IJCSE International Journal of Computer Sciences and Engineering Open Access
Review Paper Volume-5, Issue-8 E-ISSN: 2347-2693

Understanding the Learners' Intelligence, Stress and Attitude to Learning on Worldwide Knowledge, Research, and Experience

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Available online at: www.ijcseonline.org

Received: 16/Jul/2017, Revised: 30/Jul/2017, Accepted: 18/Aug/2017, Published: 30/Aug/2017

***Abstract*—** Research on various aspects of the multimedia learning materials such as animation, sound, graphics, interactive video and its impacts on learning has been conducted. For the development of any comprehensible educational system, the learning materials and methodology play a very important role. The students' inner psychology is an integral part of any learning system aiming at personalized information material delivery. Personalized information material delivery can be described as a process of building the learning materials according to the students' personal inner psychology, his/her behavioural aspects, goals, likes and dislikes. The inner psychology of a student is generally represented in the form of his/her intelligent quotient, emotional quotient, personality, stress and attitude quotient. The research works differ in the way they represent the student psychology, how they update the student's inner feeling and the teaching–learning strategies they adapt for providing the personalized information learning materials.

***Keywords*—** ICT Tools, Memory and Learning, Multimedia and Animation, Stress, attitude

I. INTRODUCTION

The phrase *'Review of Literature'* consists of two words, viz., Review and Literature. The term 'Review' means to "Look Again" or to organize the knowledge of specific area of research, to involve an edifice of knowledge to show that study would be an addition to this field. The term "Literature" in research methodology refers to the knowledge of a particular area of investigation of a discipline which includes theoretical, practical and its research studies or literature as the mirror that reflects the past view and presents the future perspective. Review of related literature means to locate, to read and to evaluate the past as well as current literature of the research concerned with the planned investigation. Such literature provides the researcher with the footprints of earlier travellers gone ahead on the same route. The time spent in survey of related literature is invariably a wise investment. It is a crucial step which minimizes the risk of dead ends, wasted efforts, rejected topics and even more important errorless findings based on a faulty research design. Review of literature also makes a researcher aware of the nature, kind and magnitude of the work done in the field and indicates the direction of further studies on the subject. Sometime, from such reviews of the relevant literature, the probable and possible topics of research may also emerge. To conceptualize the research problem explicitly and meaningfully, there lays the significance of review of related literature done by the researcher. Keeping in mind the stated arguments, the researcher has reviewed the relevant literature, followed by a systematic analysis of studies, ideas, concepts and views of different researcher, as presented here following in

a) literature survey on multimedia and 3-D animation
b) literature survey on intelligence and emotional intelligence
c) literature survey on stress
d) literature survey on Personality and
e) literature survey on attitude.

II. LITERATURE SURVEY ON MULTIMEDIA & 3-D ANIMATION

So many related research works and evidences for the current research are available in IEEE Xplore, ACM and International journals. Many of the research papers deals with the visual perception, graphics, multimedia learning system, 3-D animation and intelligent quotient concepts. The related research works and evidences for this research works are discussed in detail in the following research studies.

Ann McNamara (2011) investigated the perception of graphics, visualization, virtual environments and animation.

They found the application of animation and graphics in algorithm design and display technology design. According to Riaza Mohd Rias (2009), multimedia learning aid using 3-D animation helps the students to learn memory concepts. It also develops more interest and more clarity among the students. Zhang. Vu (2010) investigated the technologies including teaching design and multimedia teaching resources development. Li Chengbiao (2009) found out the evaluation indicator system of the quality of multimedia teaching in higher educational institutions in China. Discussed the open instructional design methods. He presented a paper on instructional design, instructional design model, self-regulated learning and learning interaction. Liang Yu-bao (2010) investigated and discussed the methods to improve the quality and effect of computer-aided instruction's application in classroom teaching in institutes of higher education. He found out the effect of multimedia teaching, discussed the well-designed components of teaching process and used multimedia courseware in classroom teaching as the core material for the learning. There is dearth of studies showing the role of 3D animation for educating nursing students. So our study was planned to enquire the effect of 3D animation on nursing students perception of learning practical and applied aspects of electrocardiography in context to bloom's taxonomy (Pandey , 2015).

Ahmad (2010) discussed the effects of segmentation of instructional animation in facilitating learning of IT subjects in Malaysia. He discussed the different animation materials and its impact. He investigated more than hundred students doing diploma in information technology [polytechnic level] in Malaysia. He elaborately discussed the animation materials and its application in IT subjects. He did not investigate the difference between the 2-D animated materials and 3-D animated materials in the learning environment.

Miller et al. (2011) conducted a research on the effect of animations within PowerPoint presentations on learning introductory astronomy. They discussed the effect of animation materials in studying astronomy subject. But they did not explain 3-D animated material and its impact. M. Taylor (2010) investigated the use of animation in teaching the higher education to support students with dyslexia. The aforementioned research examined the details about the usefulness of animated learning materials in supporting students with dyslexia in a UK higher education setting. Research has not been conducted to study its impact in Indian education system on students with and without dyslexia. Cathy J. Pearman (2010) investigated the relationships between the impact CD-ROM story books and young readers. They found out that formats like electronic, interactive texts, CD–ROM storybooks increase vocabulary, fluency, comprehension among them. They also concluded that supplementary features such as word pronunciations, definitions and animations aid readers in improving the vocabulary.

S. Shyam (2004) discussed the arousal, memory, impression–formation effects of animation speed in Web advertising. The above-mentioned research found out the relationship between the animation speed and attention and also the perception level in Web advertisements. Garry Hoban (2010) found out a new method of teaching approach to encourage slow-motion [student-generated animations] of science concepts. They concluded that slow-motion helped the students of primary- and secondary-level school to learn the concepts of science in an easy way.

Hoffler (2010) investigated the effects of individual difference and learners' performances through visual materials in 76 pair wise comparisons. They found the use of 3-D animation materials among the multimedia learning. They also discussed the students' performance among the animation learners. D. Passig and S. Eden. (2000) conducted experiments among the hearing-impaired and speech-impaired learners. They used virtual reality learning and 3-D animation in their experiment to facilitate the learning process. They found the effectiveness of Virtual Reality created by 3-D animation software. G. Korakakis (2010) conducted research to determine the use of specific types of visualization [3-D illustration, 3-D animation and interactive 3-D animation] combined with narration in the age group of 13- to 14-year-old students. Hsiu-Mei Huang (2010) conducted research to determine the learners' attitudes towards virtual reality learning environment. They investigated the use of animation and multimedia for learning, pedagogical views and teaching/learning strategies.

Some researches discussed the XML-based digital textbook and its educational effectiveness, which could offer a diverse range of supplementary digital media functions including sound effects, audio-visuals, animations, 3-D graphics and other state-of-the-art multimedia features. introduce a three-dimensional multi-resolution method to capture, in real time, the transient events leading to cellular binding and uptake of peptide (HIV1-Tat)-modified nanoparticles. Applying this new method to observe the landing of nanoparticles on the cellular contour in three dimensions revealed long-range deceleration of the delivery particle, possibly due to interactions with cellular receptors. Furthermore, by using the nanoparticle as a Nano scale 'dynamics pen', we discovered an unexpected correlation between small membrane terrain structures and local nanoparticle dynamics. This approach could help to reveal the hidden mechanistic steps in a variety of multi scale processes.(Kevin 2014). Chen. W (2010) discussed the advantages of techniques such as image-based animation, 3-D modelling and computer games. They also discussed learning by employing approach and edutainment. Mark (2009) investigated the educational impact of digital visualization and auditing tools on a digital production course. They found the importance and

application of digital visualization in complex interdisciplinary programs of engineering and fine arts. Hasler et al. (2007) discussed and conducted research on the effect of animation to faster the learning. They suggested that animation could be more useful when the learners were allowed to stop and start the animation. In this study, we describe the implementation and evaluation of an experiment with Augmented Reality (AR) technology in the visualization of 3D models and the presentation of architectural projects by students of architecture and building engineering. The proposal is based on the premise that the technology used in AR, such as mobile devices, is familiar to the student. When used in a collaborative manner, the technology is able to achieve a greater level of direct engagement with the proposed content, thereby improving academic outcomes.

Cimer discussed the advantages of visual materials to teach biology subjects among the secondary school students. They suggested that teachers should use 3-D animation, computer simulations, videos, models for effective learning biology concepts. They recommended the above visual method of teaching for long term memory and effect. Lioyd P. Rieber (1991) discussed the topics like animation, incidental learning and continuing motivation. The aforementioned research concluded that elementary school students benefitted from animation- and incidental computer-based instruction. It also concluded that it motivated the students for further studies.

III. LITERATURE SURVEY–INTELLIGENCE

In the early 20th century, Charles Spearman (1904) invented the first formal factor analysis of correlations among the intelligent tests. Spearman's model investigated a single common factor that accounted for the positive correlations across intelligence tests. He used the single common factor "g" in his model. His model and intelligence analysis is considered to be the first theory of intelligence. He maintains that in the measurement of any ability, there enter two independent factors. One is the "g" factor and the other is the specific factor "s", which varies from person to person. According to Jean Piaget (1969), intelligence is an adaptive process that involves interplay of biological maturation and interaction with the environment. To test the intelligence of children Stanford-Binet IQ questionnaire is widely used. To test the intelligence of adult Wechsler adult intelligence scale is widely used. Generally, each Intelligence tests measures mental ability such as verbal abilities, perceptual abilities, memory, verbal fluency and numerical abilities. Intelligence Quotient (I.Q) is the ratio between mental age and chronological age, multiplied by hundred (Aja, 2011).

IV. LITERATURE SURVEY – EMOTIONAL INTELLIGENCE

According to JD Mayer and Salovey Peter (2007), emotional intelligence "is the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions". According to Kamsin (2007), emotional intelligence "is the innate potential to feel, use, communicate, recognize, remember, learn, manage and understand emotions".

Ying-Chun & Chen (2010) investigated the cognitive styles of visualizer and verbalizer in the learning environment. They also investigated the multimedia learning materials relationships and emotional assessment. Saeed Rajaeepour et al, (2014) studied the relationship between emotional intelligence and performance. They also investigated and proved the relationship between personality and exam performance. (Jing, (2010) investigated the data mining technique and emotional intelligence. They found five types of vocational students through their research. The types were balanced type, adaptation type, strong evaluation type, weak regulation type and strong-adaptation assessment type. Belanger F et al, (2010) investigated the computer science students' performance and emotional intelligence. They found out the relationship between the emotional intelligence level and academic performance among the 613 undergraduate students in USA. Aguirre, F et al, conducted research about the functioning of emotion. They found out that emotions had an important impact on thinking, judgment, reasoning, memory and decision making. They also developed a new faculty named as artificial emotional intelligence. Palethorpe. M (2006) conducted research on emotional intelligence and skills. He proposed some guidelines to develop inner emotional intelligence and discussed the importance of Emotional Intelligence in career development.

V. LITERATURE SURVEY–STRESS

Four types of theoretical models are available to explain the mechanism of stress.

(i) Cognitive model
(ii) Physiological arousal model
(iii) Emotional functional model
(iv) Seligman's learned helplessness model

Cognitive model

We propose that a cognitive approach has the potential to guide studies investigating the relationships between adversity, stress, and resilience. We outline a preliminary cognitive model of resilience in order to facilitate the application of cognitive approaches to the investigation of resilience in the face of adversity. We argue that the situation ally appropriate application of flexibility or rigidity in

affective-cognitive systems is a key element in promoting resilient responses. We propose that this mapping of cognitive processing can be concept unlisted as being undertaken by an overarching mapping system, which serves to integrate information from a variety of sources, including the current situation, prior experience, as well as more conscious and goal-driven processes (Sam et al., 2016) This study examined direct associations between emotional competence, perceived stress and turnout in 489 Spanish teachers. In addition, a model in which perceived stress mediated at linking emotional competence to teacher burnout symptoms was also examined. Results showed that emotional competence and stress were significantly correlated with teacher burnout symptoms in the expected direction. Moreover, mediational analysis indicated that perceived stress partly mediated the relationship between emotional competence and the three dimensions of burnout even when controlling for salient background characteristics. These findings suggest an underlying process by which high emotional competence may increase the capacity to cope with symptoms of burnout, by reducing the experience of stress. Implications of these findings for future research and for working with teachers to prevent burnout are discussed (Lourdes, 2016).

Physiological model

According to this model, "effects of stress follow from physiological arousal". Moderate arousal can improve the performance, but high-level arousal reduces focus attention. High-level arousal leads to poor performance because it interferes with the attention process. There are so many physiological measures of arousal that can be calculated by using heart beat rate, blood pressure, skin conductivity and respiration rate. Physiological arousal interpretation explains some of the cognitive aspects of stress and its effects.

Emotional functional model

J Dollard, NE Miller - 1950 investigated the links between frustration and low performance. According to their view, "emotional aspects are the causes of stress". Stress results in frustration, which in turn causes irritation. Emotional changes lead to low interest in tasks. Frustration can also produce aggression. Not all stress produces a negative mood, it reduces motivation and interest. It can also produce fear, depression and emotional changes. It is tempting when considering how stress has been defined to describe different definitions as reflecting different stages in our understanding of the term with each stage representing the research emphasis of the time. Describing stress definitions as progressing through a series of stages gives, perhaps, a more orderly feel to the way they evolved than actually occurred. Researchers, depending on their own agenda, followed different paths, in flounced somewhat by the demands of their own discipline and nudged along by social, economic, and political issues, helping to explain why different approaches often were unacknowledged(Philip, 2012).

Seligman's learned helplessness

Abramson, L. Y., Seligman, M. E., and Teasdale have proposed this model in 1975. According to his view, "some chronic stress occurs again and again. People can learn to be helpless by experiencing repeated stress of lack of their control. Learned helplessness creates three problems. They are motivational, cognitive and emotional problems.

The mechanism of learned helplessness is now very well-charted biologically, and the original theory got it backward. Passivity in response to shock is not learned. It is the default, unlearned response to prolonged aversive events and it is mediated by the serotonergic activity of the dorsal raphe nucleus, which in turn inhibits escape. This passivity can be overcome by learning control, with the activity of the medial prefrontal cortex, which sub serves the detection of control leading to the automatic inhibition of the dorsal raphe nucleus. So animals learn that they can control aversive events, but the passive failure to learn to escape is an unlearned reaction to prolonged aversive stimulation. In addition, alterations of the ventromedial prefrontal cortex-dorsal raphe pathway can come to sub serve the expectation of control. We speculate that default passivity and the compensating detection and expectation of control may have substantial implications for how to treat depression (Steven, 2016).

VI. LITERATURE SURVEY – PERSONALITY

According to Freeman, F. S. (1934) personality is "the resulting individuality arising out of the interaction of a self-conscious and intelligent person and the environment in which he lives". Guilford, J. P., and Guilford, R. B. (1936) defines personality as "the fact that a man eats, sleeps and works and does not define his personality, rather his personality is defined by what he eats, how he sleeps and what is distinctive about his work pattern". The consistent and characteristic ways of functioning of an individual reveal his personality. Allport, G. W. (1955) has given a comprehensive definition of personality, which recognizes the value of wholeness adjustment and distinctiveness of man's "personality". According to Allport, "personality is a dynamic organization within the individual. Paul Costa and Robert McCrae [National Institutes of Health] derived the "big five" personality in the 1970s. Warren Norman [University of Michigan] and Lewis Goldberg [University of Oregon] studied in a different way. Five big personality differences were found out by the psychologists. The Big five dimensions developed from their experiments.

Most human personality traits can be compiled into five broad dimensions of personality. Big five personality test is now the most commonly used and accepted assessment

method of personality explored the impact of individual differences in personality factors on interface interaction and learning performance in both an interactive visualization and a menu-driven Web application. Yang ping et al (2009) conducted research on personality learning system. They developed different learning programs for different personality learners and found the efficiency level among the learners. Li, T., Ma, Y., Qiu, Y., and Yue, P. (2007 integrated the human factors such as emotion, personality into the interface. They reviewed the concept of human–computer interaction and artificial intelligence. Al-Dujaily (2007) investigated the relationship between e-learners' performance and personality types. Reuther, A., and Meyer, D. G. (2002) investigated the effect of personality type on the usage of a multimedia engineering education system. They investigated the students' satisfaction level among the multimedia learners. They also compared the computer-based educational delivery with multimedia learning material.

VII. LITERATURE SURVEY–ATTITUDE

Monitoring the students' attitudes and developing an understanding of the factors that affect attitudes and behaviours will assist educators in providing appropriate learning material and learning experiences to learners. The successful integration of new information and communication technology in educational environments depends, to a great extent, on learners' attitudes and interests towards them.

Selwyn, N. (1997) has investigated the use of Computer Attitude Scale [CAS] to identify the students' attitude towards computer assistance and learning. The scale consists of factors such as self-confidence in previous knowledge, computer engagement, fears of long-lasting negative consequences of computer use hardware usage anxiety and evaluation of positive consequences of computers. It is a 6-point attitude measurement scale.

General education teachers have differing views about the inclusion of students with disabilities in mainstream classrooms. However, the type and severity of the children's disabilities affect teachers' willingness to accommodate certain students and their confidence that they will effectively manage their classroom. It has been reported that teachers have expressed concerns about having students with autism and emotional behavioural disorder in the general education setting because of the children's lack of social skills, behavioural outbursts, modifications made to the curriculum, and lack of training and supports. Many instructors do not believe they are able to teach these populations effectively while simultaneously teaching a large group of typically developing students. Teachers' attitudes toward their current student population with special needs dramatically affect the success and effectiveness of their instruction (Jennifer,2011)

Researches prove that better computer knowledge students have, the higher their perceived usefulness of computer system, higher computer self-efficacy and lower computer anxiety. Although there are many advantages, students have different attitudes and opinions towards this modern information and communication technology process of learning. There is a connection between technical abilities and students' attitude towards multimedia learning. Computer attitude is also influenced by time spent. Computer usage time and computer experiences are the main aspects for positive computer attitude.

VIII. CONCLUSION

The basic concepts such as multimedia-learning platform, personalized learning material, intelligent quotient, emotional quotient, attitude quotient, personality and stress are discussed. Basic concepts about adult education, intelligence, emotionality, memory and learning, motivation are discussed. A detailed literature review on intelligence, emotionality, personality, stress, memory is also presented. The above literature review has given the evidences and direction to study the 3-D Animation learning materials' impact on adult learners.

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