Integrated Approach for the Detection of Learning Styles of the Students

[1]Dr.Nazreen Bee.M
Assistant Professor,
Department of Computer Science,
Faculty of Science and Humanities,
SRM Institute of Science and Technology,
Ramapuram campus, Bharathi Salai, Ramapuram,
Chennai-89. India.

[2]Dr. Surya Susan Thomas
Assistant Professor,
Department of Computer Science,
Faculty of Science and Humanities,
SRM Institute of Science and Technology,
Ramapuram campus, Bharathi Salai, Ramapuram,
Chennai-89. India.

Abstract

Detection of learners' preference in their learning styles is very important criteria in the adaptive learning environment of any learning management system. In the existing learning environment system, inclination is more towards content management and students' data analysis. Data mining play a very significant role in detecting unseen data from large volume of data. Educational data mining (EDM) is a specific data mining field, concerned with developing approaches for discovering the unique and gradually large-scale data that come from educational data. Using the mining methods/ approaches helps us to understand learners. Specific data mining techniques are applied for discovering unseen pattern from the students learning database. This paper mainly focuses, to understand the learners' preferences in Active/Reflect dimension in FSLSM.

Keywords—**e-learning, Data mining techniques, learning styles model.**

I. Introduction

Applying an e-learning in the educational process helps to improve the excellence of technology-based learning and provides an enhanced understanding of the educational system [12].Most of the e-learning techniques have the following features:

- o Use of technology-based learning transmit the course materials wherever it is needed.

- o Includes content and techniques of the learning objectives.

- o Make use of electronic elements such as animation, graphics, textual, audio and video materials

- o Promotes learning techniques to make use of instructional methods such as examples, practice, assessment and feedback to help learners to discover new knowledge and skills [9].

Three Metaphors for learning are

1. Learning implies to gather the knowledge.

2. Learning implies adding information succession.

3. Learning implies making sense of knowledge creation.

II. The Principle of the Research

- The goal of this study is to find learners' preference in the learning styles.

- This study utilized Felder Silverman learning styles model to identify the learners' learning styles.

- Discussion of learner preferences in active/reflective dimension to process information actively

III. E-learning management system:

E-learning management system plays an important role for analysing the student's interest in online room lectures. It is easy to observe the students and their interaction on a particular topic which is being taught by the instructors during information transfer and knowledge utilisation[7].

Depending on the essentialities of E-learning management system, it has been put to practice from time to time[3]. The integration of web-based learning with these components can lead the society for the successful implementation of virtual learning environment (VLE).

Students' preferences are predicted using classification technique and is applied to the respective data which is collected from the students demographically such as urban, rural, semi-urban to identify students' preferences learning styles from students' group and reactions to a specific pedagogy based upon FSLSM learning management system. The experimental results using random forest algorithms indicate that the generated model can self-effacingly distinguish the students' preference learning styles[2]. The following Fig :1diagram illustrates the principle of e-learning management system[13].
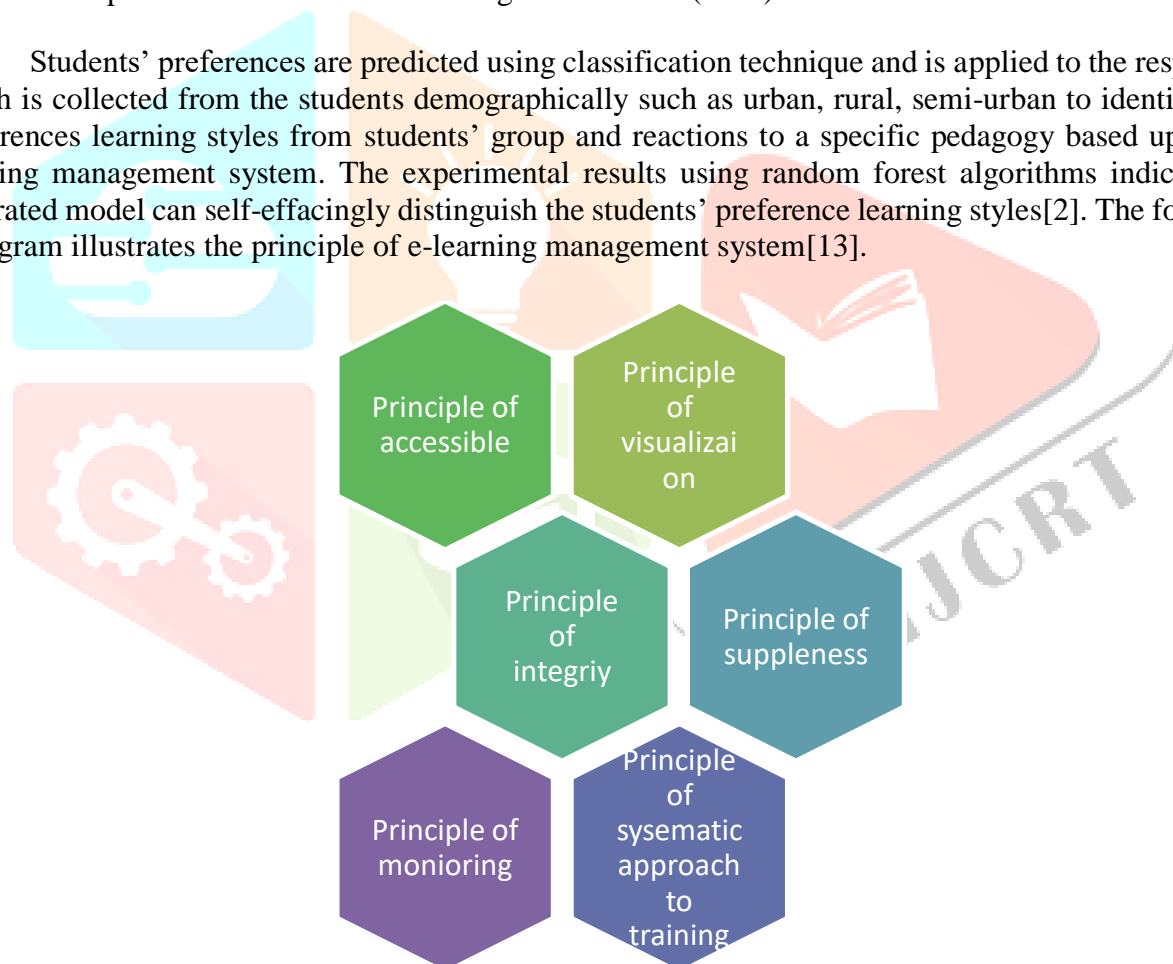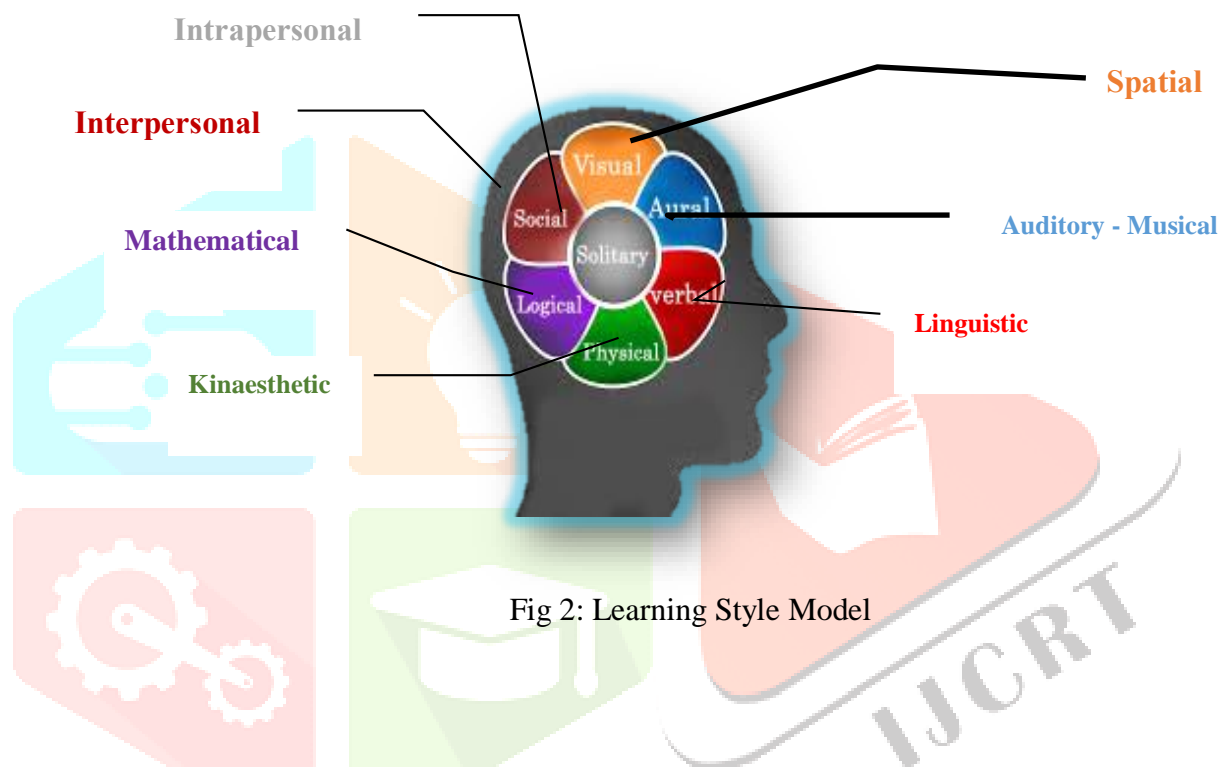

Fig 1: Pedagogy principles in e-learning system

IV. FLEXIBLE AND GENERIC APPROACH FOR DETECTING LEARNING STYLES.

This method identifies the learning styles of students and tend to know each one of them[14].It also estimates the learning styles based on the approach in the Index of learning styles (ILS) of Felder Silverman's learning styles model (FSLSM).It investigates the correlation between the results of ILS question and the preferences of the learners [1].

The sample is categorized under the parameter of geography as Urban - 2187 (66.5%), Semi-urban - 950 (28.9%), Rural - 152 (4,6%). The sample consisted of 3289 students from urban, rural and semi-urban. The findings allow us to identify the different forms of learning styles which are more suitable for students of certain psychological types. The following diagram Fig:2 illustrate the seven types of learning styles model.

.

Fig 2: Learning Style Model

Observing the learning styles of the individual in order to predict the learning styles preferences is a vital task for diagnosing learner's strengths and weaknesses. Learning styles refer to attitudes and behavior, which determine the way an individual learns [5]. Learning styles are important factors in educational settings for effective teaching-learning process [16].

TABLE 1:THE DIMENSION IN FELDER SILVERMAN LEARNING STYLES AND ALSO THE LEARNER'S INCLINATIONS

Dimension of Felder	Learner's Preferences
Sensory	Perception
Intuitive	
Visual	Input
Verbal	
Active	Process
Reflective	
Sequential	Understanding
Global	

4.1 LEARNING STYLES FROM PATTERNS OF BEHAVIOUR

1. *Sensing:*
   In this type, learners prefer their learning styles in concrete thinking, practical, concerned with procedures and facts.

2. *Intuitive:*
   In this type, learners who prefer conceptual thinking, concerned with theories and meanings and innovative.

3. *Visual:*
   These learners prefer visual presentation, graphs, pictures, diagrams and flow charts.

4. **Verbal:**
   In this type learners prefer written and spoken explanations

5. **Active:**
   In this type, learners prefer to try things out, working with others to group to gain knowledge from others.

6. **Reflective:**
   These learners prefer thinking things through working alone and they like to work out alone in their own pace.

7. **Sequential:**
   These leaner's prefer their learning styles in holistic thinking, system thinkers and learns in a huge group of students.

8. *Global:*
   These learners prefer holistic thinking, systems thinkers, learns in large leaps[6].

The Index of Learning Styles (ILS) is a survey instrument from FSLSM is used to assess preferences on four dimensions active/reflective, sensing/intuitive, visual/verbal, and sequential/global of a learning style model formulated and validated by Richard M. Felder and Linda K. Silverman. This FSLSM is based upon Cartesian products of the phonological variable represented by Richard M. Felder. As the result of ILS questionnaire - higher Level of Preferences (LOP) has to be used.
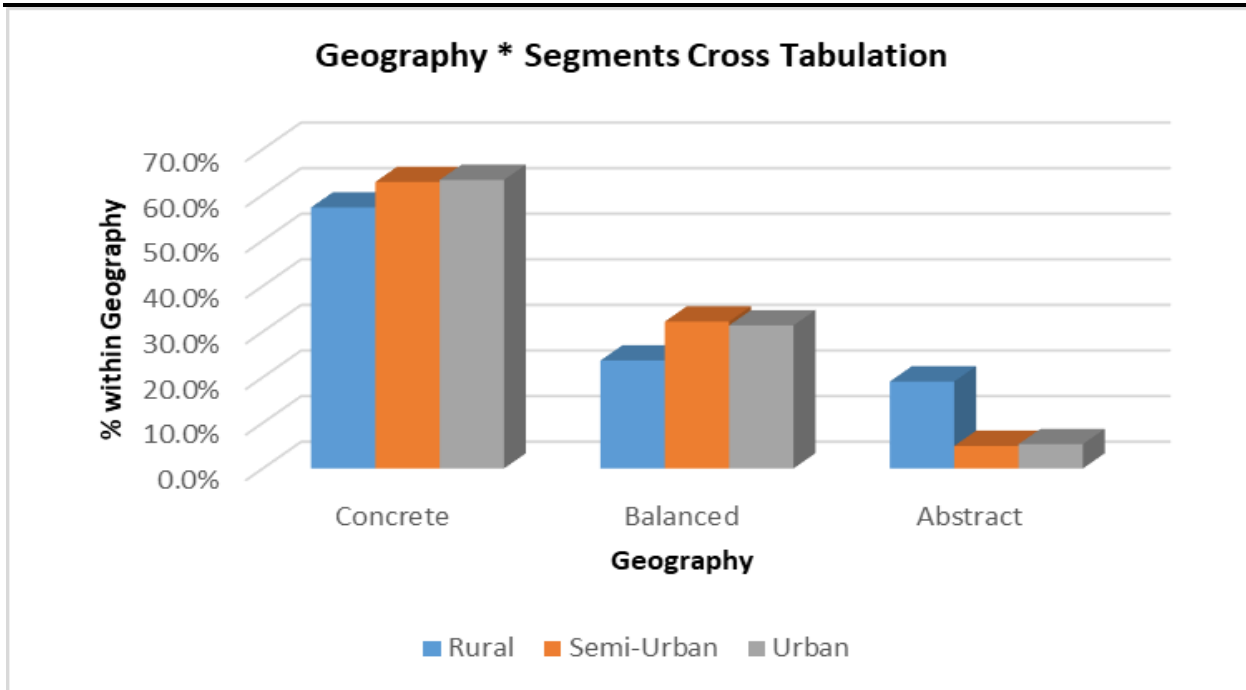
- If the student's preference score is between 1 and 3, it specifies balanced preferences on both the dimensions of scale.

- If the student's preference score is between 4 and 7,it specifies moderate preferences for one dimension of scale.

- If the student's preference score is between 8 and 11, itspecifies strong preferences for one dimension of scale.

V. RESULTS & FINDINGS

From Table 2 and Fig:3, it can be observed that across Geography, that is, Urban, Semi-urban and Rural, it can be noted that the cluster 1 is named as "Concrete", cluster 2 and cluster 3 are balanced, hence they can be merged into a single cluster, Cluster 2 and 3 are combined and named as "Balanced" and Cluster 4 is named as "Abstract" based on the learning style preferences of the respondents. From the Table 2, 31.3% preferred "Balanced" type, 62.9% of the respondents have preferred "Concrete" type of learning style, and only 5.9% of the respondents fall under "Abstract" type. It can be noted that the students were not "Reflective" and majority of them were "Active". Therefore, following results shows that active type learners prefer to try things out and prefers working with others group to gain knowledge from others. From the sample questionnaire dataset, it was observed that 62.9% of students preferred active learning styles method.

Table 2 Cross tabulation for Geography segments in Active/ Reflective dimension from FSLSM

Geography * Segments Cross Tabulation						
			Segments			
			1.00 Concrete	2.00 Balanced	3.00 Abstract	Total
Geography	1 Rural	Count	87	36	29	152
		% within Geography	57.2%	23.7%	19.1%	100.0%
	2 Semi-Urban	Count	597	306	47	950
		% within Geography	62.8%	32.2%	4.9%	100.0%
	3 Urban	Count	1384	686	117	2187
		% within Geography	63.3%	31.4%	5.3%	100.0%
Total		Count	2068	1028	193	3289
		% within Geography	62.9%	31.3%	5.9%	100.0%

FIG 3 GRAPHICAL REPRESENTATION OF STUDENTS PREFERENCE IN ACTIVE /REFLECTIVE DIMENSION

VI. CONCLUSION

Most of the academicians and researches in Educational Data Mining (EDM) gives special attention towards the usage of e-learning system.Learners with interpersonal learning styles prefer to learn in groups or with other people which provide a way to collaborative learning with peers and instructors. Based upon the FSLSM dimension, 62.9% of students from urban, rural and semi-urban prefer learning styles to try things out, and working with others group to gain knowledge from others.

VII. REFERENCES

[1]. Katerina Zdravkova ,"Reinforcing social media based learning, knowledge acquisition and learning evaluation." *Procedia - Social and Behavioral Sciences 228 (2016) 16 – 23.*

[2]. Bhubaneswar, "Integration of Web Services with E-Learning for Knowledge Society," *Procedia Computer Science 92 (2016) 155 – 160.*

[3]. Zhang Liqin, "Construction of a MOOC Based Blend Learning Mode," The 10th International Conference on Computer Science & Education (ICCSE 2015)July 22-24, 2015.

[4]. Hoic-Bozic, Natasa, Martina Holenko Dlab, and Vedran Mornar. "Recommender System and Web 2.0 Tools to Enhance a Blended Learning Model." *IEEE Transactions on Education* 59.1 (2016): 39-44.

[5]. Juric, Petar, Maja Matetic, and Marija Brkic. "Data mining of computer game assisted e/m-learning systems in higher education." *Information and Communication Technology, Electronics and Microelectronics (MIPRO), 2014 ,37th International Convention on.* IEEE, 2014.

[6]. Alharbi, Hadeel, Ashoka Jayawardena, and Paul Kwan. "Social recommender system for predicting the needs of students/instructors: Review and proposed framework." *Future Internet of Things and Cloud (FiCloud), 2014 International Conference on.* IEEE, 2014.

[7].   Hafidi, Mohamed, and Mahnane Lamia. "A personalized adaptive e-learning system based on learner's feedback and learner's multiple intelligences."*Programming and Systems (ISPS), 2015 12th International Symposium on*. IEEE, 2015.

[8].   Hadiana, Ana. "Web based e-learning system analysis using Kansei Engineering." *Information and Communication Technology (ICoICT), 2015 3rd International Conference on*. IEEE, 2015.

[9].   Barana, Alice, and Marina Marchisio. "Ten good reasons to adopt an automated formative assessment model for learning and teaching Mathematics and scientific disciplines." *Procedia-Social and Behavioral Sciences* 228 (2016): 608-613.

[10].   Togawa, Satoshi, and Kazuhide Kanenishi. "Live migration destination selecting method for disaster recovery on e-learning environment." *2016 International Conference on Big Data and Smart Computing (BigComp)*. IEEE, 2016.

[11].   Julia Shishkovskaya et al. "EFL Teaching E-learning Environment: Updated Principles and Methods" *Procedia-Social and Behavioral Sciences* 206 (2015):199-204.

[12].   Naser-Nick Manochehr. "The Influence of Learning Styles on Learners in E-learning Environments: An empirical Study." *2014 Inforamtion system- Cheer,* 2014.

[13].   Xinhua et al. "An Innovative Web-Based Collaborative Learning Model and Applicatio Structure,*Computer science and Software Engineering, 2008 International Conference on*. IEEE, 2008.

[14].   Juric, Petar, Maja Matetic, and Marija Brkic. "Data mining of computer game assisted e/m-learning systems in higher education." *Information and Communication Technology, Electronics and Microelectronics (MIPRO), 2014 37th International Convention on*. IEEE, 2014.

[15].   Alharbi, Hadeel, Ashoka Jayawardena, and Paul Kwan. "Social recommender system for predicting the needs of students/instructors: Review and proposed framework." *Future Internet of Things and Cloud (FiCloud), 2014 International Conference on*. IEEE, 2014.

[16].   Gupta, Ms Varsha and Mr Dipesh Sharma, " A Study of Various Face Detection Methods." Methods 3.5, 2014.