On The Assessment of Quality Teaching Processes in Informatics

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ABSTRACT: Quality is a multi-perspective construct, varying from one context to another and difficult to define in a general way. In order to improve quality in higher education, educational processes need to be assessed. In this paper three models are presented and refined: the first assesses the educational process, the second the e-learning process and the third is a combination of both to assess mixed process. To assess learning and teaching processes of Informatics and Internet Certificate, and to validate the first proposed model, a survey methodology is adopted. Empirical study shows that some characteristics of the lecturer, the profile of the student, and the learning situation characteristics increase learner's satisfaction and decrease the rate of absenteeism among students. Finally, an on_line survey is developed and a tool that transform the data base file in different file format. This will facilitate assessment in Higher education.

KEYWORDS: Assessment in education, assessment models, quality, higher education, assessment criteria, learning and teaching processes, Certificate of Informatics and Internet training.

1. Introduction

Quality in education is defined by [PAW 07] as a multi-dimensional concept defined by many indicators such as: curricula, students, infrastructure, internal and external environment, teaching methods and teachers. [VIK 05] discussed quality indicators such as relevance and content of programs, qualification of teachers, performance of students, level of research activities, access to adequate equipments, social and professional insertion of graduates and number of publications.

Recently, educational processes are discussed in the content of e-learning, so we discuss quality concept in distance learning, this perspective is studied by [CHO 09][WAN 08] [SUN 08].

In order to improve quality in education or in distance learning we need to assess learning and teaching processes and to find criteria that affect the success of a given learning situation and hence increase learner's satisfaction.

In order to propose refined assessment models, recent assessment frameworks and models in education and in e-learning field are reviewed in section 2. Three assessment models are presented in section 3, the first assesses the live education process, the second the e-learning process and the third is a combination of both to assess mixed process. In section 4, a survey methodology is used to assess learning and teaching processes of Informatics and Internet Certificate, and to validate the first proposed model. In section 5, statistical interpretations will answer the question: "How can we lead a quality learning situation in informatics?" Finally, on-line survey and a file transfer tool are developed to facilitate further quality assessment in education.

2. Assessment of teaching and learning processes

2.1 In live education

Actually many quality models developed for industries are adopted in order to define quality assessment in education.

To assess educational processes [DIX 07] proposed The Design-Based Research in Innovative Education Framework (DBRIEF) model. It is composed of five phases: (a) Informed exploration: it begins by the problem identification, a review of related literature, research question and development of the theoretical model and its hypothesis. (b) Presage: is the interrelation between environment factors of the context, teacher's and student's factors. (c) Process: it is the heart of this framework, focusing on classroom processes and interaction between teacher's and student's behavior. It is an iterative process. (d) Product: it is the measure of outcomes, of results, of the educational processes and a data gathered is analyzed. (e) Extended evaluation: this final phase allows to prepare another research and to apply another model.

[GRI 08] discussed the concept of outcome, "what students know and are able to do". He presented two dimensions of assessment: the relative achievement assessment like feedback or an exam score and the absolute achievement assessment which is usually conducted by an agency external to school like certification.

[HOB 08] focused first on component relating to facilities, equipment, personnel, and second, on processes adopted by the university and finally outcomes which are the results of educational processes.

These theoretical models present principal components that need to be assessed in order to measure quality of learning and teaching situation. A new detailed assessment model and a list of assessment criteria need to be developed.

2.2 In distance learning

[SUN 08] provide a clear definition of e-learning concept as the use of technology to deliver information for training. This modern education creates interaction between learners and instructors, or learners and learners without time and space constraint. They discussed dimensions and factors that affect user's satisfaction in an e-Learning system. The proposed assessment model covered six dimensions: learners, instructors, courses, technology, design and environment. In order to investigate real factors affecting learners' satisfaction, a survey is conducted using thirteen factors.

[WAN 08] evaluated the web-based e-learning system (WELS) in order to assess learner's satisfaction; it contains four dimensions and 13 criteria which are learner interface focused on usability, friendliness, easiness and stability of interface, second learning community focused on easiness of discussion between learner and their teacher, share and exchange of data, third system content should be up to date, sufficient and useful and finally personalization in controlling learner progress and recording learner performance.

[CHO 09] discussed five primary criteria in order to evaluate the effectiveness of an e-learning system. These criteria are e-learning material, quality of web learning platform, synchronous learning, learning record and self-learning.

Assessment in e-learning is producing by a variety of detailed models; we have to use the whole of components and criteria to adopt them to measure learner's satisfaction in the distance learning system.

3.   The proposed assessment models

In this section, we present three models. The first deals with classical education, the second assesses e-learning processes and the third a combination between the two previous ones, assesses mixed processes.

3.1   In live education

Our new model covers three phases namely the context, the learning and teaching processes and the outputs. The context is school's characteristics. The learning and teaching processes include student's and teacher's characteristics and learning situation which covers many factors such as lesson structure, teaching methods and assessment. Finally the outputs or outcomes of the learning situation similar to recent models [DIX 07] [HOB 08]
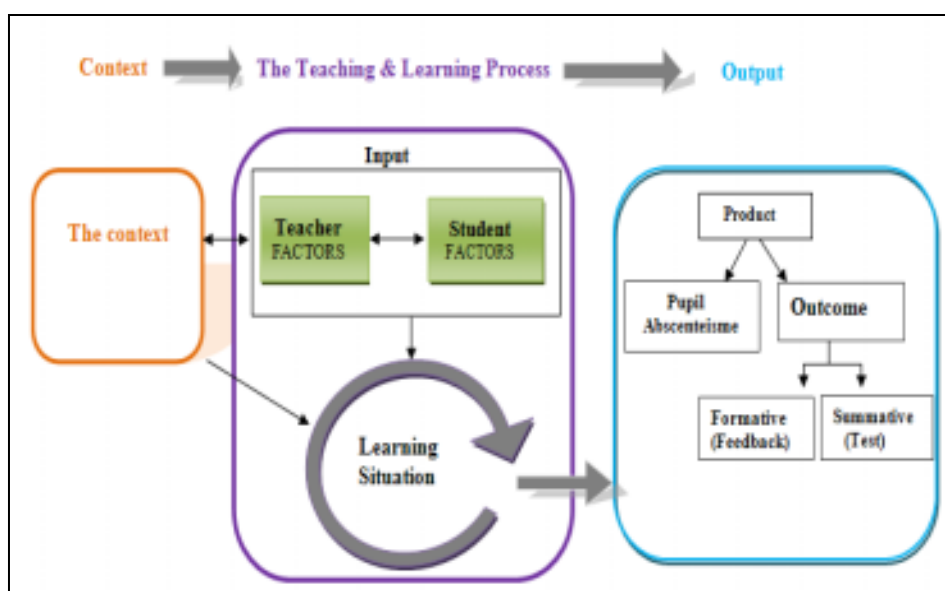

FIGURE 1 – *The model for assessing quality teaching processes in live education*

Our first new model presents a general component which needs to be refined in order to list assessment indicators and criteria. Context characteristics are institution's name, subject that will be assessed, class and scholar year.

Student is considered as the most important component that influences the success of the learning situation. [GRA 08] presented factors like teacher-student relation, student's academic orientation, student behavioral values, and student's activities. We propose to add student's demographic information.

The teacher concept was discussed by many researchers. The work of [ZIK 08] focused on the concept of teacher's competency and its impact on classroom teaching and then, they proposed six primary factors which are clarity of instruction, motivational competence, diagnostic competence of social relations, diagnostic competence of performance, individual reference and teacher's care. [GRA 08] focused on teacher's demographic information.
[GRA 08] and [SCH 06] introduced teacher occupational experience which includes two items, the highest educational degree achieved and the year of teaching experience. Finally, [SCH 06] discussed teacher's personality characteristics.

Furthermore, various empirical investigations studied criteria related to learning and teaching situation [DIX 07] presented the teacher's and student's behavior, the structures of tasks and the time needed to learn. Others criteria like tools and materials discussed by [HOB 08] and ICT in learning [DIX 07]. [EUR 04] presented the factor school time and provided their items which are length of lesson and frequency of holiday when the field was taught. [SCH 06] studied the concept teacher's motivation during the lesson including three factors.

The concept of outcomes was presented by [GRI 08] also [EUR 04] discussed the same factor, the tests result exams and they presented another factor which is pupil's absenteeism. We add student's satisfaction criteria because the first goal in all empirical investigations is to focus on the satisfaction of the learner.

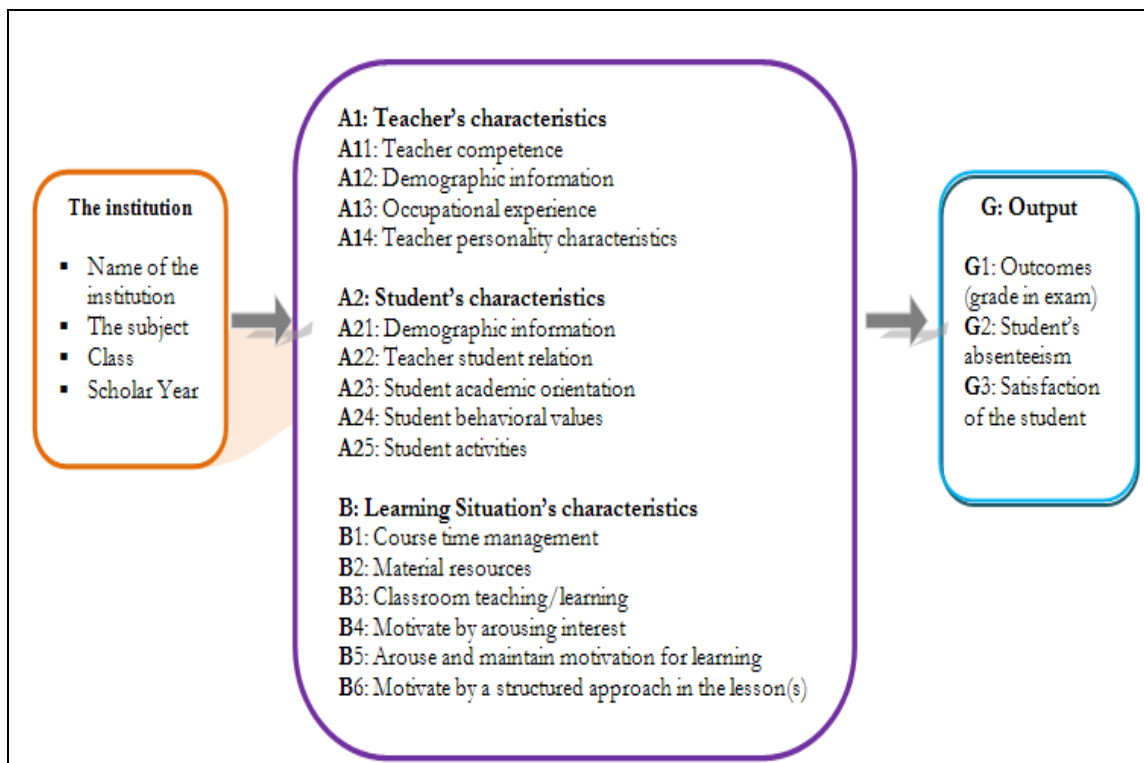We present in figure 2 our refined assessment model in classical education.

The institution
- Name of the institution
- The subject
- Class
- Scholar Year

A1: Teacher's characteristics
A11: Teacher competence
A12: Demographic information
A13: Occupational experience
A14: Teacher personality characteristics

A2: Student's characteristics
A21: Demographic information
A22: Teacher student relation
A23: Student academic orientation
A24: Student behavioral values
A25: Student activities

B: Learning Situation's characteristics
B1: Course time management
B2: Material resources
B3: Classroom teaching/learning
B4: Motivate by arousing interest
B5: Arouse and maintain motivation for learning
B6: Motivate by a structured approach in the lesson(s)

G: Output
G1: Outcomes (grade in exam)
G2: Student's absenteeism
G3: Satisfaction of the student

FIGURE 2 – Refinement of the assessment model in live education

3.2 In distance learning

We carefully studied dimensions and their relative criteria proposed by [CHO 09] [WAN 08] [SUN 08] and we summarized them in 6 dimensions and 22 criteria. The six dimensions are: Instructor (A), Learner (B), E-learning platform (C), System content: the course (D), Synchronous learning (E) and Self learning (F).

The criteria A (instructor) was studied by [SUN 08], and contains 2 sub-criteria which are attitude toward e-learning and response timeliness.

The criterion B (learner) also studied by [SUN 08] and contains 2 criteria which are attitude toward e-learning and computer Anxiety.

The criteria C (e-learning platform) contains 8 sub criteria studied by [CHO 09] [WAN 08] [SUN 08], it focuses on ease of use, containing multimedia design, providing interactive mode, providing assessment, user friendliness interface, a good web connection, stability and ease of understanding.

The criteria D (system content) mainly focuses on four characteristics of the course presented in platform: it should be up to date and sufficiency [WAN 08], useful [WAN 08] [SUN 08] and finally structured [CHO 09].

The criterion E (synchronous learning) mainly focuses on 3 sub criteria the first discussed by [CHO 09] and [WAN 08] which refer to the possibility of student to contact his teacher by the use of web discussion, the second sub criteria is the possibility to have a synchronous learning between teacher and other students and finally the possibility to meet in class when it is necessary [CHO 09].

The criteria F (self learning) contains three sub criteria which are the possibility to record learning, the control of learning progress [CHO 09] [WAN 08] and finally the review of learning content frequency [CHO 09].
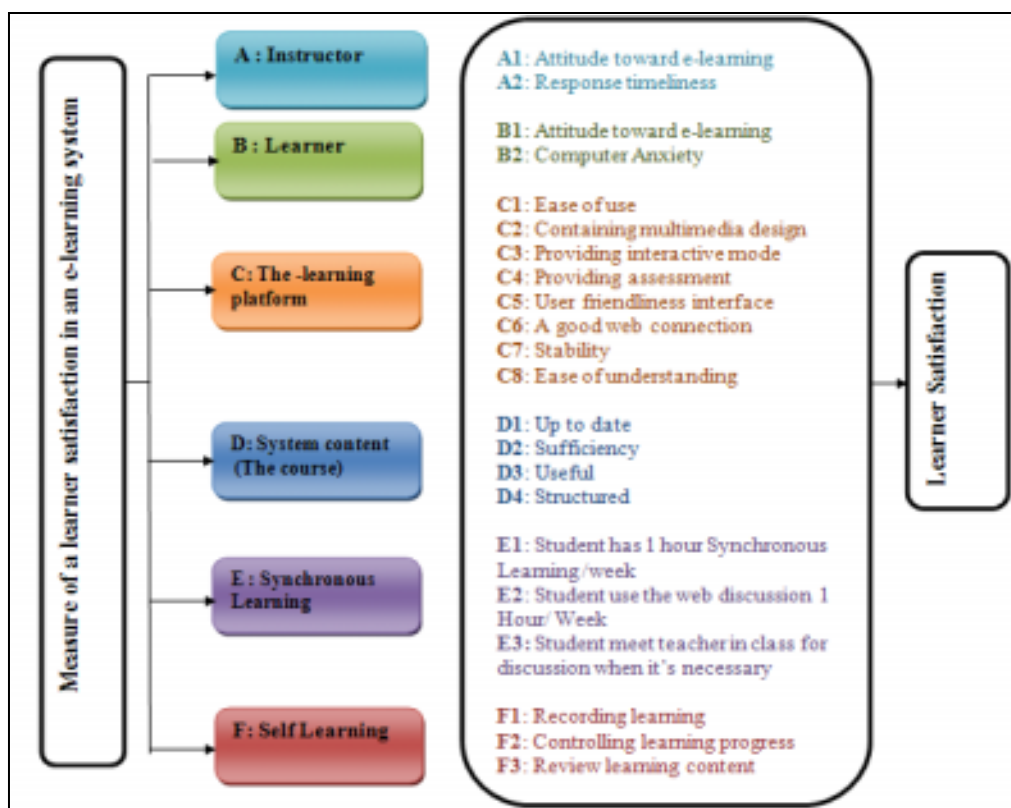

FIGURE 3 – The new model for assessing learner's satisfaction in an e-learning system

3.3 In mixed processes

The Tunisian government is continuously improving education to move the field forward. The recent is the integration of e-learning processes in higher education in teaching informatics and other fields. In this context, some fields can be taught in combination with e-learning processes like Informatics and Internet Certificate (C2I) training which is supported by The Tunisian Virtual University. Our need is to produce a new model for assessing mixed processes. The idea is to add e-learning dimensions and features presented in the second model to the first model, specifically learning situation's components.

The proposed model presented in figure 4 includes 9 dimensions or components which are institution, teacher, student, learning situation, learning platform, system content, synchronous learning, self learning and outcome.

This model is a combination between the first model used to assess quality in education and the second used to assess distance learning processes. It covers 44 criteria which are a combination between the two first proposed criteria.
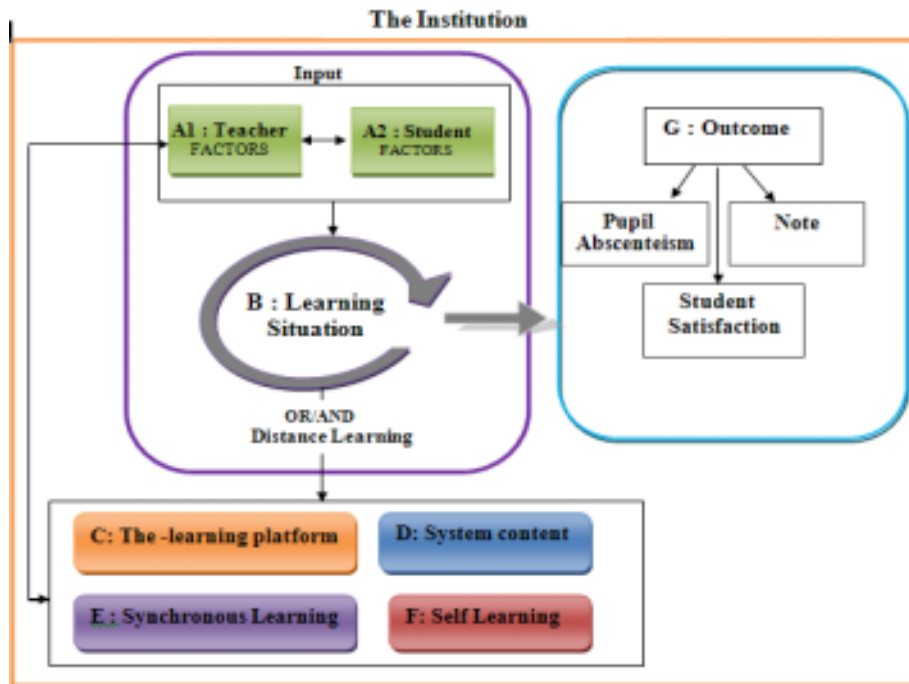

FIGURE 4 – The proposed model for assessing mixed processes in higher education

4. Empirical study

4.1 The field to be assessed

Informatics and Internet Certificate is chosen to be assessed. Our choice is justified for the following reasons: it is a field that incorporates distance learning processes and it is taught to informatics and non informatics students. This field is financed by the ministry of higher education and scientific research and technology under the direction of TICE.

In addition to classroom formation, we note a distant formation using learning platform which is proposed by the Tunisian Virtual University but, really in Tunisia e-learning processes are in its beginning because the field is taught with a rare access to distant learning tools, so we decide to apply the first model.

4.2 The conducted survey

295 paper questionnaires are distributed to students registered in C2I training into Two Tunisian Universities; also a form is distributed to every teacher in order to gather their personal's information.

At « The High Management Institute of Tunis» we distributed 128 questionnaires in order to assess informatics and non informatics students and in « The Higher Institute of Trade and Accounting of Bizerte» we distributed 167 questionnaires to assess non informatics students in the first year of finance or marketing.

5. Empirical Results

Multiple regressions are used to study the relationship between target variables and a set of predictor variables. STATA Statistical software is used to conduct the empirical study. This is a summary of factors related to lead quality educational processes in teaching informatics.

First, student's satisfaction increase for a unit increase in the presence of assessment during the lesson, student's participation, creation of pleasant variation in educational approaches, teacher's seriousness and when the teacher note the student's amelioration and it decrease for a unit increase in teacher's experience and in the presence of software as resource material.

Second, student's absenteeism decrease for a unit increase in the creation of pertinent lesson, structured lesson and when the teacher gives realistic examples and when students haven not the support of course, in consequence they are obliged to assist and it increase for a unit increase in the presence of CD as resource material and when teacher is nervous.

Third, grade in exam increase for a unit increase in the presence of CD as resource material, creation of opportunities to be creative, Keeping attention by a sequence of explaining and giving assignments and when the teacher is able to make a boring topic really interesting and when he is competent and it decrease for a unit increase in student's age and when teacher is boring.

In order to improve quality teaching processes in informatics and specially in teaching C2I we propose as improvement action: to train contractual and temporary teachers or to be supervised by other experienced teachers, to concentrate on the presence of assessment during the lesson such us: tests or oral evaluation or multiple choice questions and to motivate students then to focus on the quality and pertinence of numeric course and to develop e-learning features. Finally, teacher should urge their students to use the C2I platform.

6. Conclusion and perspectives

In order to improve quality concept in education we need to assess educational processes and to find real criteria that affect the success of a given learning situation in informatics. For these reasons, a review of assessment models in education is studied.

Then three models are developed and refined: the first model to assess educational processes at classroom, the second model to assess learner's satisfaction in an e-learning system. And the third model, a combination of the latter two models, to assess quality in mixed processes.

A survey methodology is used to assess C2I training in order to validate the first proposed model. And 295 questionnaires are distributed to registered students in two Tunisian universities.

Empirical investigations from collected data show us good results about real criteria affecting the success of C2I training.

Further investigation is needed to assess educational processes at classroom and evaluate all kinds of informatics trainings. Another work of interest is to focus on the improvement of our three proposed models by adding other components like curricula, equipments, environment, institution's characteristics and research unity.

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