

# Design Methodology of Online Counseling system on Basis of Adaptive E-Learning

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**Abstract**—E-learning has been more than around for ten years. It is probably the learning object that is assumed to be the learning content today. Commencing from computer-based delivery systems world, learning objects were idolized as Lego blocks or atoms. E-learning can be assumed as a part of lecture room or not that totally depends upon its implementation. It can be designated to as self-paced, non-synchronous training or can be drove by an instructor or can be renamed as concurrent learning. Distance learning is best matched to E-learning and also adjustable training, but can also be utilized with confronting teaching, where the terminology commonly used is blended learning. Realization of the alliance between individual characteristic versus education has been in history for a very long time. Though, just by merely accepting, comparing it to consistently testing this relation is nothing but two distinct things.

**IndexTerms**—Adaptability, e-Learning, Bayesian Network, Learning Navigation, Counseling

## I. INTRODUCTION

Adaptive learning can be termed as an educational method that tends to bring interactive teaching devices in the form of computers which in turn accustom the exhibition of educational entities according to the student learning necessities which is depicted by their acknowledgment to tasks and queries. The technology therefore includes concepts which are derived from numerous fields of study including psychology, computer science and education.

Adaptive learning was believed to be custom-made learning which cannot be obtained on huge scale using classical and non-adaptive methodologies and a flexible learning system which can be termed as adaptive intents to reconstruct the learner from static recipient of information to collaborative in the educational proceedings. Adaptive learning systems first and foremost function is in education, but business training is also another popular application. Hence these are devised as both web applications and desktop computer applications.

Adaptive learning is further termed as computer-based learning or adaptive instruction or adaptive educational database or computer-based pedagogical agents and also intelligent tutoring systems.

## II. LITERATURE SURVEY

In literature survey, the importance is on the pertinent past literature that used the various characterization techniques. Some of the researchers focus on sentence abstraction rather than sentence generation for text narration. Extractive narrations are tending to be weaker. Abstractive narration tends to be more powerful.

Gerhard Weber in Adaptive Learning systems suggested of constructing an Overlay Model for students. It would take knowledge of the student as a subset of the expert knowledge base and would judge the learning condition of the student by comparing the latter's performance with the knowledge that they should master.

The paper Analysis of Alarm Correlation Based on Bayesian Learning by Oeng Xing, LuomingMeng in the year 2007 emphasized on Bayesian Network as graphic approach that is established on Bayes' Theorem and the same is depicted by a directed acyclic graph (DAG).

Research on individualized teaching strategies of Adaptive teaching system by Bo Hongquan, in 2006 concentrates on student learning preference through a Bayesian Classifier and thereby generating personalized teaching methodologies. But, this research aims at only studying and constructing a system prototype of adaptive intellectual learning .

Research on Web-based Adaptive Learning Support System by Chen Pinde in the year 2003 tends to propose user modelling method along with a set of organizing and expressing program for knowledge. In addition to intellectual adaptability supported learning-supporting system, it also develops a prototype system known as A-Tutor. Due to lack of existence of an evaluation model, this system prototype has never been applied in adaptive e-learning practice .

Research on Adaptive Internet Learning System network-based by Shengquan Yu, Kekang 1999 presents the internet-based adaptive learning systems structured design. This Learning system has the role of learning content through adaptability presentation along with navigation of hypermedia learning space with the help of adaptability. However, this model fails to present a learner model or any such suitable adaptive algorithm.

The paper Research on Adaptive e-Learning System Using Technology of Learning Navigation by Meijing Guan, Jixuan, Yubing Yang in the year 2013 introduces the prototype of adaptive e-Learning system designs, strategy of adaptability

diagnosing plus the path strategy of adaptive learning along with models of system functional design, business flow design and data flow design.

### III. Problem Statement

Our main Moto is to achieve Adaptive learning via Online Counselling Application. In order to achieve this task we tend to apply the Bayesian Network Algorithm and IRT mechanism in order to achieve our goal so as to achieve the Goal of the System i.e. Giving Advice to students as to which field would be suitable for their Professional Future

### IV. Methodology

A Bayesian network or Bayes network can be defined as a set of random variables and their conditional dependencies through probabilistic graphical model that would be represented through a directed acyclic graph (DAG). If we take an example, Bayesian network can represent the probabilistic affiliation between diseases and symptoms. If the symptoms could be provided, the probabilities of the presence of various diseases can be computed by the network.

Bayesian networks can be referred to as directed acyclic graph where nodes mean random variables in the Bayesian terminology; they may be discoverable entities, inherent variable factors, and anonymous parameters or can be hypotheses. Conditional dependencies are represented by Edges; nodes which are disconnected depict variables that are conditionally not dependent. Every node is connected via a probability operation that accepts the input in the form of particular set of parent node variable values and gives output in the form of the probability or can be termed as probability distribution of the variable represented by the node.

This algorithm also builds using hidden Links and Bayesian Network, a system known as the adaptability navigation. The Bayesian Network decides the state of each node is through the Hidden Links part, and then according to learning objectives the nodes are removed. Lastly, the adaptability learning path is generated by adjusting the false path of the graph.

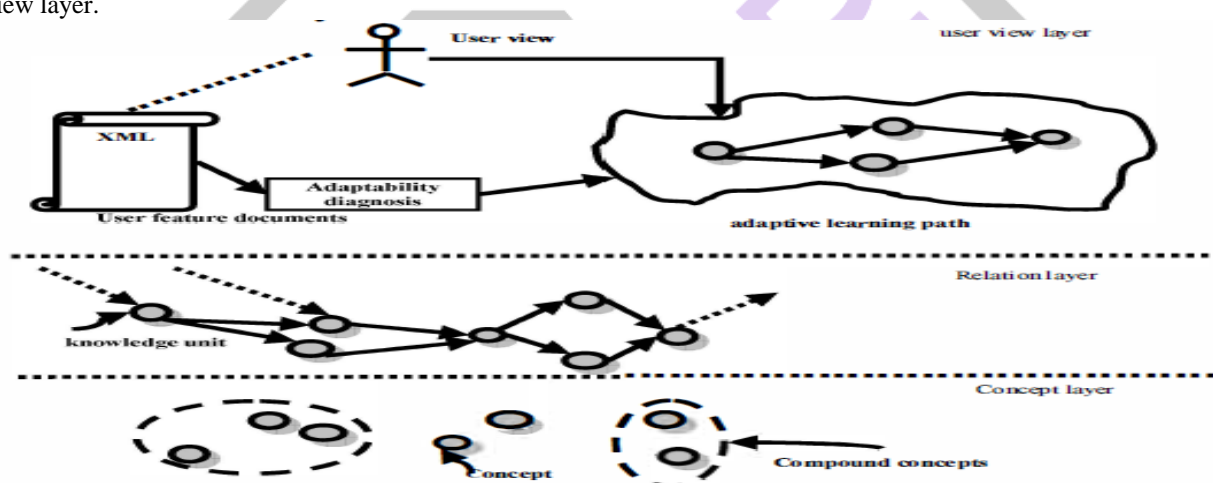
#### 1. Algorithm:

1. Build an empty set S.
2. Build a graph  $R(A, M)$  where  $A = \{ \text{all nodes of a concept set} \}$ ,  $M = \{ \}$ .
3. for all node  $A_i \in A$  do
4. Build an ordered set  $B = \{ \text{All require nodes of } A \}_i$ .
5. if B isn't empty then
6. Put all pair of nodes  $(b_i, a_i)$  into E where  $b_i \in B$
7. end if
8. end for
9. Set states of nodes.
10. for all  $A_i \in A$  do
11. Initiate a empty ordered set R.
12. if the level of  $A_i > \text{learning objective}$  then
13. Put  $A_i$  into U.
14. for all  $(A_i, A)$  where  $A_j \in A$ ,  $(a_i, a) \in E$  do
15. Put them into R and remove them from E.
16. end for
17. Initiate a empty set E'.
18. for all pair  $(a_m, a_n) \in R$  do

19. for all pair  $(ax, ay) \in M$  do
20. if  $ay = Am$  then
21. Put  $(ax, an)$  into  $M'$ .
22. Else
23. Put  $(ax, ay)$  into  $M'$ .
24. end if
25. end for
26. end for
27.  $M = M'$
28. end if
29. end for
30. Create a new graph  $R'(A- S, M)$ .

## II. Adaptive e-Learning system prototype

The prototype of Adaptive e-Learning system i.e. Fig 1 can be generally divided into 3 layers: concept layer, relation layer and user view layer.

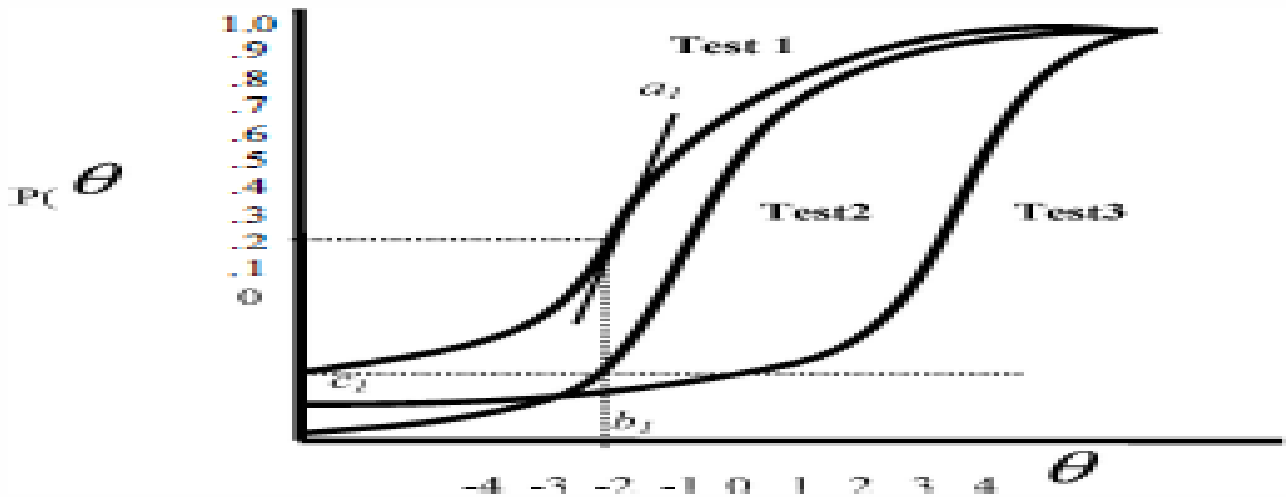


**Fig. 1 The prototype of Adaptive e-Learning system**

Concept layer or concrete layer can be used for concept storage. The realization of concepts or learning nature can be simple or can be a compound by applying or organizing different concepts. The function of Relation layer is to explain the interrelations between concepts. It also has the functionality of extracting from the concept layer, the specific concept or compound concept. In addition, it comprises of addition of a layer of definition and then converting it into a knowledge unit whose task is generating a generic learning path that lastly accumulates and form a course from these knowledge units. The Relation layer is defined as the reason and effect relation in the Bayesian Network. The father node is defined by using the concept Prerequisite, and the joint probability distribution of every random variable in Bayesian Network is defined by the content of Conditional Probability Table. The end layer or the user view layer is responsible for generating the adaptive learning path. The generation of the path is done by the comparison of general learning path which was created by the user profile and the second layer.

## III. Adaptability diagnosis design

The functionality of judge of learner's competence, in our case known as Adaptability diagnosis, is to evaluate students via calibrated test papers and, hence, evaluates student capability and proficiency with respect to knowledge of the specific field depending upon the student answers. Organizing the learning content dynamically is an important foundation for the system, and it can occur in the beginning, during climax or during mid process of learning. The assessor of student learning capability is a major mark in adaptive e-learning system since the same acts as the chief basis that the system understands pupils learning capability as well as cognitive capability. It is not possible to know learning needs of individual student's, just by conducting the adaptive learning based on student needs. With respect to adaptive diagnosis, item response theory (IRT) is the basis of the most widely used framework. That is the reason we embrace the 3-variable logistic model of Logistic Model in IRT, followed by the mathematical formula which is:

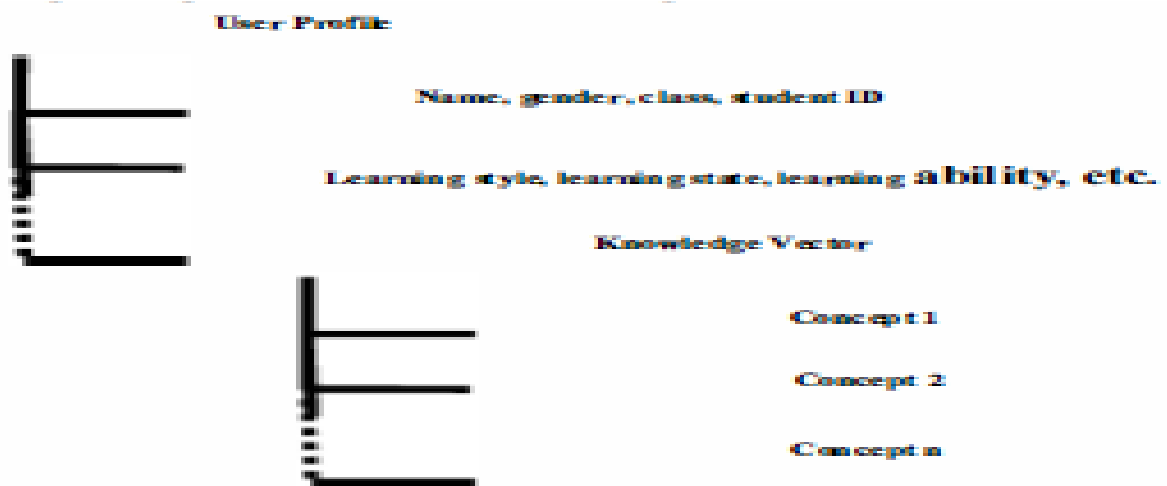


**Fig. 2 Item Characteristic Curve**

In the formula, the probability of students w.r.t competence parameter  $\Theta$ 's right feedback to the test is determined by  $B_i(\Theta)$  i.e.  $a_i$  substitutes the discrimination of test  $i$ ,  $b_i$  substitutes the respective complication, and  $c_i$  substitutes the respective false-chance parameter.

#### IV. Adaptability navigation design:

Since each learner bears their respective attributes, every learner bears their respective user profiles in e-Learning adaptive system. Presentation is in the form of User profile, and its pattern here is XML. Arrangement is depicted in Fig.3 which consists of different data of user's, such as name, purpose of learning, state of learning, capability of learning and progress of learning, etc. The model of adaptability navigation is perceived by creation of dissimilar path of adaptability learning by learner capability judge algorithm depending on the user file. item characteristic curve of "three-parameter logistic model" which is depicted in Fig.2 discusses about three different tests, which determines that the slope of the conjugation point is  $a_i$ , and the discrimination of the test is directly proportional to value,  $b_i$  is the  $\Theta$  of the  $P_i(\Theta) = 0.5$ , and its higher value just makes the test more tedious, cut-off of the characteristic curve is  $c_i$ , and its higher value just makes it simpler for the testis to predict the correct answer even if they don't have any idea about it. Hence, during the course of adaptive diagnosis, test with higher differentiation, lower pseudo-chance parameter and moderate complication is complimentary and adopts the test used in the system over a period of time, and the questions not concerning with the specification were adapted according to the stats of accuracy rate of each question so as to unravel learner's ability diagnosing algorithm.



**Fig. 3 User Profile Structure**

The adaptability navigation is built by utilising Hidden Links and Bayesian Network in which Bayesian Network in the Hidden Links part decides the the state in each node, and then according to learning objectives the nodes are removed. Lastly, the adaptability learning path is created by adjusting the false path.

#### V. System Overview

Online Career Counseling has emerged as a true legacy of modern technology to the new generation. Compared to earlier times when there were very few options available to the candidates, today there are a number of good remunerative career professional that are available to the students. Besides these, the current level of media exposure makes majority of students thoroughly confused. Many of these aspiring candidates and their parents are unaware of how to take this important Career Decision. At this point of time Career Counseling comes to the rescue of the students and parents. But accessing renowned and good Career Counselors still remains a big hurdle for the students and their parents.

The Questions in the question bank are to be taken from the relevant textbooks of 8th, 9th and 10th Grade. We have taken into Consideration the concept from Schema Theory that elaborates that all knowledge is organized into units. These units of knowledge, or can be called as schemata, information is stored. A schema can be defined as a generalized definition or a conceptual system for interpreting knowledge i.e. how knowledge is represented and how it is utilized.

From this theory we can conclude that if a student is aware of a particular low level concept then he would definitely be comfortable with its higher version.

The system summary is as given below:

Front End: PHP

Back End: MySQL

Students Requirements: After 10th

Goal of the System: Advising appropriate field to students for their Professional Future.

#### VI. Counseling Model

Pre Requisite for students: 10th Pass

Would consist of 4 set of questions:

- a) Science
- b) Commerce
- c) Arts
- d) Engineering

Will consist of 4 Levels of questionnaires with each level having difficulty level higher than the previous one

Level 1

Will Present Four Questions, each from 1 Set. The marks for correct answer will be allotted as per the formula (1 X (Level No.)) i.e. for Level 1 each correct answer would be allotted 1 mark with No Negative marking i.e.0 for wrong answer.

Level 2

Will Present Four Questions. Difficulty as well as Marks of each question would depend on the previous answer. The marks for correct answer will be allotted as per the formula (1 X (Level No.)) i.e. for Level 2 each correct answer would be allotted 2 marks only if the student has given correct answer for the same field in the previous level. Else the system would present a question of difficulty level 1 and marks would be allotted as per level 1.

## Level 3

Will Present Four Questions.

Difficulty as well as Marks of each question would depend on the Previous Level answer. The marks for correct answer will be allotted as per the formula (1 X (Level No.)) i.e. for Level 3 each correct answer would be allotted 3 marks only if the student has given correct answer for the same field in the previous level. Else the system would present a question of next level of which student has answered and marks would be allotted as per that level.

## Level 4

Will Present Four Questions. Difficulty as well as Marks of each question would depend on the Previous Level answer. The marks for correct answer will be allotted as per the formula (1 X (Level No.)) i.e. for Level 4 each correct answer would be allotted 4 marks only if the student has given correct answer for the same field in the previous level. Else the system would present a question of next level of which student has answered and marks would be allotted as per that level.

## Score Calculation

Each of the 4 field will have separate individual calculations. The field having a higher score will be the winning field and that field would be advised to the student.

In Case of score Ties we will have a look at 3 Cases

Best Case

Worst Case

Average Case

i. Best Case

a) Brilliant Student.

b) Gives Correct Answers of each of the 4 field questions of all levels.

c) Final score has a tie in all field i.e. has 10 marks in every field

d) In such cases, the History of student i.e. 10th Mark sheet is referred and Decision is made

ii. Worst Case

a) Worst Student

b) Gives Wrong Answers of each of the 4 field questions of all levels.

c) Final score has a tie in all field i.e. has 0 marks in every field

d) In such cases also, the History of student i.e. 10th Mark sheet is referred and Decision is made.

Average Case

a) Average Student

b) Gives Answers of each of the 4 field questions of all levels according to his/her calibre.

c) Final score has a tie in more than 1 field i.e. has 7 marks in science and Engineering field

d) In these cases also, the History of student i.e. 10th Mark sheet is referred and Decision is made.

## V. CONCLUSION

Big opportunities for the improvement of education are being evolved through the fast transformation of computer network. E-Learning has emerged and is providing its learners with complimentary learning habitat, upscale resources; in addition it also expands the space and time for teaching. Adaptive e-learning is evolving into a well discussed topic in the research recently. But, out of these most are uninvolved with adaptive instruction, instead, they are more into adaption of the content format to meet the requirement of the delivery device, more incline to form base of their adaptively on evaluations of upcoming content theory or material adjustments, less satisfactory foundation than reasoning functionalities for making adaptive instructional judgments. It is hence believed that the hour to design reliably e-learning systems that can bring exclusively successful, persuasive, and compelling experience of learning, designed to satisfy meet the requirements of the individual learner has arrived. The appropriate components in such a customized learning environment include a variety of characterization learner information and content elements, in addition with healthy, accurate rhyming between appropriate content and learner characteristics or features. The final outcome is adaptive e-learning, an addition to the field of educational psychology and deployment of an adaptable system of Online Professional Counseling. This paper discovered the construction and comprehension of learning via adaptability.

## REFERENCES

- [1] Meijing Guan, JixuanJia, Yubing YANG: Research on Adaptive e-learning Based on Technology of Learning Navigation, 2013
- [2] Oeng Xing, LuomingMeng: Analysis of Alarm Correlation Based on Bayesian Learning, 2007.
- [3] Hongquan Bo, Research on individualized teaching strategies of Adaptive teaching system, Nanjing Normal University, PhD thesis, 2006.
- [4] Yingfen Ma, Teaching and learning under network environment and Teaching Models of Network Beijing Science Press, 2005.
- [5] Pinde Chen, Research on Web-based Adaptive Learning Support System, South China Normal University, PhD thesis, 2003.



- [6] Gerhard Weber, Adaptive learning systems in the World Wide Web, Proceedings of the seventh international conference on User modelling. New York, Inc, 1999.
- [7] Shengquan Yu, Kekang He: Research on Adaptive Internet Learning System network-based Third Global Chinese Conference on Computers in Education, 1999.
- [8] M.Villano, Probabilistic student models: Bayesian belief networks and knowledge space theory Proceedings of 2<sup>nd</sup> International Conference on Intelligence Tutoring System, 1992.
- [9] Elaine Rich, User Modelling via Stereotypes, Cognitive Science, 1979

