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The Effects of Chemical Hazards in Sustainable Development of Agriculture Using Fuzzy Associative Memories (FAM)

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Abstract- The effect of innovative methods of teaching in education are needed today's education system where the system is unfair in many ways like providing knowledge, judging the student and formation of a student. Little changes and effort will bring effective change in the life of the students and will not only learn the subject but also will learn some special skills needed for life. In this paper we analyze the effects of innovative methods of teaching in education using Fuzzy Associative Memories (FAM). We arrive at the conclusions by this study how the new methods will help in development of the education system. This paper has four sections. In section one we recall the notion of Fuzzy Associative Memories (FAM) and its properties. In section two we describe the problem. In Section three we adopt FAM to this problem and analyze the problem. Section four gives the conclusions based on our study.

Keywords- innovative methods, passive and active learning, teacher centered, student centered, retaining of information, Fuzzy Associative Memories (FAM)., special fuzzy matrix.

I. FUZZY ASSOCIATIVE MEMORIES (FAM) AND ITS PROPERTIES

In this section we give the essential definitions and results so as to make the paper a self contained one.The Unit hypercube $I^n = [0, 1]^n = [0, 1] \times ... \times [0, 1]$ product of [0, 1] taken n-times consists of the set of all vectors of length n and the coordinates are taken from the unit interval [0, 1].In general fuzzy sets μ are maps from a universal set X to the unit interval [0,1].

i.e., $\mu : X \to [0, 1]$Throughout the paper by a fuzzy set we mean a point in the unit hypercube. Thus in this paper we do not take the usual fuzzy sets i.e., a map μ from a universal set X to the unit interval [0, 1].Fuzzy system defines mappings between cubes. Fuzzy system S maps fuzzy sets to fuzzy sets. Thus the fuzzy system S is a transformation. i.e., $S : I^n \to I^p$ where n and p are finite positive integers. The n-dimensional unit hypercube I^n consists of all the fuzzy subsets of the domain space $X = \{x_1, ... ,x_n\}$; $x_i \in R$, i=1,...,n. Similarly I^p consists of all the fuzzy subsets of the range space $Y = \{y_1,...,y_p\}$; $y_i \in R$, i=1,...,p. Hence X denotes a subset of R^n and Y denotes the subset of R^p.The function f maps n-vectors in X to p-vectors in Y. The continuous function f maps small changes in input to small changes in output i.e., if the input patterns are close to one another then the output patterns are close to one another. The system maps similar inputs to similar outputs and so estimates continuous functions.

A. Fuzzy Associative Memories (FAM)

Fuzzy system $S : I^n \to I^p$ maps balls of fuzzy sets in I^n to balls of fuzzy sets in I^p. This continuous fuzzy system behaves as an associative memory known as fuzzy associative memory. Let A and B be the fuzzy subsets of X and Y respectively where $X = \{x_1, ... ,x_n\}$ and $Y= \{y_1,...,y_p\}$. A defines a point in the n-dimensional unit hypercube I^n and B defines a point in the p-dimensional unit hypercube I^p. Equivalently A and B define the membership functions m_A and m_B respectively that map the elements x_i of X and y_j of Y to [0,1] . The membership values will be known as fit values which indicate how much x_i belongs to or fits in the subset A and how much y_j belongs to or fits in the subset B. Therefore we say that $\{x_1, ... ,x_n\}$ is the fit vector that represents A and $\{y_1,...,y_p\}$ is the fit vector that represents B . We describe this with the abstract functions.
$m_A : X \to [0, 1]$, $m_B : Y \to [0, 1]$.Since in this paper the fuzzy sets A and B are points in unit hypercube, one can view A and B as natural vectors. Represent A and B by numerical fit vectors (if the fit values are given numerical values then the fit vector is known as numerical fit vector).

$A = \{a_1, ... ,a_n\}$ and $B = \{b_1, ... ,b_p\}$,
where $a_i = m_A(x_i)$ and $b_j = m_B(y_j)$.

The fuzzy set association (A_i, B_i) is named as a "rule". The antecedent term A_i in the fuzzy set association (A_i, B_i) is known as input associate and the consequent term B_i is known as output associate.The FAM system maps points A_j near A_i to points B_j near B_i. The closer A_j is to A_i, the closer the point (A_j, B_j) is to (A_i, B_i) in the product space $I^n \times I^p$. In this sense FAMs map balls in I^n to balls in I^p.That is only FAM can give results which are graded or it not only gives the solutions but the gradation of importance of each solution.

II. DESCRIPTION OF THE PROBLEM

A. Introduction

Teaching is a process intended for learning by inducing a behavioral change in the taught. It is an art of communicating a

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message with impact on audience. The purpose of teaching is creating knowledge awareness and feelings in the taught and brings about behavioral change. It does not man always reading the book and memorizing then vomiting in exams. This is why we mentioned before as our system is often unfair. Our examination and evaluating students is not even for everyone. Many are not good in memorizing but talented in other skills which should be considered and need for life. Society is not in the need of people who will remember formulas but who will apply it in practice and bring solution. If our system is good enough then students will surely know what they learn and for what they are learning the subjects. But the true case is they are always in confused state why we need to study all these and sometime their career and life totally different from what the study. This shows how our system educates the student. Our subject and ultimate target of education is to make money where even the good lessons given in the subjects are forgotten after vomiting in examination and not practiced in life and this is the saddest part of our system.

If not the recent violence against teachers and staffs would have not taken place. We tried to bring about what had to be done to rectify this among so many types. The process of education should have certain characteristics which will fulfill the need of education. Teacher should have no communication barrier as well as he would love for the subject he teaches and love on students he handles. Teacher should be well prepared in his topic which he deals about. The message or content which is going to be passed from the generation of teachers to generation of students should be clear. The complicated and advanced level which cannot be understood by most of the students should not be passed, this will bring hatred in the hearts of students on the subject. Content should be taught sensitized and receptive.

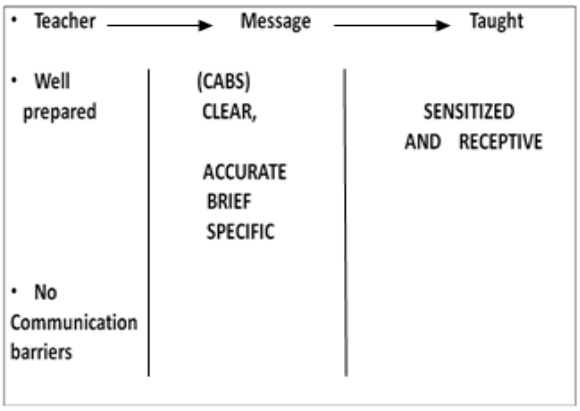

Figure :1

By the way of teaching it can be divided by four different types of teaching namely active, passive, learner centered and teacher centered. We can say neither this one of this type is good nor the other bad. Students and mental ability is not always stable and constant. It differs from student to student and time to time but still following one of these types we can bring them normal and constant. Clearly students today are different from students yesterday. In this case our teaching styles and methods may not fit with students' learning styles. This will lead to problems in class rooms. Whenever this disagreement between teacher and student take place following event take place in class rooms. Namely

- Lack of student involvement
- Noise
- Cheating in exams
- The students may not attend the class
- The students may not listen to the teacher
- The students may not do their homework or tasks
- The students may come to the class on purpose
- The students do different kinds of things in the class such as sleeping or drawing pictures

As solution for above problems the teaching methods should get along with the wavelength of the students. İn this paper we have discussed about most useful and prefered methods used in teaching also the stages of learning and studying are discussed. We need to know where and whom to use the methods so that it will bring good impact in students. The methods of teaching we discuss in this paper which successfull in bringing good effect in the education system and students' learning are given below.

- Lecturing
- Seminar
- Experimental learning
- Work shops
- Group discussions

B. Lecturing

Lectuing may look old type and may not look like inovative but the innovation lecturing lies in the way of the teacher handling the student during lecturing. İt is not always boasting the subject but need some sense of humour to keep class room alive and active. Using practical examples and incidents and relating with real life will keep the lecture interesting and useful. But make the examples go out of content and boring. Using the things which are already in book may sound boring so teacher should take something other than the text book so that student will prefer listen.

C. Seminar

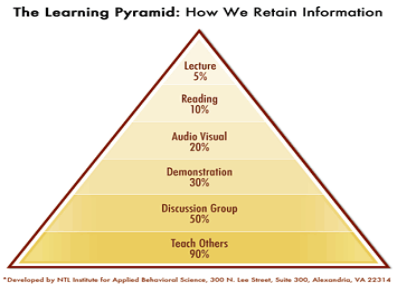

Figure :2

In the figure 2.2 the percentage information we retain after learning from different methods are given. From the figure the maximum amount retained only from teahing others. Which says the truth of teachers also learn while teach. This chances of teaching as wells as reading to learn are given to students by method of seminars.Student takes the effort of finding what they teach and they put effort to learn well so that they teach

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and pass information well which also increases their communication skills.

D. Experimental Learning

From the figure 2.2 we also find the result of using experimental learning. We learn 30% by demonstration and this will bring interest for student to learn and know better.

E. Work shops

Work shops will give chance to students express what they learnt and expose their knowledge of information with everyone. They will also have some special learning from their friends.

F. Group Discussions

Students have the tendency to learn from their friends better by being with them and learning with them. This produces good effect in students in retaining information next to teaching others. In group discussions students will learn how to communicate and team work which will help them to become good social animal.After having few most helpful innovative methods we also need to find where to use those methods. We will not be able to use certain methods with certain people. We characterize education in the following stages.

- Primary schooling
- Vocational learning
- Secondary schooling
- Higher studies

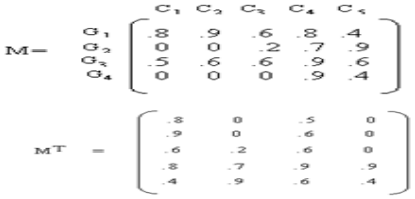
III.ADAPTATION OF FAM TO THE PROBLEM

Let us consider there are n attributes say x1, ... ,xn where n is finite associated with the innovative methods of teaching and let y1, ... ,yp be the attributes associated with the types of education, where p is finite. On the suggestion of the expert who is a professor in our college with years of experience in teaching various students and my 23 years and still carrying on experience of learning the following attributes are taken.

C_1 - Lecturing.
C_2 - Seminar.
C_3 - Experimental learning.
C_4 - Workshops.
C_5 - Group discussions.
G_1 - Primary schooling.
G_2 - Vocation learning.
G_3 - Secondary schooling.
G_4 - Higher studies.

Here we analyze this problem only on the aspect of retaining the information in different stages of education by new methods of teaching. The related fuzzy matrix M formulated using the experts opinion is as follows: Consider a fit vector

So our teaching methods and skills also should be different and dynamic in education. These methods should match with learning style of students.



$$M^T = \begin{bmatrix} .8 & 0 & .5 & 0 \\ .9 & 0 & .6 & 0 \\ .6 & .2 & .6 & 0 \\ .8 & .7 & .9 & .9 \\ .4 & .9 & .6 & .4 \end{bmatrix}$$

$$B = (1\ 0\ 1\ 0\ 1)$$

i.e. lecturing, seminar and group discussion –related to the outcome effect in education system are taken as on state of the fit vector. We compute the recalled component by taking the fuzzy inner product of fit vector B with j^{th} column of M for each column

$B \circ M^T = A = (.8\ .9\ .6\ .4)$

According to the fit vector A, we see that the Government has not taken any legal remedies to improve vocational learning which has the maximum value 0.9. Secondly the fit vector reads primary schooling to be taken good care by Government to with second maximum value 0.8. The Government has not taken any steps in secondary schooling which is the third graded value. Taking the resultant A as the fit vector now we calculate A o M. i.e., $A \circ M = (.8\ .8\ .6\ .8\ .9)$. Since 0.9 is the largest value it implies the priority is given to bring group discussion. Thus according to this expert, the first place is given to C_5. The next largest value is 0.8 given to the attributes C_1, C_2 and C_4 where to give importance and special effort for lecturing, seminar and workshops.Now suppose we consider the fit vector $B_1 = (1\ 0\ 0\ 0\ 1)$,to give preference to lecturing and group discussion which will make student dynamic skilled. Consider $B_1 \circ M^T$, as before we compute by recalling fit vector as

$B_1 \circ M^T = (.8.\ 9.\ 6\ .4) = A_1$.

Thus from this resultant fit vector we see that the on state of C_3 does not influence the model the resultant fit vector is the same. Suppose we take $A_1 = (1\ 0\ 1\ 1)$ which implies that primary education, secondary schooling and higher studies, or in the on state we get $A_2 \circ M = (0\ 0\ .2\ .9\ .9)$. The resultant vector means that the highest grade is being given to develop workshops and group discussions.

IV.CONCLUSIONS

In Bringing Change In Education System Which Are Effective In Students' Goodness, The Interest Of Students Should Be Taken In Consideration. Students Today are Not Like Students of Yesterday.By this paper we want suggest that methods of group discussions and seminars should be also followed with innovative lecturing. Chances for workshops will help better with above methods.Teaching is an art, which is acquired by passion and love for students and on subject.

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