



## ADVANCED E-LEARNING MODEL AND ARTIFICIAL EMOTIONAL INTELLIGENCE

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Article Received on 15/11/2018

Article Revised on 06/12/2018

Article Accepted on 27/12/2018

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### ABSTRACT

The research and development on Artificial Intelligence (AI) with Artificial Emotional Intelligence (AEI) issues and associated challenges is fast coming up as an emerging area of research. It has been observed that the current research and development activities on

AI based systems do not have enough data on the emotional aspects of human intelligence. Therefore, all the emotional issues are to be incorporated in future artificial intelligence based systems. We have studied some of the emotional intelligence issues from various respondents, the faculty members of different background, different locations, different experiences, different designations and age group. We have proposed an advanced e-learning model which will evaluate the performance of the students.

**KEYWORDS:** Artificial Emotional Intelligence, Artificial Intelligence, Human Intelligence, Faculty members, e-learning.

### INTRODUCTION

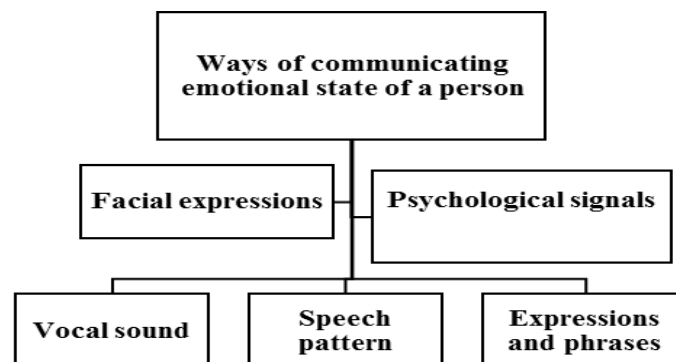
The research activities on Artificial Intelligence (AI) has been able to include several important components like the recognition of pattern and voice, identification of face and machine learning. However, it has been observed that AI should be able to include various emotions like surprise, happiness, anger, fear, frustration, impatience, disappointment, frustration etc. Human emotions are deeply associated with several parameters (Kumar et. el. 2018).<sup>[1,2]</sup>

Emotional Intelligence separates us from the machines. The functions of emotional intelligence are given in Table 1. It includes the activities and functions of artificial emotional intelligence.

**Table 1: Emotional Intelligence, Functions and Activities.**

<b>Emotional Intelligence</b>	<b>Functions of Human Emotions</b>	<b>Activities of Human Emotions</b>
is the ability to recognize, understand and manage one's own emotions	Emotions include the ability to identify them	ability to recognize human emotions
is the ability to recognize and influence the emotion of others	to recognize their powerful effects	ability to respond appropriately
	to use that information to guide behavior	

Thus, the recognition and understanding of human emotions is of paramount importance for artificial emotional intelligence systems Kumar *et. al.* (2018).<sup>[1,2]</sup> The research and development activities in the recent years have made it possible to include emotions into machine intelligence. It is possible to develop a system that allows the computer to recognize human feelings using physiological reactions and facial features. The possible ways of data communicating the emotional state of a person to a machine are many and are shown in Fig.1. Thus, understanding emotions of large section of the people will help in artificial intelligence for future machines.<sup>[1,2]</sup>



**Fig. 1: Ways of Data Communicating the Emotional State of a Person to a Machine.**

### **I. Characteristics of the respondents**

We have conducted research on the faculty members of different gender, age group, teaching experience, discipline and location etc. The data at 6 different locations (Ranchi, Patna, Lucknow, Indore, Noida, Chennai) was collected from 1000 faculty members. In this paper, we will first report the results of 10 emotions.

## II. RESULTS FOR EMOTIONS

**1. I know when I am happy:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 2. We have observed variation with respect to the location and gender. In male, it varies from 94 % to 98 % whereas in females it varies from 88 % to 94 %. The average being 96 % and 92 % respectively.

**2. I know when I am sad:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 3. We have observed variation with respect to the location and gender. In male, it varies from 89 % to 96 % whereas in females it varies from 88 % to 92 %. The average being 93 % and 90% respectively.

**3. I know when I am surprised:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 4. We have observed variation with respect to the location and gender. In male, it varies from 89 % to 94 % whereas in females it varies from 85 % to 90 %. The average being 92 % and 88% respectively.

**4. I know when I feel fear:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 5. We have observed variation with respect to the location and gender. In male, it varies from 89 % to 94 % whereas in females it varies from 85 % to 90 %. The average being 92 % and 88% respectively. This is identical to the previous question related to surprise.

**5. I know when I am disgust:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 6. We have observed variation with respect to the location and gender. In male, it varies from 88 % to 93 % whereas in females it varies from 85 % to 90 %. The average being 91 % and 88 % respectively.

**6. I know when I feel disgust:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 7. We have observed variation with respect to the location and gender. In male, it varies from 90 % to 93 % whereas in females it varies from 87 % to 90 %. The average being 92 % and 89 % respectively.

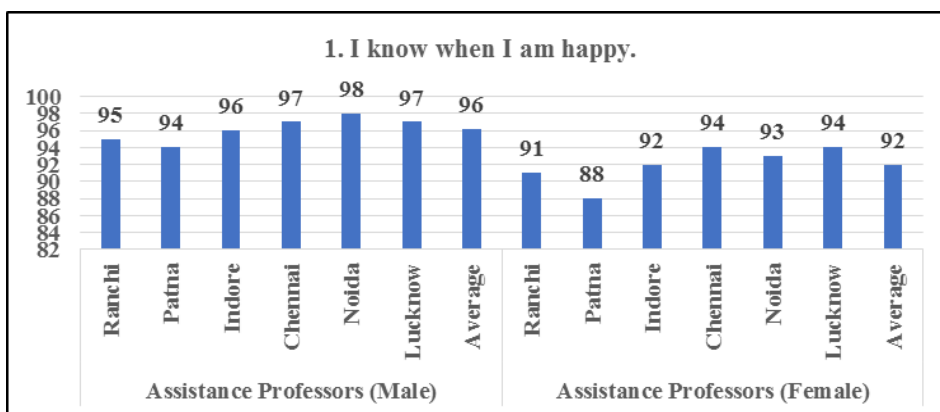
**7. I know when I feel boredom:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 8. We have observed variation with respect to the location and gender. In male, it varies from 88 % to 90 % whereas in females it varies from 84 % to 89 %. The average being 90 % and 87 % respectively.

**8. I know when I feel hopeful:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 9. We have observed variation with respect to the location and gender. In male, it varies from 88 % to 92 % whereas in females it varies from 88 % to 90 %. The average being 90 % and 91 % respectively.

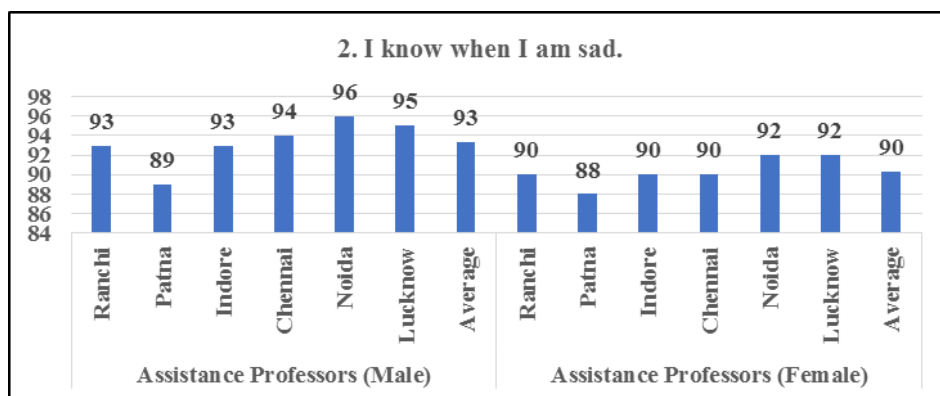
**9. I know when I feel anger:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 10. We have observed variation with respect to the location and gender. In male, it varies from 94 % to 98 % whereas in females it varies from 91 % to 94 %. The average being 96 % and 92 % respectively.

**10. I know when I feel shame:** The responses of the Assistant Professors (Male and Female) to this question is shown in Fig. 11. We have observed variation with respect to the location and gender. In male, it varies from 90 % to 93 % whereas in females it varies from 87 % to 90 %. The average being 91 % and 88 % respectively.

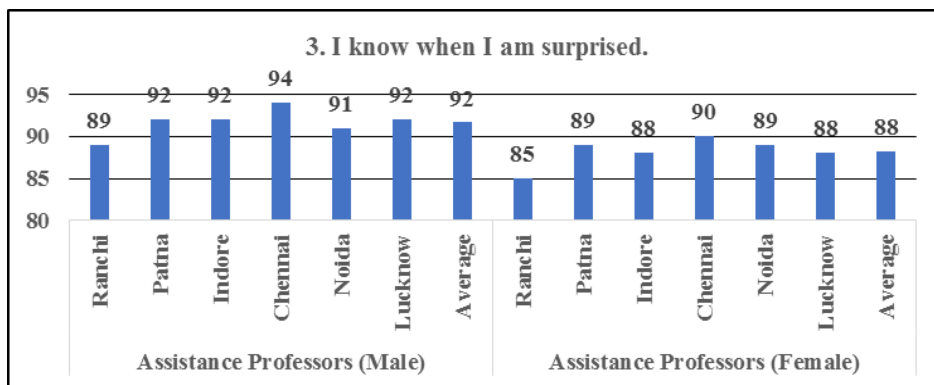
The corresponding results for Associate Professors and Professors shows that they are more or less similar in nature with marginal changes and hence are not discussed.



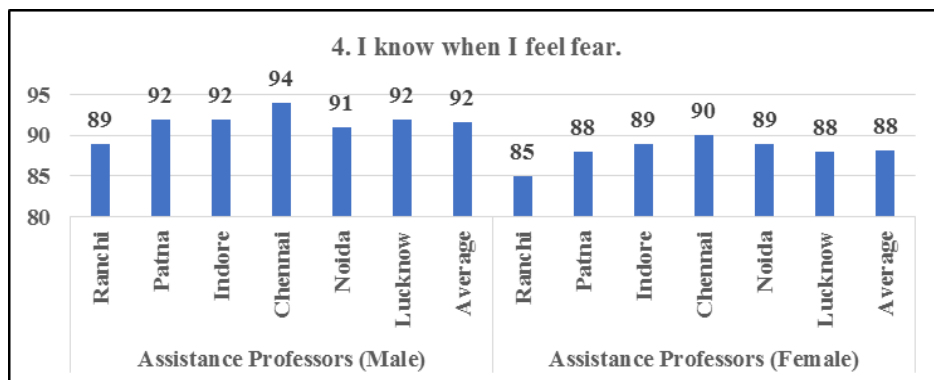
**Fig. 2: Response of the Faculty Members to the Question 1 (%).**



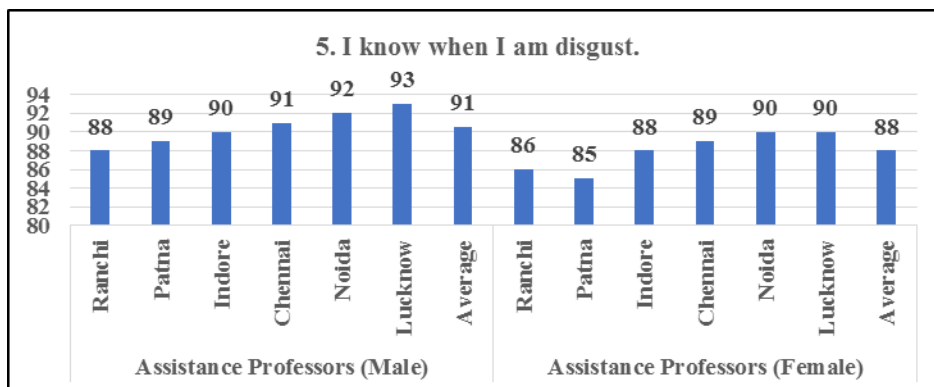
**Fig. 3: Response of the Faculty Members to the Question 2 (%).**



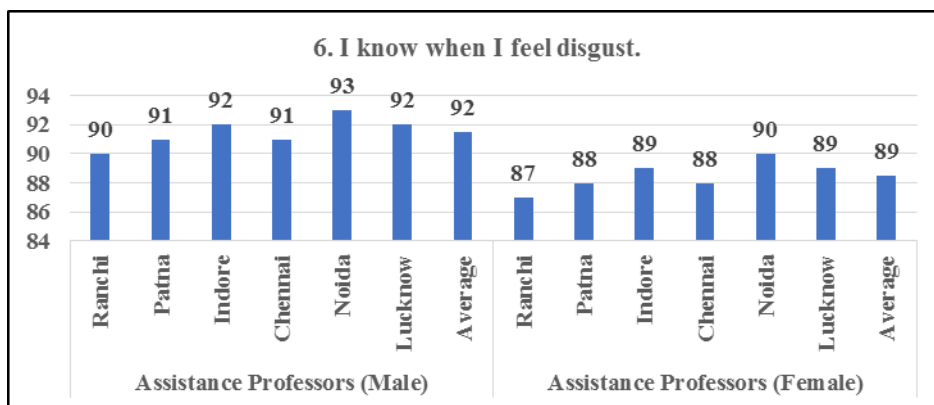
**Fig. 4: Response of the Faculty Members to the Question 3 (%).**



**Fig. 5: Response of the Faculty Members to the Question 4 (%).**



**Fig. 6: Response of the Faculty Members to the Question 5 (%).**



**Fig. 7: Response of the Faculty Members to the Question 6 (%).**

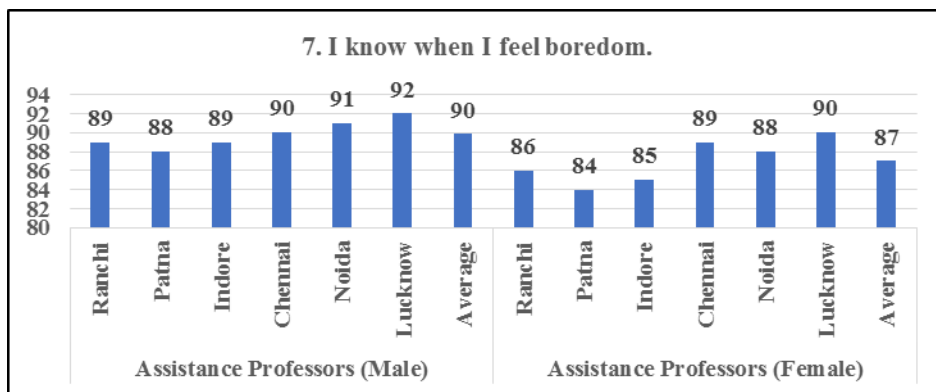


Fig. 8: Response of the Faculty Members to the Question 7 (%).

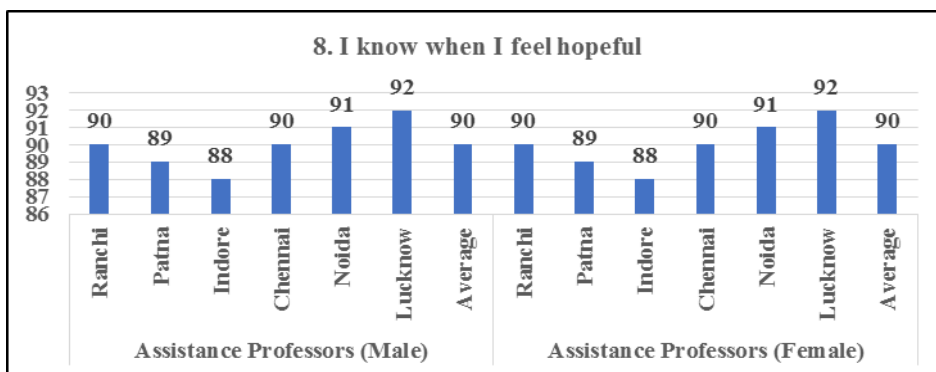


Fig. 9: Response of the Faculty Members to the Question 8 (%).

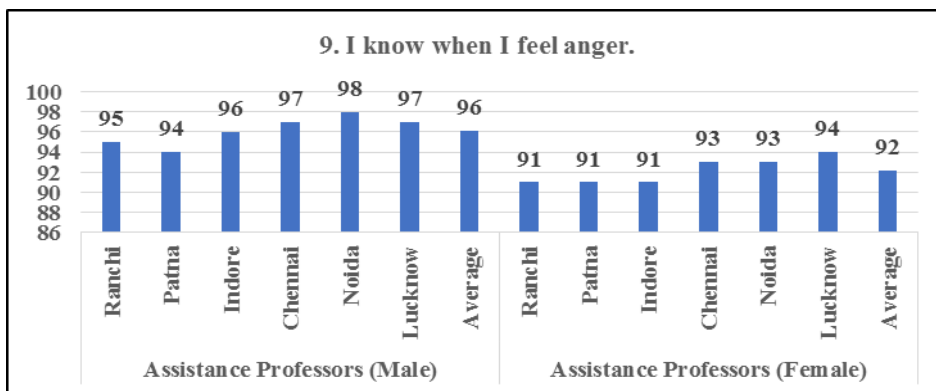


Fig. 10: Response of the Faculty Members to the Question 9 (%).

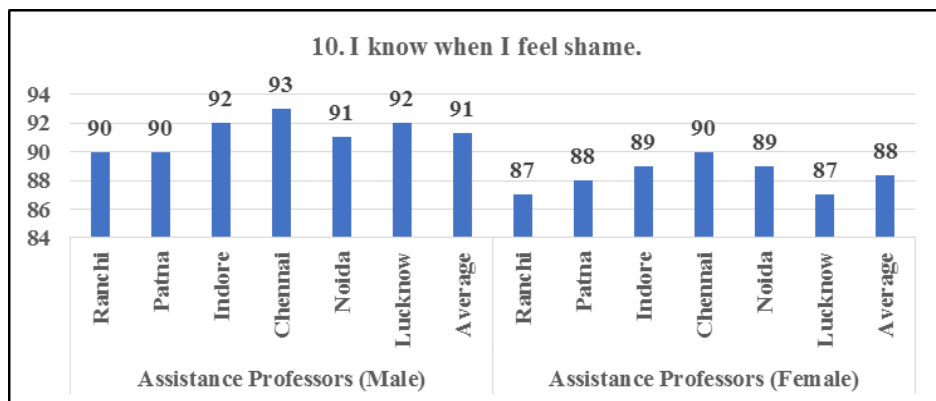


Fig. 11: Response of the Faculty Members to the Question 10 (%).

### III. Interactive Open Education Resources (OER) (Advanced e-learning)

Once we understand the emotions of the faculty members, it is important that they are built in learning model. In an interactive OER (advanced e-learning), the system will evaluate the performance of the students in successive manner i.e. as and when they are able to understand the subject. This requires modification of existing OER as shown in Fig. 12.

The methodology of how students will read, learn and how the system will evaluate the performance is described below:

#### (1) Get Started

- Student enters the Lab housing necessary infrastructure for OER reading etc. if he wants to read and then to be evaluated by the system.
- Otherwise he can read at anytime and anywhere.

#### (2) Start Reading

- After identification of the student, the student is allowed to download the material of Unit 1.
- He reads the material as per his convenience within the allotted time (1 to 8 hrs).

#### (3) Get Examined

- After one hour or so the system will ask the student whether he would like to be tested for Unit 1. The student will respond with either Y or N.
- In case of Y, the system will open a new screen containing 5 or 10 objective type questions. The student will attempt the questions and would submit his answers. The system will immediately evaluate the performance.
- In case of N, the student will continue to read the same unit until he clears it.

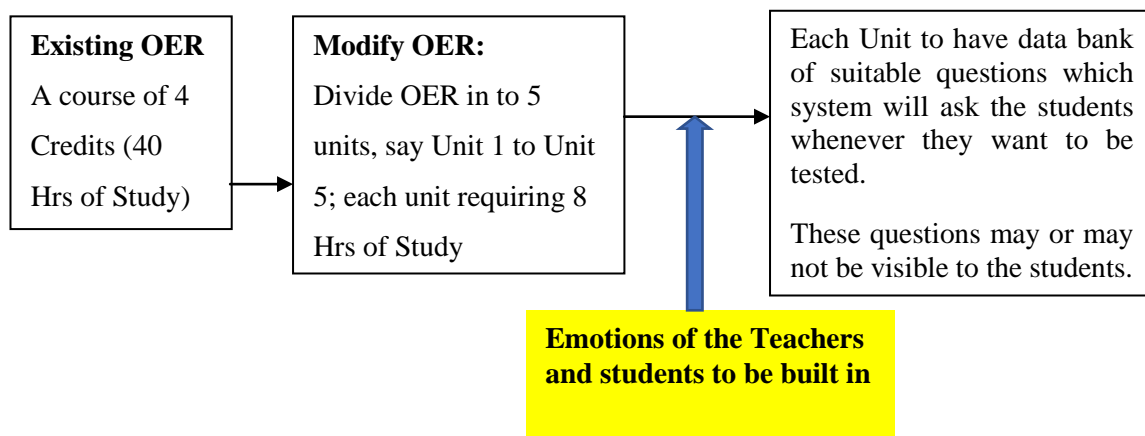
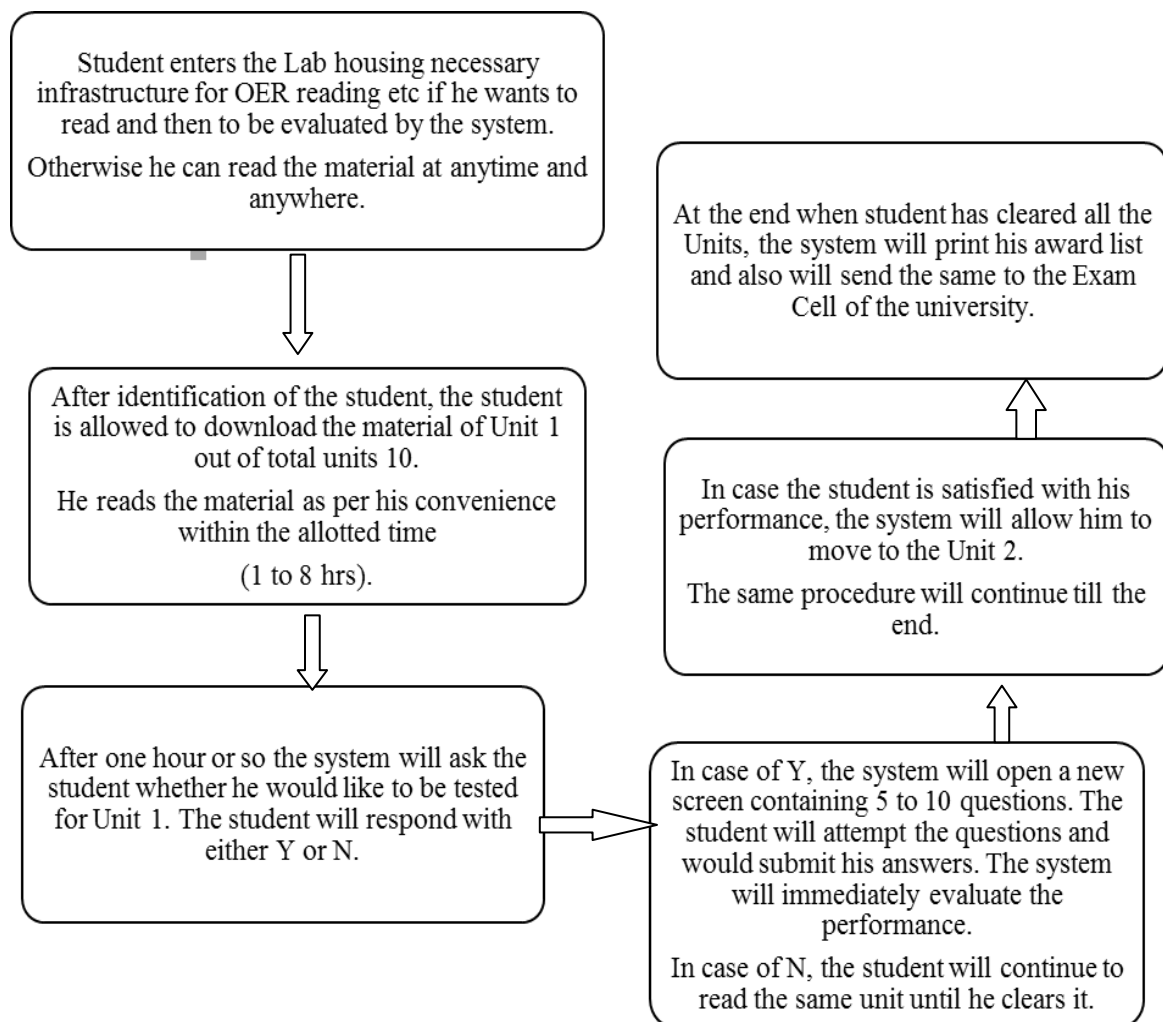


Fig. 12: Modification of Existing OER.

**(4) Clear the Course**

- In case the student is satisfied with his performance, the system will allow him to move to the Unit 2.
- The same procedure will continue till the end.
- At the end when student has cleared all the Units, the system will print his award list and also will send the same to the Exam Cell of the concerned university.

The entire process is described in Fig. 13.



**Fig. 13: Operational Scheme for Advanced e-learning.**

**IV. E-learning and Emotional Intelligent Models**

The e-learning environments has now started to consider the emotional state of the teachers as well as learners for enhancing their capabilities and performance. The emotions, if built in the e-learning and evaluation process, will help in a big way not only the students but also the teachers and the institutions.



We have proposed an advanced evolving e-learning system originally developed by Tang and Mccalla (2002).

The architecture of the proposed system having all the necessary components is shown in Fig. 14.

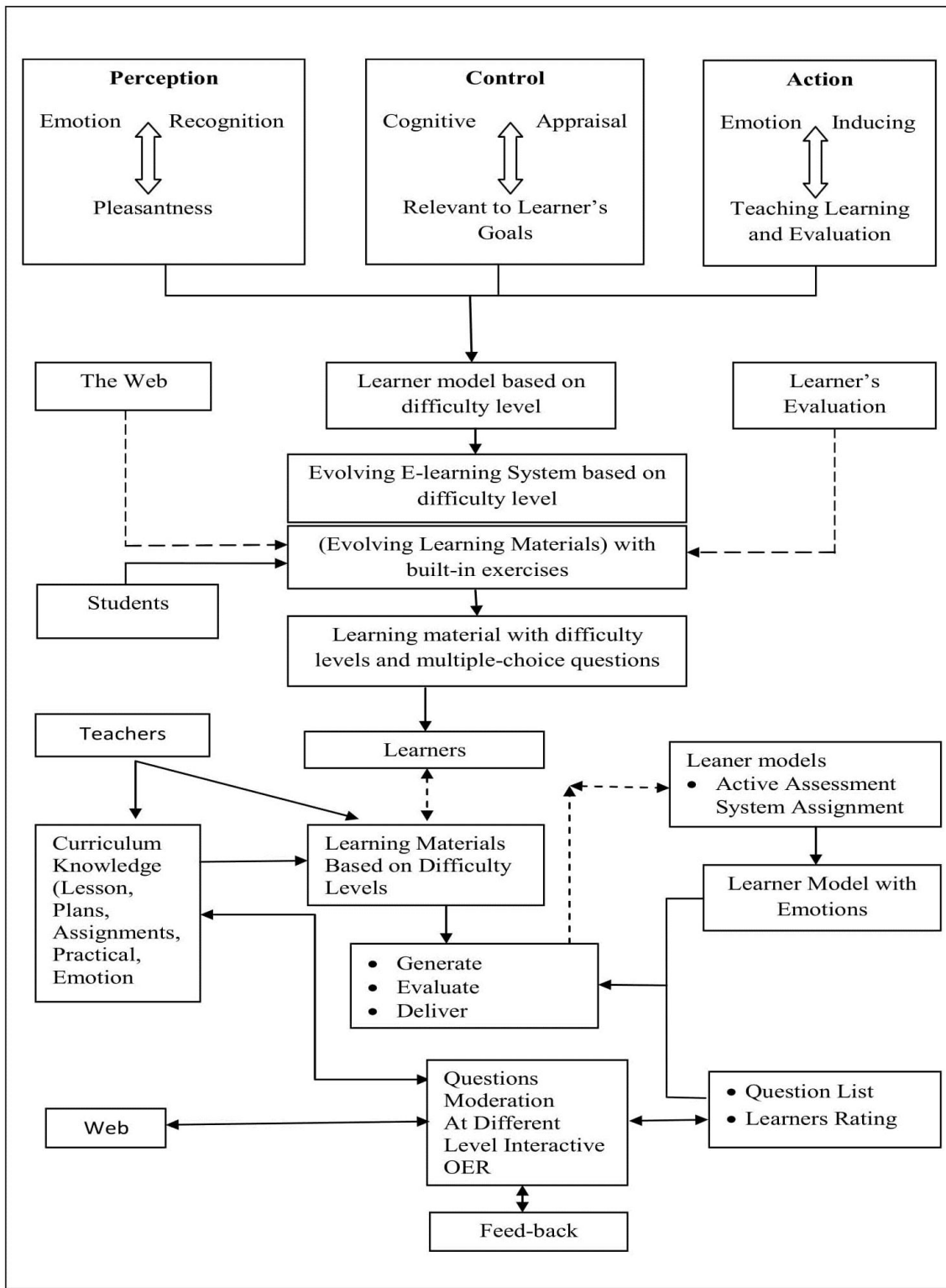


Fig. 14: Model Architecture.

## V. CONCLUSIONS

We have studied emotional intelligence issues from various respondents, the faculty members of different disciplines and teaching experiences. It has been observed that responses of the respondents vary with their locations, experiences. This indicates that future intelligent machines based on artificial emotional intelligence have to consider emotional intelligence deeply. We have proposed a model for advanced e-learning which can have learning, emotions and evaluation.

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