Smart Feedback System Based E-leaning Model

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Abstract: *Feedback is an important part of the learning and interaction in e-learning systems. Feedback as information the user receives from the system as the result of his/her action. Feedback in e-learning is the mechanism that tends to replace the teacher who provides comments, advice, and explanations and evaluates the students in traditional learning environments. In general, the feedback in e-learning occurs not only in the assessment process, but can be provided to a student during navigation through learning materials, communication and collaboration with other students, in the process of work with personal information and managing the courses.*
In this paper we discussed the adaptation of feedback for an improved e-learning system. The characteristics that should be taken care at the time of design of feedback system by analyzing the features of tag based feedback system and a graphically represented feedback based on different parameters. We also discussed the problems in designing a smart feedback based e-leaning system and what may be its consequences with respect to the learner's cognitive abilities.

1. INTRODUCTION

E-learning is a well-known research area among the researchers from industry and academia.Till now a lot of frameworks and models have been already proposed for designing an efficient e-learning system.There are three main aspects pedagogy, technology and learner's preferences on which most of the frameworks and models surround. But as we also know that in the traditional classroom teaching there is an important role of teacher in providing proper feedback to asses learner's performance and improvement as per the objectives of using an e-learning system.

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In this paper we discussed the adaptation of feedback for an improved e-learning system. The characteristics that should be taken care at the time of design of feedback system by analyzing the features of tag based feedback system and a graphically represented feedback based on different parameters. We also discussed the problems in designing a smart feedback based e-leaning system and what may be its consequences with respect to the learner's cognitive abilities.

2. LITERATURE REVIEW

The worldwide e-learning industry is economically significant and was estimated in 2012 to be over $68 billion according to conservative estimates.[1] *(EC ,2012. Brussels: European Commission Report).*Information and communicatiotechnologies (ICT) are used extensively by young people. [2]*(Digital media and learning fact sheet,2005).*

E-learning expenditures differ within and between countries. Finland, Norway, Belgium and Korea appear to have comparatively effective programs. [4] Before a fully online program is launched, the issues related to the content, learner's need, overall management and administrative affairs must be addressed for a smooth implementation.

E-learning System provide such an infrastructure that online students do not be required to set foot on campus to participate in or take advantage of student services.

All the issues related with e-learning systems can be well handled if there is a proper feedback providing facility incorporated with the system.It was suggested that feedback in a web-basedlearning system should have the following qualities:
- Proper, timely and thorough online feedback
- Ongoing formative feedback about online group discussions
- Ongoing summative feedback about grades
- Constructive, supportive and substantive online feedback
- Specific, objective and individual online feedback, and
- Consistent feedback.

According to Brusilovsky [6] a hypermedia application can be adapted to the various characteristics of the user like

knowledge, experience, preferences, interests, individual traits, goals and environment.The effective elements of online teaching include frequent and consistent , diplomatic and evaluative online feedback.

Bischoff [7] argued that students need regular feedback in order to know how their performance was evaluated, and how they can improve it, and also how their grades are calculated.

3. OBJECTIVES

Objectives of designingSmart Feedback System based e-Learning Model is to provide a tool for systematically reviewing e-learning initiatives and programs specially from the perspective of feedback system. So its objectives include the following specifications:

- Planning and designing e-learning and blended-learning materials with proper feedback facility
- Organizing resources for e-learning, blended, and simulated virtual-learning environments which can provide feedback at the time of navigation.
- Designing distributed learning systems for corporations, public and private universities, virtual universities and cyber schools so that e-learning system itself will be equivalent to assessment teacher.
- Designing Learning Management Systems and comprehensive authoring systems which incorporates the smart feedback system
- Evaluating e-learning, blended-learning courses, and programs in perspective of feedback providing features
- Evaluating e-learning authoring tools/systems, LMS and LCMS in terms of the consequences of including smart feedback system with e-learning system.

4. FEEDBACK

In general, the feedback in e-learning occurs not only in the assessment process, but can be provided to a student during navigation through learning materials, communication and collaboration with other students, in the process of work with personal information and managing the courses like planning, enrolling, completing etc.

Feedback adaptation in e-learning systems from the perspective of Individual Adaptation: Adapted to each student and his/her individual (combination of) characteristics. [8]Individual characteristics could include the user's knowledge of the subject being studied. User's knowledge of the main concepts, formulas etc. The number of mistakes the user makes during the testing.

The characteristics that can be important for individual feedback adaptation in e-learning system:

(a) Personal data

Personal data typically includes parameters such as name , *age, gender* etc.The only real individual use of personal data is to give a "personal touch" to the application, for instance by including the user's name in the feedback.

Example:

 "Sorry, Rizwan. Your answer is incorrect

b) Knowledge:

The user's answers to a test provide information about the user's knowledge.But individual feedback adaptation means that other parts of the user's knowledge also play a role in the feedback the learner receives.The feedback to a (wrong) answer can be more informative when it refers to knowledge the learner already has, perhaps about related topics.

Example:

 "Sorry, Rizwan. Your answer is incorrect. you should revise this topic/chapter/unit."

c) Interaction Parameters

For the purpose of feedback adaptation the following interaction parameters, grouped can be taken into consideration:

- *Chronometric data :*time spent viewing pages with learning materials, time spent for passing the question in the tests and the total time spent on the assignment, the time of idle intervals.
- *Try data :*the number of attempts to pass the tests or assignment, the number of times needed to give the correct answer for the certain question.
- *Navigation data :*visited links and pages, number of visits, the frequency that specific selections have been made.

 The following issues with feedback design in e-learning systems can be outlined:

4.1 Feedback representation: What & How

In feedback representation we analyze that which characteristics of user should be included in feedback. To make the feedback more learner oriented it should clude personal details like user's name.

This is also a matter of consideration that how the feedback should be represented and what should be the structure or format of feedback.

4.2 Time of feedback presentation:(Either immediate or delayed feedback)

Time of feedback representation includes the decision making feature of the matter that feedback should be provided to the learn just after his/her action or it should be provided after some time i.e a thorough delayed feedback.

4.3 Distraction of students from the learning by feedback:

As the main goal of using any e-learning system is to facilitate learning and teaching with the use of ICT. So, it must be assured that after getting the feedback the learner should not be distracted from the learning i.e. feedback should be presented in assessment mode that does not discourage the learner from learning.

5.   SMART FEEDBACK SYSTEM (SFS) :

Smart Feedback System is the key feature of this model. That has been designed with the aim of providing the feedback to the learner in such a way that it can be as efficient by the feedback given by a subject matter expert of the area of e-learning solution or the assessment given by a good counselor and teacher. The central idea is inspired from the specifications of a good feedback system recommended by experienced faculties of various academic areas and well known counsellers. Technically Smart feedback system can be described in the following three unique specifications:

- Concept Based Feedback
- Graphical Feedback
- Multiparameteric Feedback

5.1 Concept Based feedback:Concept Tag associated with the Feedback

This includes specific to questions based on a particular concept of the course,suggestion for revision of a particular Concept/Chapter/Unit.It can be implemented by associating a tag with each question. Tag (Concept) will describe the key topics or concepts used to solve that question. For example:

Q. Stack is a data structure that follows: (a) FIFO (b) LIFO (C) FILO (d) None

Tag: Stack

- Answer: (a)/(c)/(d)

Feedback: Sorry, Rizwan. Your answer is incorrect. You should revise the topic "Stack".

- Answer: (b)

Feedback: Congo, Rizwan. Your answer is correct.You have learnt well the topic "Stack".

5.2 Graphical Feedback: Graphical Representation of feedback

As we know an image can express the idea in a better way than the way of thousands of text. So there should be the options of viewing the feedback in graphical way also. Main reasons behind making the graphical feedback is as follows:

- Easy to understand
- Easy to analyze
- Easy to assess

For example, a Subjectwise test results of a student of class tenth can be represented in the following two ways:

(a) Subject -wise Test Result Feedback: Tabular Feedback

Table 1

	MATHS	PHY	CHEM
TEST1	8	5	6
TEST2	8	7	6
TEST3	6	9	6

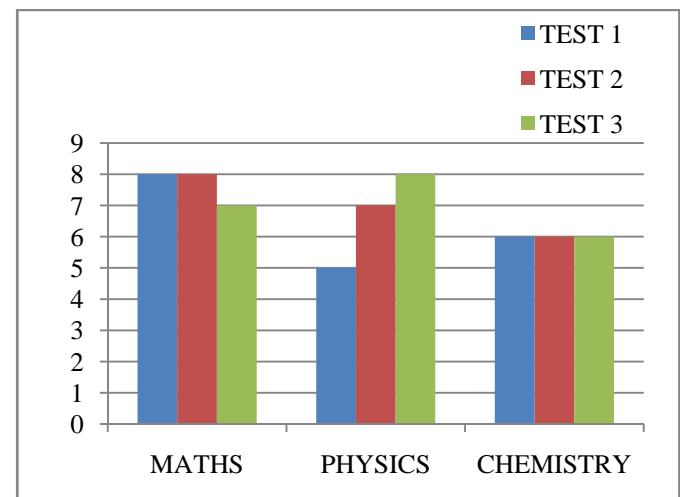**(b) Subject -wise Test Result Feedback :**

Graphical feedback

Fig. 1

5.3 Multiparametric Feedback

The basic idea of multiparametric feedback is that feedback should not only be based on only on specific parameter like score only but also it should be a detailed feedback analysis based on different assessment parameters as per the specification of learner and e-learning system. So the multiparametric feedback has the following unique features:

- Detailed feedback
- Analysis based on different parameters
- Conclusion oriented

Testwise Performance

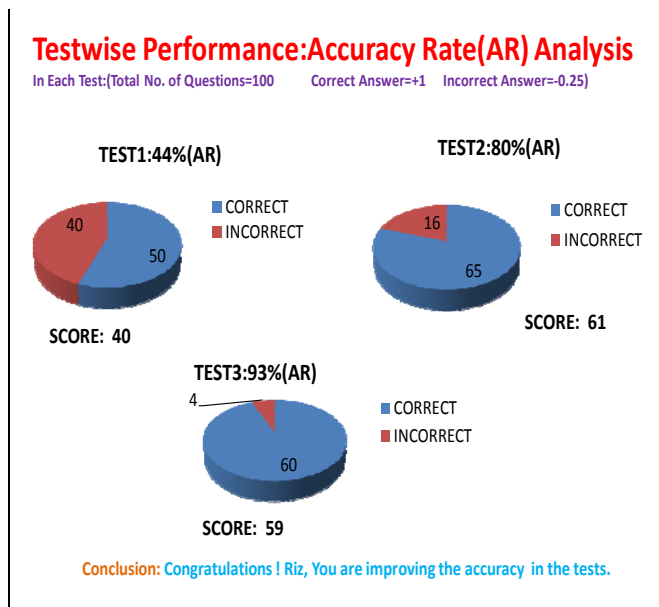**Table 2**

TEST No.	TOTAL NO. OF QUES-TION	COR-RECT	INCORR-ECT	MAR-KS
TEST1	100	50	40	40
TEST2	100	65	16	61
TEST3	100	60	4	59

Testwise Performance using Multiparametric Feedback feature:

Analysis based on

- Score,
- Questions attempted,
- Accuracy Rate

Test wise performance can be represented as follows:

6. CONCLUSION & FUTURE WORK:

Smart Feedback System based e-Learning Model provides a structure for systematically reviewing e-learning initiatives and programs specially from the perspective of feedback system.Smart Feedback System based e-Learning Model serves as an instrument that verifies that each aspect needed for an efficient e-Learning system is cultivated.Multiparametric feedback system is the key feature of this model.

As per the extensive literature survey done on different e-learning models, I came to the conclusion that the proposed model "Smart Feedback System(SFS) based e-Learning Model" can accommodate the following features that can be used for the extension of this model:

- Performance of learners where brief immediate tag based feedback is presented.
- The performance of the learners in the test with detailed graphical feedback.
- Performance of the learners in the test where multiparametric feedback is presented.
- Variations in the learning tendency of the users when the score in the tests are provided with concluding feedback.

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