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Evaluation of Students Knowledge – An Experiment in E-Learning

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Abstract

In the present paper the author presents a design experiment pertaining to the evaluation of students' knowledge as a possible step forward in improving the quality of the educational process in general and of the students' assessment process in particular. Starting from the Donald Kirkpatrick's four levels evaluation model the author focused his design experiment on the Kirkpatrick's level 2 evaluation. The author believes that the new trend in education pertaining to the development of new evaluation methods and techniques using or assisted by the computer can be integrated successfully within the traditional Kirkpatrick's evaluation model.

Key words: *design experiment, e-learning, evaluation subsystem, learning subsystem*

Brief Overview of Donald Kirkpatrick's Four Levels Evaluation Model

Donald Kirkpatrick published his four levels evaluation model first time in 1959 in a series of articles published on the US Training and Development Journal. In 1975 Kirkpatrick published the first edition of the Evaluation Training Programs book presenting the four levels model in detail [3].

Translating the four levels Kirkpatrick's evaluation model onto the students' evaluation process the author considers that the four levels are measuring the following:

- Level 1: Student reaction – measure what the students thought and felt about the learning experience;
- Level 2: Learning – measure the level in knowledge achieved by the student;
- Level 3: Behaviour – measure the extent of student behaviour and capability improvement;
- Level 4: Results – measure the effect on the educational process resulting from the student performances.

The four levels Kirkpatrick's evaluation model gives to the assessors the possibility to asses the learners, in our case the students, by looking from various angles and perspectives. However, despite the latest criticisms coming from some specialists side the Kirkpatrick's evaluation model is still recognised by many others one of the best systems in place even was introduced more than fifty years ago [1].

Of course, always is room for improvement therefore the author believes that an „association" between the Kirkpatrick's Level 2 evaluation and the e-learning features can lead to a significant improvement of the students' knowledge evaluation.

Why a Level 2 Evaluation?

A Level 2 evaluation it is necessary in order to measure what the students learned. Most of the specialists are calling this level of evaluation as a knowledge evaluation used to measure whether the original learning objectives of the course were met. The Kirkpatrick Level 2 evaluation helps the instructors to identify which specific skills, attitudes etc. were achieved by the learners [2]. Also, a Level 2 evaluation is helpful for the instructors in order to check which degree the course content and structure support in an effective manner the learning process.

The main goal of any instructor is to enhance and finally to maximize the amount of knowledge transferred to the learners. During such complex process any instructor is dominated by a universal question: *"Did my students learn something during my course?"*. The author believes that the answer to such question can be obtain only thru a fair and deep assessment of the knowledge level achieved and not only before and after the entire curriculum is provided but always before and after each course contained in the curriculum structure.

One of the pinpoints of the educational process is the effectiveness of the topics presented during the courses presentations. The measurement of this effectiveness will lead with certainty to the collection of vital information absolutely necessary to improve the curriculum structure and content.

A Level 2 evaluation can help in an effective manner to collect such vital information at least because this level of evaluation provides a significant list of methods and tools for learners' evaluation. Bellow, the author is presenting such examples of evaluation tools and methods which can be used before and after each course from the curriculum:

- Interviews and observations;
- Written tests (i.e.: multiple choice items from a list, true/false questionnaire, matching list etc.);
- Online interviews and tests;
- Online self-assessment;
- Measurement and analysis at a group scale;
- Possibility to obtain clear scorings limiting the risk of inconsistent assessment etc.

E-Learning Value

The E-Learning can be defined as a means of education that incorporates electronic equipments and tools and the interactivity between these and the people involved in the educational process (i.e.: instructors and learners). Lately, more and more E-Learning projects were developed and some spectacular successes where recorded [2].

The value of the E-Learning process is highlighted thru the advantages offered such us:.

- Eliminate obstacles like distance and the travel costs from the original location to the classroom location for both, instructors and learners;
- Easy and no limited access to the learning materials;
- E-Learning can be fit easy in the learners' programme;
- Provides learners with the possibility to select the learning materials based on each learner knowledge level;
- Simple and easy to implement E-Learning platforms;

- Effective in ensuring reliable and accurate assessments;
- A valuable feedback can be collected by both, instructors and learners and used like a tool for continuous improvement;
- Effective from a financial point of view involving low costs for designing, developing and implementation;
- Applicability to an extended variety of disciplines etc.

One very important component of the E-Learning process is the students' knowledge assessment. Without entering in deep theoretical details the author highlights the fact that the E-Learning has the capability to provide measurable assessments for the efficiency, effectiveness and compliance of the learning process [4].

Students Knowledge Assessment – General Principles

Students' knowledge assessment is one of the essential components of the educational process in higher education. In fact the assessment process is the key factor influencing the way how the students and the instructors approach the educational process. An effective assessment process, properly designed, developed and implemented will lead to obtain quality results during the educational process.

The general principles of the assessment process are the same in any learning environment. Generally speaking, the students' knowledge assessment is a process of individual performances measurement and is using grades to indicate the level of knowledge achieved by an individual at a certain moment. This measurement process is to be correlated with the learning process outcomes [5].

E-Learning process doesn't make an exception from the general principles of the assessment process. The general principles of the assessment process in an E-Learning environment can be described as follows:

- To measure the performances achieved by students;
- To determine if a students is prepared or not to proceed to the next level of education;
- To promote learning ,
- To provide a feedback to both, students and instructors in order to identify the areas creating learning difficulties and to establish the necessary solutions. Also, the instructors can use the feedback to identify in which area the teaching process is not effective etc.

A Design Experiment for Students Knowledge Assessment

An assessment process, generally speaking, must be a fair process giving equal chances to all students. Ensuring the maximum grade of process fairness could be the very first step in the direction of making students more responsible by getting their trust in the instructor "balance of appreciation".

More and more often the specialists in the educational area talk about E-learning highlighting the benefits of this type of learning environment. Being a learning process developed using electronic equipments and tools automatically the assessment shall not make exception and shall be carried out using the same.

In the figure no.1 the author is proposing a system which can be used in E-learning environments and which integrates the learning and the evaluation components of the educational process. Presented as diagram the system is deemed by the author as a tool which can correlate in an effective way the assessment process with the outcomes of the process.

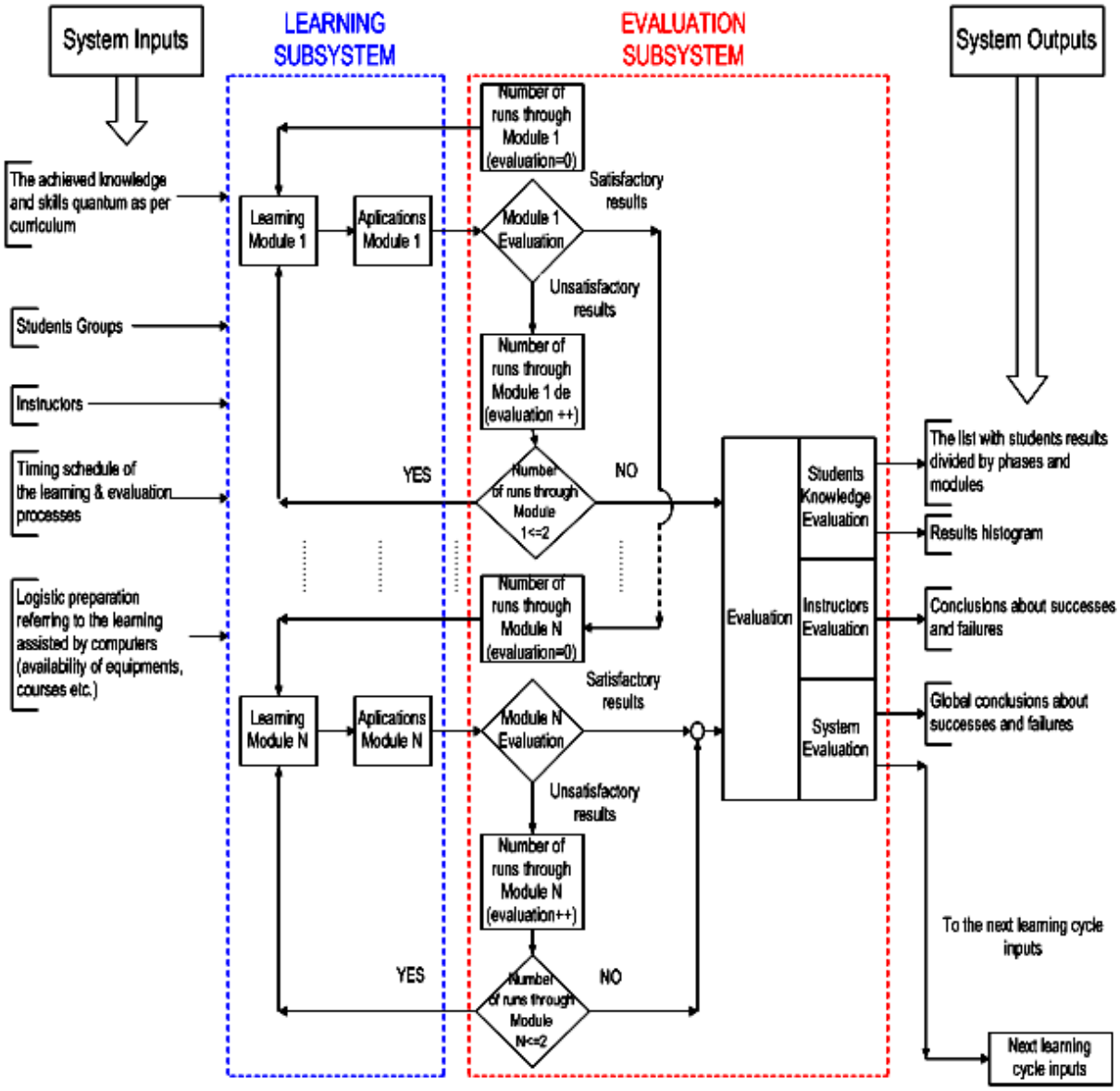

Fig. 1. The diagram of an experimental integrated learning & students evaluation system

This diagram was designed during the system development phase and from the very beginning as an automatic system for students' knowledge evaluation in order to also cover the learning component.

The system has two subsystems, one covering the learning component of the educational process and the second subsystem covering the students' knowledge evaluation component.

System Inputs

The system inputs were considered by the author being the very basic ones, the same with the inputs of a traditional educational process developed through normal methods and techniques. The author has considered the system inputs as follows:

- The achieved knowledge and skills quantum per curriculum;

- Students Groups;
- Instructors;
- Timing schedule of the learning & evaluation processes;
- Logistic preparation referring to the learning assisted by computers (availability of equipments, courses etc.).

Without deeply detailing, the author considers that in the E-learning environment a very important input is constituted by the logistic availability. Being a process dependent on the hardware and software "infrastructure" availability then it must ensure that the necessary resources are in place and every one, instructors and students have access to those. Of course, these are the very basic premises and they are directly interconnected to the financial resources.

Learning Subsystem

The Learning Subsystem was deemed by the author to be a modular system. The curriculum presentation during the learning process is carried out in modules. The students can go for individual study or they can go for groups study. It is their choice how they will follow the learning process the system being design to be flexible to any approach.

Each module comprises from a theoretical part presented through an e-class and a practical part followed by applications and exercises.

Evaluation Subsystem

Once a module is complete an evaluation of the students' knowledge will be carried out automatically. The students can pass the modules and they are directed by the system to the next module until they complete the curriculum and they are promoted to the next learning cycle.

But, the students can record also a failure in passing any of the modules completed. Than, if a failure occurs the students are automatically directed by the evaluation subsystem to re-run the module in discussion. The re-running can be performed in consecutive cycles up to the moment when the student is passing the evaluation proving that a certain level of knowledge has been achieved.

The scores are established by the system after each module evaluation and at the end. The evaluation subsystem is designed in a manner which avoids any possibilities of cheating the multiple choice tests used being generated randomly.

Of course, the feedback coming through evaluation shall not be reduced only to the students' knowledge evaluation but shall be extended to the instructors' evaluation and finally, shall be extended to the evaluation of the entire system in order to identify the weaknesses and to cover the aspects of the continual improvement of the process.

System Outputs

The system outputs will not be different than those recorded from the traditional educational process but the main advantage is that these outputs are measured all the time, in fact continuously giving in any moment of the process a clear picture where the students, the instructors and the systems itself are. The author has presented the system outputs as follows:

- The list with students results (scores) divided by phases and modules;
- The results histograms;
- The conclusions about the successes and failures;
- The global conclusions about the successes and failures.

The feedback coming from the system must support a deep analysis and must provide consistent measurements. All these make possible to act on the weakness points and make possible to eliminate possible failures in less time that the traditional systems.

Conclusions

E-learning environments are a great opportunity to significantly move ahead in the battle for a better educational process having as final target to educate excellent professionals. Talking about using E-learning environments the author is talking about the future, a future which can be a consistent reality today. It is true that at the very beginning the development of an E-learning projects involves significant efforts and also financial resources but taking in balance the final outcomes the author believes that deserve the entire attention.

The experimental model presented in this paper it is considered by the author a possible solution for developing integrated educational systems covering both components, learning and evaluation. The system was designed taking into account the principle of easy management of the aplication what will be later developed based on this model as well as the principle of effectiveness during practical applications.

Such integrated learning and evaluation systems offer a unique chance to both, instructors and students, to have a beneficial experience and to gain a high level of professionalism either by developing the existing skills either by developing new ones. A level 2 assessment process offers the same beneficial outputs which can be used in planning, development and implementation of a secure educational system from the results point of view, results which talking to another scale are targeted by the society itself.

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Evaluarea Cunoştinţelor Studenţilor – Un Experiment în E-Learning

Rezumat

În prezentul articol autoarea prezintă un proiect experiment ce ţine de domeniul evaluării nivelului de cunoştinţe al studenţilor drept un prim pas înainte făcut în direcţia îmbunătăţirii calitative a procesului educaţional în general şi pe cel al evaluării studenţilor în particular. Pornind de la modelul de evaluare pe patru nivele dezvoltat de Donald Kirkpatrick autorea şi-a focalizat proiectul experiment pe al doilea nivel de evaluare dezvoltat de Kirkpatrick. Autoarea consideră că noua tendinţă din cadrul procesului educaţional aparţine noilor metode şi tehnici de evaluare ce utilizează sau sunt asistate de calculator şi care pot fi integrate cu success împreună cu modelul de evaluare tradiţională a lui Kirkpatrick.