Smart Feedback System Based E-leaning Model

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Abstract:**Feedback is an integral part of the learning and interaction in e-learning systems. Information the received from the system as the result of user's action. is considered as feedback..Teacher's comments, advice, and explanations all lead to the concept of feedback In general, the feedback in e-learning is involved throughout the use of e-learning system. 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 and proposed Smart Feedback System(SFS) based e-learning model. 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.

I. 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.

Feedback is a natural part of the learning as well as interaction in e-learning systems. Feedback might be perceived as information the user gets from the solution due to the response to his/her action. Feedback in e-learning is the technique that is likely to take the place of instructor who can provide comments, recommendation, and interpretations and evaluates the learners in traditional learning systems. In general, the feedback in e-learning takes place} not only in the assessment process, but can be provided to one throughout navigation through learning resources, discussions and collaboration with different learners, along the way of operate personal information and management of 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.

II. 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 communication technologies (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.

Most of the challenges associated with e-learning systems could be properly dealt with when there is an appropriate feedback delivering service combined with the system .This was recommended that feedback in a online learning system ought to have the following characteristics :

- appropriate , well-timed and comprehensive web based feedback
- continuing formative feedback regarding web based group discussions.
- continuing summative feedback about grades
- constructive, supportive and meaningful online feedback
- objective and individual online feedback, and
- standardized feedback.

According to Brusilovsky [6] a hypermedia application could be designed to the numerous features of the user just like knowledge , experience , choices , likes and dislikes , individual traits , objective and surrounding.The highly effective components of web-based training consist of regular and persistent , a subtle and evaluative online feedback . Bischoff [7] argued that learners require frequent feedback in so as to understand how their overall performance was assessed, and then the best way to enhance it, including how their score is calculated.

III. OBJECTIVES

Objectives of designing Smart 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.

IV. FEEDBACK

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 attributes might include the user's understanding of the topic being learned . User's understanding of the principal concepts , formulas etc . The number of faults the user can make during the period of the testing The characteristics that can be important for individual feedback adaptation in e-learning system:

- **Personal data:**

Personal details basically contains parameters

including, age , gender etc. The only actual personal utilization of personal details is to give a "personal touch" to the application , for example by including the user's name in the feedback . Example:

"Sorry, Rizwan. Your answer is incorrect

- **Knowledge:**

The user's answers to the test provides details about the user's understanding . However individual feedback adaptation signifies that other elements of the user's knowledge has additionally be the cause in the feedback

the student obtains . The feedback to a (incorrect) response might be further informative when it pertains to understanding the student presently possesses , possibly regarding associated topics . Example:

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

- **Interaction Parameters**

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

- ***Chronometric data*** *:* It refers to duration of watching the pages with learning resources , time duration for moving the question in the tests and the overall time spent on the project , the duration of idle time periods
- ***Try data*** *:* It refers to 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*** *:* It refers to consulted hyperlinks and sections , number of visits , the number that particular preferences have been done.

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

A. 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 include personal details like user's name[9].
This is also a matter of consideration that how the feedback should be represented and what should be the structure or format of feedback.

B. 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.

C. 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.[10]

V. Smart Feedback System (SFS) :

Smart Feedback System 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 counselors.[11].
The Smart Feedback System(SFS) is structured in different components and a stepwise presentation of the feedback, following its structure, is realized. The stepwise presentation offers the opportunity

(i) to provide gradually the appropriate feedback information to each learner, and

(ii) to enable learners at each step to exploit the feedback information and try again.

To this end, the stepwise presentation of the SFS represents a way of adapting the feedback to learners needs.

The following components are supported by Smart Feedback System(SFS):

A. First Component:

The Belief Prompt-Rethink Write (BP-RW)

This component take into consideration of the confidence of the student and enable him/her to rethink his/her perception and explain the answer [12] . The specification of the feedback produced presented by this component targets to facilitate students to think again about their perception as well as to enter into a self-explanation procedure as a way to determine any faults done generally accidentally .

B. Second Component:

Tutoring Feedback Units (TFU)

Tutoring Feedback Units (TFU) along with the E-TRQ (TFU+E-TRQ) are included . The specification of the particular feedback module focuses to (i) instruct students and redirect their thoughts by providing them an indicator , and (ii) instructor students by offering them to analyze learning stuff in line with the features of the predicted answer . The particular components are offered in accordance with the learners' specific features.

C. Third Component:

Correct Response(CR)

This component update learners about the correct response and associated explanations, if available.. The feedback components of the Correct Response (CR) or the CR along with the Explanation of the Response (CR+ER) are provided, according to the learners' individual characteristics .

D. Fourth component:

Performance Feedback (PF)

Lastly , in the 4th layer , students are updated their performance . The Performance Feedback (PF) component is presented after the finishing of the activity/task and facilitates students to get access on their learner model . At the beginning , the learner submits his/her answer , which is evaluated and characterized according to the proposed answer categorization scheme[13]. The feedback components of the first layer are provided (1st step) in all situations with the exception of from the situation of a "missing" answer .Then, the learner elaborates on the provided feedback information and gives a new answer or insists on his/her belief. The former case (new answer) initiates the evaluation process and the presentation of feedback starts from the beginning (1st step). The successor case initiates the provision of the feedback components of the second layer (2nd step) (or the 3rd layer in case the learner's answer is complete and accurate), giving student one more opportunity to exploit the feedback information.The feedback component of the fourth layer is provided after the end of the activity.

VI. Feedback Representation in Smart Feedback System (SFS)

Smart feedback system provides following three unique specifications of feedback representation:

- Concept Based Feedback
- Graphical Feedback
- Multiparameteric Feedback

A. 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".

B. 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 Subject-wise test results of a student of class tenth can be represented in the following two ways:

Subject -wise Test Result Feedback: Tabular Feedback

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

Table 1

Subject -wise Test Result Feedback :

Graphical feedback

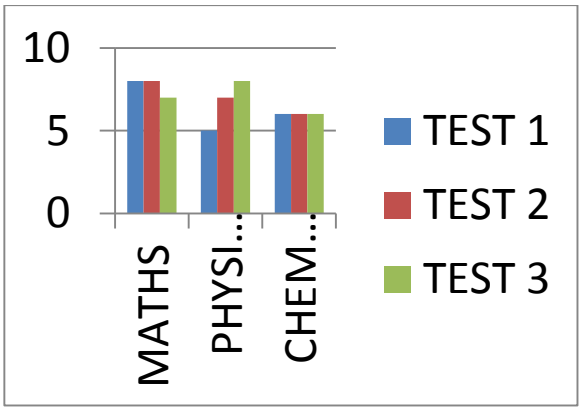

Fig: 1

C. Multi-parametric Feedback:

The basic idea of multi-parametric 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[14]. So the multi-parametric feedback has the following unique features:

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

Testwise Performance

TEST	TOTAL NO. OF	COR-REC	INCORR	MAR

No.	QUES-TION	T	-ECT	-KS
TEST 1	100	50	40	40
TEST 2	100	65	16	61
TEST3	100	60	4	59

Table 2

Test-wise Performance using Multi-parametric Feedback feature:

Analysis based on

- Score,
- Questions attempted,
- Accuracy Rate

Test wise performance can be represented as follows:

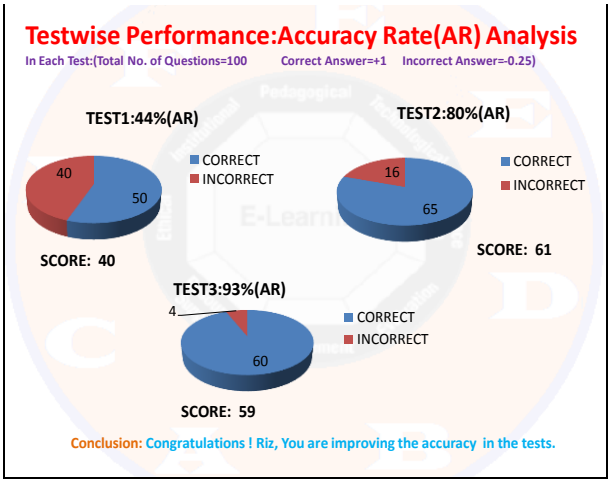

Fig: 2

VII. Conc

Smart Feedback System based e-Learning Model offers a design for methodically examining e-learning endeavors and programs exclusively from the point of view of feedback technique .

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 students in the exam with detailed graphical feedback.
- Performance of the students in the test where multi-parametric feedback is presented.
- Variations in the learning tendency(cognitive abilities) of the users when the score in the tests are provided with concluding feedback[15].

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. Multi-parametric feedback system is the key feature of this model.

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