

The Role of Multiple Intelligence in E-Learning

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Abstract— E-learning has offered numerous advantages such as flexibility, remote operability, cost effectiveness, simplicity, consistency and many more. The utilization of smart tools and technologies has provided easy and convenient education in an effective way without barrier of time and place. The paper explains the conceptual mechanism of e-learning. The chapter presents role of technological players of e-learning environment which are various instructional and computer technologies. The paper focuses on theory of multiple intelligences which can become inherent part of basic model of e-learning. It provides various activities of e-learning in which different intelligences play important role. In order to achieve e-learning in an effective way, human being requires different types of intelligence in different measurement. The paper has presented detailed discussion on the same. To claim the impact of multiple intelligences on e-learning activities, an example is presented which shows tight integration of multiple intelligence with model of e-learning.

Key words: Computer Technologies, Instructional Technologies, E-Learning, Multiple Intelligences

I. INTRODUCTION

E-learning has offered numerous advantages such as flexibility, remote operability, cost effectiveness, simplicity, consistency and many more. The utilization of smart tools and technologies has provided easy and convenient education in an effective way without barrier of time and place. The paper explains the conceptual mechanism of e-learning. The key players of e-learning environment are different technologies. The collaborative model of e-learning consists of four major constituents: Pedagogical models or constructs, instructional and learning strategies, and, Online learning technologies (i.e., Internet and Web-based technologies), and Utilizing Theory of Multiple Intelligence. In order to achieve e-learning in an effective way, human being requires different types of intelligence in different measurement. The paper has presented detailed discussion on the same. A survey has been presented which shows tight integration of multiple intelligence with model of e-learning.

The second section of the paper explains e-learning with brief discussion of online learning, distance learning and web based learning. A pedagogical approach of e-learning has been discussed in this section. The paper discusses two major types of learning modes namely asynchronous and synchronous mode. These modes are effectively working with use of instructional technologies. Various advantages of e-learning is presented in the same section. The third section of the paper discusses importance of the theory of multiple intelligence for education. The fourth section presents role of theory of multiple intelligence in e-learning. To justify the claim of the paper, an example is presented which shows the significance of different intelligence on e-learning capability. The concluding part of the paper justifies the relationship of multiple intelligence with e-learning.

II. E-LEARNING

Nowadays, it is possible to achieve education at fingertip of users with the help of smart tools and technologies. Distance learning is old paradigm of education but it has become strengthen using Information and Communication technology (ICT). There are many web based and mobile based tools, technologies and smart interfaces available which have eliminated barriers of traditional education environment. Distance learning is an effective method of education for various types and various groups of people which are geographically distant. Instructional technology or learning technology is the implementation of various tools and technology of ICT in order to strength learning or teaching activities. Due to development of smart tools and technologies, learning from remote places at any time has become effectively possible. Such type of learning mode is known as E-learning. There are several definitions of E-Learning are presented as under [1]:

- E learning is basically any educational related activities via internet, network or standalone computer or rather in today's smart world; it is learning activity available on electronic medium at any place, any time for any person on any smart internet enabled device. E-learning is mostly associated with activities involving computers and interactive networks simultaneously. The computer does not need to be the central element of the activity or provide learning content. However, the computer and the network must hold a significant involvement in the learning activity. E-learning comprises of several sub types such as web based, online and distance learning activities.
- Web-based learning is associated with learning materials delivered in a Web browser, including when the materials are packaged on CD-ROM or other media. disk
- Online learning is associated with content readily accessible on a computer. The content may be on the Web or the Internet, or simply installed on a CD-ROM or the computer hard disk.
- Distance learning involves interaction at a distance between instructor and learners, and enables timely instructor reaction to learners. Simply posting or broadcasting learning materials to learners is not distance learning. Instructors must be involved in receiving feedback from learners.

There are major two types of learning mode which are briefly discussed as under:

- (1) Asynchronous learning: In asynchronous learning mode, the learning is independent to decide when he wants to study the courseware. While in same case, the trainer is ready with the course material before the course take place. Fig. 1 represents examples of asynchronous learning.

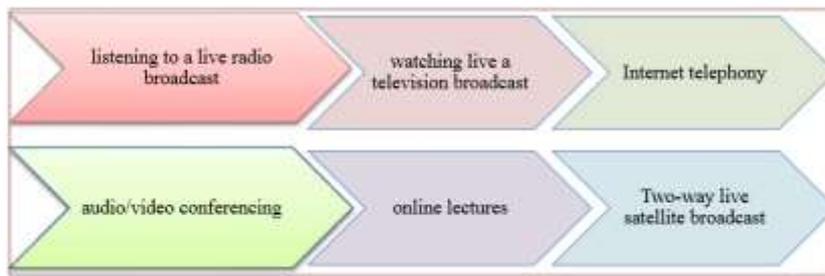


Fig. 1: Examples of Asynchronous Learning

(2) Synchronous learning: In synchronous learning mode learning and teaching takes place in real time (same time) while the trainer and learners are

physically separated from each other (place shift). Fig. 2 presents examples of synchronous learning.

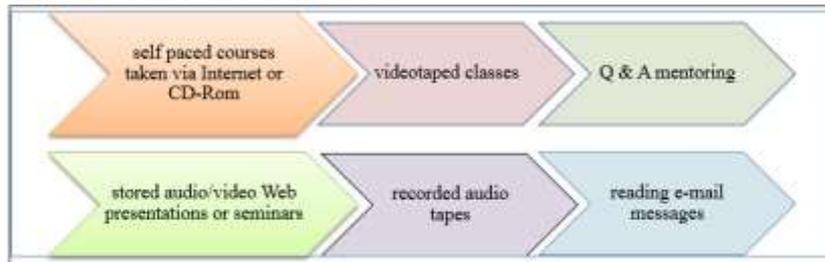


Fig. 2: Examples of Synchronous Learning

III. A PEDAGOGICAL APPROACH OF E-LEARNING

E-Learning constitutes of four key components working collectively to implement meaningful learning and interaction [2]:

(1) Pedagogical models or constructs,

(2) Instructional and learning strategies, and

(3) Online learning technologies (i.e., Internet and Web-based technologies)

(4) Utilizing Theory of Multiple Intelligence

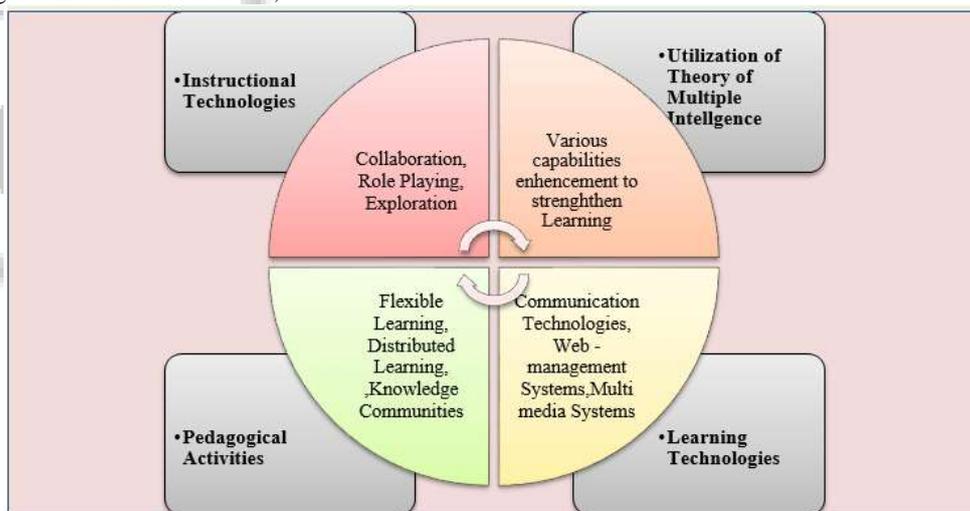


Fig. 3: Collaborative Approach for E-Learning

The above stated components iteratively constructs environment of E-learning. Furthermore, as learning technologies become ubiquitous and new technologies continue to emerge bringing forth new affordances (possibilities for action), pedagogical practices and social structures are transformed. Educators and instructional designers can think of this model as a theory-based or grounded design framework that guides the design of E-Learning [2].

1) *One to one communication*

A. Modes of communication

Within communication channels, there are different directions/ways to communicate which are narrated as under:

- Learner to learner
- Learner to trainer
- Trainer to learner

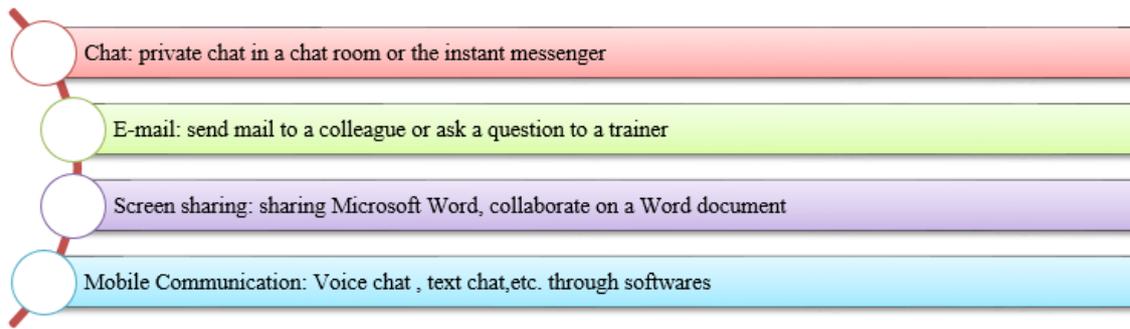


Fig. 4: Examples of one to one Communication

2) *One to many Communication*

- Trainer to learners
- learners to learners

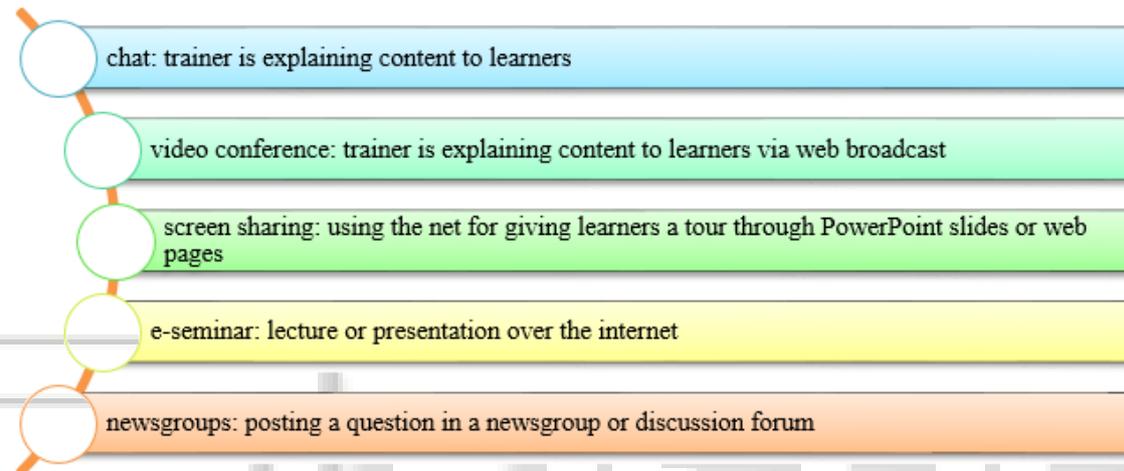


Fig. 5: Examples of One to Many Communications

3) *Many to one Communication*

- Learners to trainer
- Learners to learner

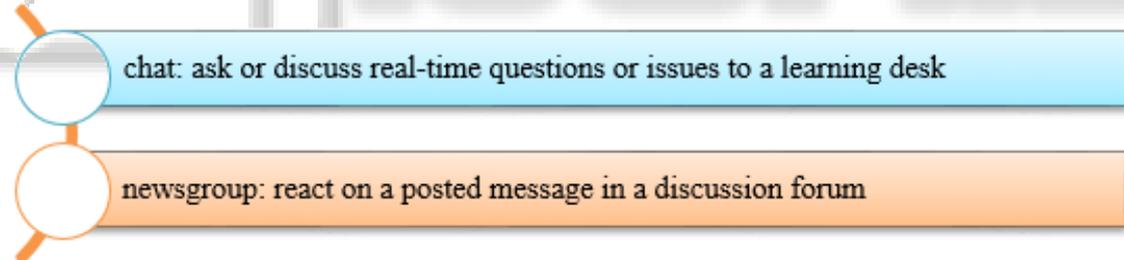


Fig. 6: Examples of Many to One communication

4) *Many to many Communication*

- Learners to learners
- Learners to learners and trainers

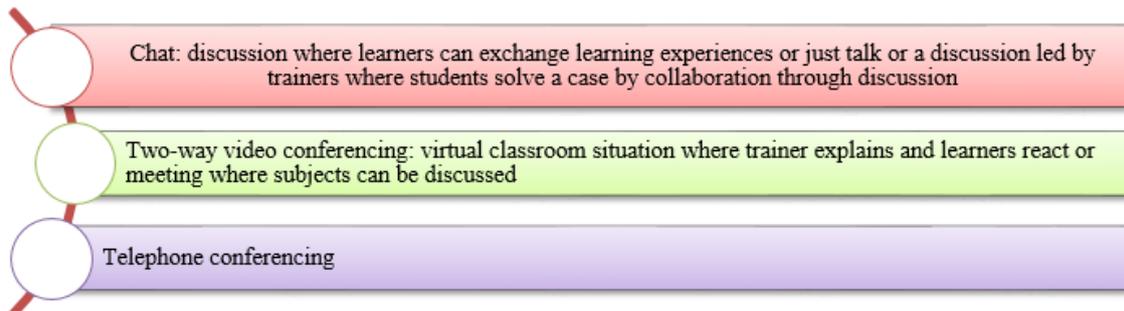


Fig. 7: Examples of Many to One communication

Apart from different types of communication environment, e-learning requires other facilities such Teaching part, teaching materials, solved examples, lists of questions, glossaries, auto tests, List of tasks and projects ,assignments and evaluations ,Communication tools, message board, chat, discussion forum, Other tools, notepad, links, download section, etc.

Learning is a cognitive activity that varies from student to student. Analyzing adaptability in e-learning system has explicitly pointed out the importance of the modeling learners' cognitive characteristics, particularly, learning styles as the most explored cognitive features.

Learning styles are used to specify how learners perceive, process and interact with learning environment. however, Felder-Silverman Learning Styles Model (FSLSM) [7] is often used for providing adaptability regarding learning styles in e-learning environments. Felder-Silverman model describes single student in accordance to four dimensions [3]:

- Active and reflexive learning style
- Sensitive and intuitive learning style
- Visual and verbal learning style
- Sequential and global learning style

B. Advantages of e-learning

E-Learning offers numerous advantages for the users all over the world. The prime advantage is that learning material is common to all the people without any geographical limitations. Several advantages are enlisted as under [4,5,6,7].

- Provides Simple as well as Flexible Logistics
- Offers immediate Results and Feedback
- Offers Greater Access to Expertise
- Offers the Most Up-to-Date Content at Much Lower Cost
- Offers Scalability to new environment
- Offers good capacity and Consistent services
- Offers High Learning Retention
- Provides Time and Money Savings
- Provides advancement of new technological Possibilities
- Provides Increased Participation
- Provides opportunity of Independent Learning

IV. THEORY OF MULTIPLE INTELLIGENCE

Major goal of education is to provide significant knowledge to each and every individual for progress in all areas. Technological advancements increase the speed of decision-making; however the basic requirement is to have problem solving ability in human being. To deal with real life problems, a certain level of intelligence is essential for every individual. Individuals in different capacities genetically achieve intelligence but the results of many researchers have shown that appropriate training and development methods can increase the level of intelligence by utilizing instructional technologies. Development of every individual depends on many factors; major of them are [8]:

- Personal Attitude;
- Social awareness with responsibilities;
- Understanding and Learning capability;
- Educational Environment;

- Technological Facilities;
- Industrial Support;
- Economic Conditions.

ICT and education fields together have enhanced skills of individuals and help them in developing problem solving ability. Intelligence can be described as "The capacity to learn and understand". Actually, Intelligence is an ability to handle complexity and solve problems in some useful context. As a result of extensive research work, it has been found that there are two major classes of intelligence existing in human being:

- One general intelligence (Eysenck, Galton, Jensen, Spearman, ...);
- Multiple Intelligences (Gardner, Sternberg, Thurstone).

There are various theories invented by many researchers to identify the types of intelligence. Dr. Howard Gardner has developed Theory of Multiple Intelligence (MI), which defines intelligence as potential ability to process a certain sort of information [9]. Gardner has identified nine intelligences but there is also a possibility of many other types of intelligence in individuals [10].

V. E- LEARNING THROUGH MULTIPLE INTELLIGENCE

Learning is defined as activities which comprises of several abilities which can be defined using are enlisted as under: Learning can be defined using following terms.

- It is biochemical activity in the brain
- It is relatively permanent change in behavior
- It is information processing
- It is remembering and recalling
- It is social negotiation
- It is thinking skills
- It is construction of knowledge
- It is conceptual change
- It is the process of transferring knowledge from the instructional context to a new context
- It is active and experiential
- It is the quality of distributing changes among the community
- It is modification of one's perceptions to immediate environment
- It is an unpredictable and a self-organizing phenomenon

Personalized education through electronic environment is known as e-learning. In order to achieve learning capability, student needs above stated characteristics along with knowledge of utilizing instructional technologies. Gardner predicted as early as 1983 that "the potential utility of computers in the process of matching individuals to modes of instruction is substantial" and that "the computer can be vital facilitator in the actual process of instruction"[11]. The virtual classroom capabilities can be easily extended through the Theory of Multiple Intelligence. In the above stated aspect [10], e-learning is basically implementation of the theory of multiple intelligence which is developed by Howard Gardner (1999). Table 1 represents multiple intelligence, associated abilities and professions exhibiting these intelligence [12].

Intelligence	Associated abilities	Professions exhibiting these intelligences
Linguistic	Capacity to use language to express and appreciate complex meanings	Poets, writers, storytellers.
Logical-Mathematical	Ability to use and appreciate abstract relations, carry out inductive/deductive reasoning, numerical abilities.	Scientists, Mathematicians, Accountants
Spatial	Ability to perceive visual and spatial information, and to transform and modify this information, and to recreate visual images	Artists, architects, sculptors and engineers
Bodily-Kinesthetic	Use of all or part of one's body to solve problems, fashion products, or construct meaning	athletes, surgeons,
Musical	Create, communicate and understand meanings made out of sound	composers, opera singers
Interpersonal	Ability to perceive and make distinctions in the moods, intentions, motivations and feelings of other people and to act accordingly	teachers, psychologists
Intrapersonal	Enables individuals to understand themselves and to draw on that understanding to make decisions about viable courses of action	No specific profession -Those achieving high status
Naturalist	Distinguish among, classify and use features of their environment	farmers ,gardeners, botanists,

Table 1: Multiple Intelligence, Abilities and appropriate professions

VI. AN EXAMPLE UTILIZING THEORY OF MI

Therefore, in order to achieve a satisfactory learning outcome for all learners, the varied intelligence strengths of

the individual learners should have a direct bearing on the methods of instruction. Fig. 8 represents e learning activities which are associated with different intelligences.

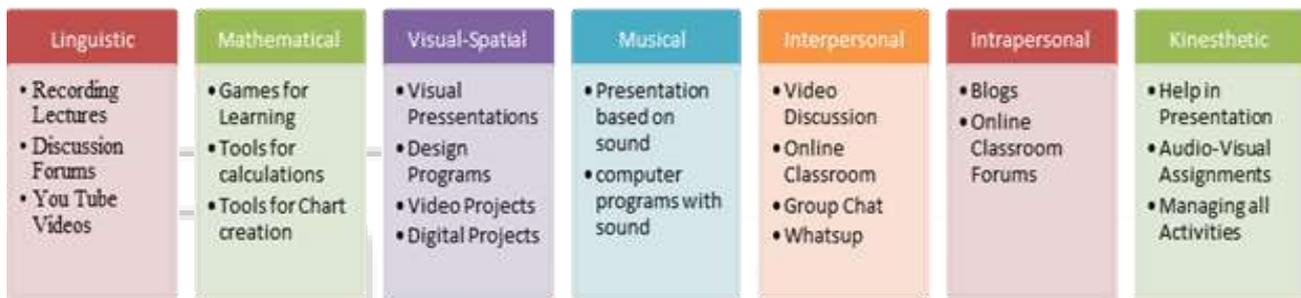


Fig. 8: E-Learning Activities utilizes Multiple Intelligences

Basically, e-learning activities required different intelligences in different capacities. Table 2 represents

various e- learning activities along with different multiple intelligence levels.

E-Learning Activities	Lingui stic	Logical	Visual	Kines thetic	Inter personal	Intra personal
Reading	High	Medium	High	High	High	Very High
Interpretation ability	High	Very High/ High	High/ Medium	High/ Medium	Medium	High
Visual Ability	Very High/ High/	High/ Medium	Very High /High	Low/ Medium	Low /Medium	High
Operating Ability	High/ Very High	High	High	Low/ Medium	High/ Medium	High

Table 2: Multiple Intelligence Measurement for E-Learning Activities

A survey has been implemented on students who are using E-Learning environment for their studies. The

questionaries' of multiple intelligences has been offered to students of class 8. The result presented is as under:

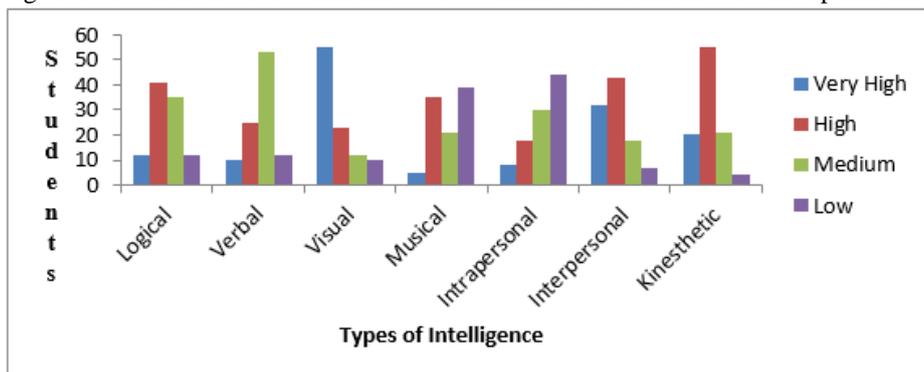


Fig. 9: % of Students possess different types of intelligence

Result of questionnaires is calculated with the help of total score for every student. Four different criteria viz. Very High, High, Medium and Low are determined to analyze the results. It is found that these students are capable to utilize e- learning capabilities very efficiently.

VII. CONCLUSION

Multiple Intelligence theory is a classification and conceptualization of human intelligence. In order to make effective e-learning paradigm, MI theory offers a specific pluralistic conceptualization of intelligence. The paper has presented e-learning approach and various communication modes. The paper has presented benefits of e-learning and ways of effective e- learning mechanism. The paper has provided a new conceptual model of e-learning integrating the theory of multiple intelligence. E learning consists of several activities which needs specific type of intelligence in specific measurement. In order to implement e-learning in an effective way, the theory of multiple intelligence is utilized. The purpose of the paper is to provide significance of the theory of multiple intelligences to e-learning paradigm. An example is presented which represents that particular set of intelligence in particular capacities are required to achieve e-learning efficiently. A survey on several students has been presented to justify the role of the theory of multiple intelligence. The result shows that students having different intelligence such as Logical, Verbal, Interpersonal, Intrapersonal, musical, spatial and kinesthetic are required to utilize e-learning in an efficient manner.

REFERENCES

- [1] M.Martin, (2006), e-Learning: Concepts, Usage and Tools , available at: www.teipat.gr/socrates-ip2006/files/e-Learning.ppt
- [2] Dabbagh, N. (2005). Pedagogical models for E-Learning: A theory-based design framework. *International Journal of Technology in Teaching and Learning*, 1(1), 25-44.
- [3] R.Bozidar,et.al.(2009), Creating Adaptive Environment for e-Learning Courses, *JIOS*, VOL. 33, NO. 1, PP. 179-189
- [4] The Benefits of Online Learning available at <https://www.mindflash.com/elearning/benefits-of-online-learning>
- [5] Justin Ferriman, 7 Awesome Advantages of E-Learning, December 10, 2013 available at <http://www.learndash.com/7-awesome-advantages-of-elearning/>
- [6] <http://www.businesszone.co.uk/community-voice/blogs/scott-drayton/the-advantages-and-disadvantages-of-elearning>
- [7] <http://peoplelearn.homestead.com/ELearning/Introduction/Benefits.html>
- [8] K. B. Mankad and P. S. Sajja. (July 2012). Measuring human intelligence by applying soft computing techniques: A genetic fuzzy approach , in *Diagnostic Test Approaches to Machine Learning and Commonsense Reasoning Systems*, X.A. Naidenova and D. Ignatov, Eds. Hershey, PA: IGI Global, pp.128-153 [Online]. Available: <http://www.irma-international.org/viewtitle/69407/> [Accessed July 2013].
- [9] P. Carter, *The complete book of intelligence tests*. Chichester, West Sussex: John Wiley & Sons Ltd., 2005.
- [10] H. Gardner, *Intelligence reframed*. New York, NY: Basic Books, 1999, pp. 33-34.
- [11] H. Gardner, *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books, 1983
- [12] Paul McNamee et.al.(2009), E-Learning, Multiple Intelligences Theory (MI) And Learner-Centred Instruction: Adapting MI Learning Theoretical Principles To The Instruction Of Health And Safety To Construction Managers, *Journal of College Teaching & Learning*, Vol. 6, No.2