning. Methodologies were cross-referenced against the variables being studied and major areas of omission can be identified that in turn will suggest a future research agenda.

Some of the questions that were asked:

- will the effectiveness of different eLearning pedagogies depend on particular individual learning histories?
- does the effectiveness of particular technologies depends on gender?
- are the presence (or absence) of some individual variables or clusters of variables more significant than others in determining the effectiveness of eLearning and, if so, can they be weighted in some way?
- is the profile of the learner more significant than the nature of the learning environment?
- is the effectiveness of the technological solution outweighed or enhanced by particular environmental variables?
- which is more important – getting the software right or the learner support right?
- can we use multi-variance statistical techniques (such as factor analysis) to see which variables ‘cluster’ together and the extent to which they impact on each other?

The researchers have found this a useful framework for evaluating and researching the effectiveness of specific eLearning projects and programmes. The evaluation of eLearning, and research into the evaluation of eLearning, has been dominated by descriptive ethnographic studies, rather than interpretation and analyses and there is a predominance of ethnomethodological approaches, in particular, heavily contextualised case studies.

SYSTEM CONCEPT AND SYSTEM APPROACH

Let us summarise changes affecting the training: From behaviourism we could follow the shift to knowledge work. In our countries the programmed instruction was very popular, lots of self-instructional materials, job aids and performance technology were realised. Some of them are described in the conference proceedings “From Programmed Instruction to eLearning” (Kapounová, ed., 2005). System engineering gave us the system concepts and the system approach with the instructional systems development (ISD) and computer systems development (Clark, 2000). We can mention the General Systems Theory (GST) as well (Klir, 1972), we accepted the challenge of *systems thinking* and it stayed still with us.

The evaluation of eLearning is similar to that of any other learning but we need to accept particular groups of attributes. We intend to accept the systems approach and we need to determine major parts of system. We were inspired by a similar approach we used in analysis of information system in education (Kapounová, 1999).

In the system purposely defined for evaluation of eLearning we have specified the following structure and we try to find their properties:

- subsystems
 - learners
learner motivation, age, school level (basic, high school), way of study (full-time, distance);
 - tutors
teachers (according to the school level – basic school, universities), qualified tutors, professional orientation (humanities, sciences), competences to prepare and implement eLearning programmes (with certificate), tutor’s communicativeness;
 - learning contents
full study programme, individual course, branch of knowledge (humanities, sciences), curriculum, methodology, learning styles, testing, assessment;
 - technology
hardware, software, Internet connection, accessibility, multimedia support, other technology;
 - learning management system (LMS)
role of learning management, LMS with or without ICT support, type of used LMS, institutional background, accreditation, how to begin and terminate study;

- relationships
between subsystems are drawn in Figure 2;
- characteristics
experts in individual disciplines estimated typical attributes of elements, subsystems and relationships; they form the basis for system of variables which can be analysed and tested;
- system environment with the subsystems (elements) as:
 - socio-economic characteristics
changes in demographic structure, learner's social status, level of education, age, gender;
 - job market
retrained workers requirements, increasing number of students (as well as training institution, universities), new challenges in new professions;
 - progress in new technologies
flexibility to accept new technologies, pressure and support (positive or negative) of computer (or other) companies;
 - policy – as governmental, educational, company, universities policy
kind of support – e.g. who is funding or paying for the course, public relations (PR).

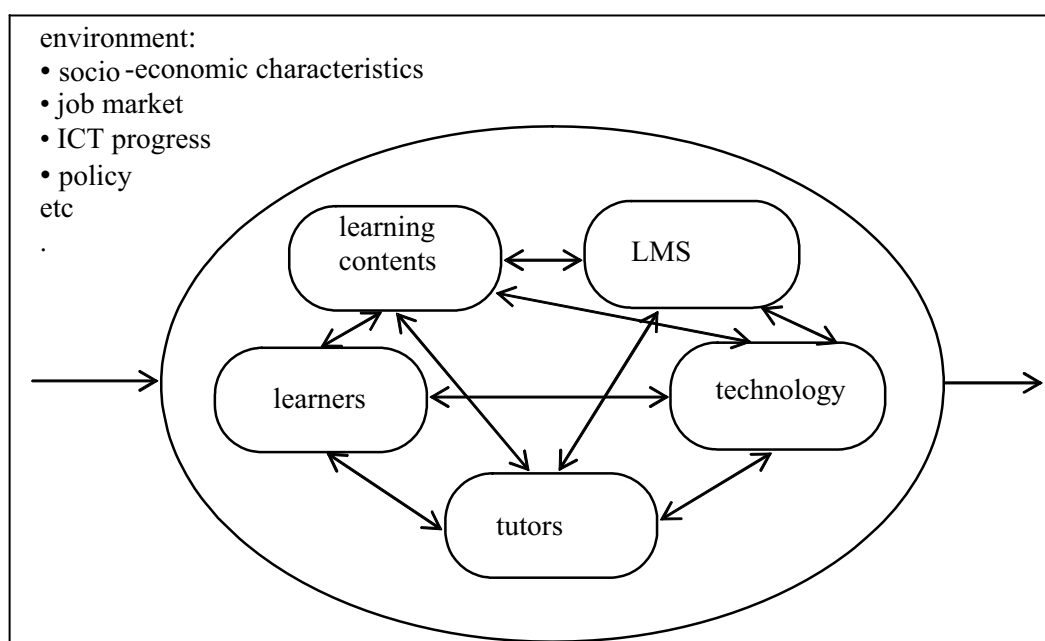


Figure 2. Major subsystems and environment elements in system analysis of eLearning evaluation

For a control model we chose study programmes and short-term courses prepared and implemented at our university – it means with academic background, we didn't deal with the retraining of people with basic or lower education. We determined the characteristics of system elements, collected data and performed rough analysis. Then we identified and surveyed parameters that could affect effectiveness, efficiency and economy of eLearning.

We present some results from our first research:

Motivation of learners seems to be a very important factor (maybe the most important) in study programmes supported by eLearning. We must pay close attention to everything that encourages students motivation – in study text, during tutorials, in feedback, ... Distance students are more motivated than full-time students. Students between 30 and 40 have strong motivation, gender doesn't matter. In particular, they appreciate that they may schedule their learning and assessment duties themselves. They admit that it takes a great deal of self-discipline.

Learners prefer eLearning *study materials* that are similar to classical textbooks; many multimedia effects distract their attention. They prefer to print study texts (or their parts), which allows them to learn in places without access to the Internet; e.g. in means of transport.

Our *teachers, tutors, authors of texts and eLearning managers* complete methodical training concerning eLearning (with the certificate). Now they prepare their eLearning courses more systematically, they have to propose the whole course before its start; in classical courses some improvisation is allowed.

Which *branch of knowledge* is more suitable for eLearning? In our university we have evidently a higher number of courses in natural sciences, mathematics, information technology than in humanistic subjects, but this survey is not yet final.

Nowadays neither learners nor teachers (tutors) have any problems with *technology* (ICT) – computers with multimedia facility, Internet connection, etc.

Our rich (and expensive) experiments with *Learning Management Systems* (LMS) point to such a system that is user-friendly for both learners and teachers, and allows communication in a native language.

Financial resources (e.g. from Ministry of Education, Phare, ESF) play a very important role and they enable to involve eLearning in our educational system: teachers, tutors, managers can complete courses in eLearning and distance learning, authors can write study texts, we can run pilot projects, we can improve ICT equipment, etc.

CONCLUSION

There is no simple or easy way to evaluate eLearning courses. We have just started to find out which factors have an impact on the effectiveness of eLearning. In the next stage we will seek which system elements and characteristics are more significant and we will determine potential new ones. We intend to quantify the variables and try to use some statistical techniques (such as data mining) to see which of them can impact other or the studied system.

Even though we are able to find what can improve our eLearning courses, it is sometimes difficult to modify them, although we know that changes are inevitable. E.g. we can be acquainted with different learning styles of our students and we understand that it is necessary to prepare different eLearning materials and management for different learners – but the solution is sometimes not within the compass of instructional courses designers.

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