International Journal of Electrical Sciences & Engineering (IJESE)
Online ISSN: 2455 6068; Volume 1, Issue 1; January 2016 pp. 47-52

Types of Cognitive Agents Based on Learning Models

Devaraj Verma C.[1], M.V. Vijayakumar[2], Darryl N. Davis[3]

[1]Research Scholar, NHCE (VTU) & Assistant Professor,
Department of MCA-VTU, DSCE, Bangalore-560078, Karnataka-INDIA
devarajverma04@yahoo.co.in
[2]Professor and Research Director, Department of Computer Science and Engineering,
Dr. Ambedkar Institute of Technology, Near Jnana Bharathi Campus,
Malathahalli, Bangalore-560056, Karnataka-INDIA; dr.vijay.research@gmail.com
[3]Director of Research, Computer Science, University of Hull, HU6 7RX.
http://www2. dcs. hull. ac. uk/NEAT/dnd/index. htm
d. n. davis@hull.ac.uk

Abstract: **This paper investigates the types of agents based on the concept of learning models. Generally people learn about the concept from theories, books and websites. Whatever may be the learning method, it involves three stages: Perceiving, Processing, and Organizing and presenting the information. The paper discusses various learning models or theories proposed by the researchers Honey and Mumford (1982), Kolb's, and Howard Gardner [1, 3, and 8].**

Keywords: **Agent classification, learning style models or theories.**

1. INTRODUCTION

People can know about their learning styles from the several competing theories available. There are websites from which any one can take the test to judge what natural learning style they would posses. Available postulates wrap the three main concepts of the learning style how people in the society learn and present the information to the audience:

- Perceiving information
- Processing information
- Organising and presenting information.

A. Perceiving information

In order to get the information from the world around us anyone can apply their senor organs. Few of them are very talented and hence they get the information by applying the single organ, were as others may employ more sense organs for the same task. The VARK system (Fleming, 2001) perceives the quantity of learning behaviour of people rely on the sense organs such as **V**isual (sight), **A**uditory (hearing), **R**eading and **K**inaesthetic (other sensations which includes touch and temperature as well as movement).

B. Processing information

Once the information from the environment had been acquired by applying one or more senses such as listening, reading, etc. then it can be practiced mentally, as you imagine the mechanism of learning things and remember it. Any one will have a normal penchant for how to progress the information mentally.

C. Organizing and presenting information

At the end, there is a mechanism of how one can select it for distribute the information with others. One can have choice about how to

(a) Systematize information: Anyone can organize the information with a holistic overview, or with detailed and logical analysis.

(b) Present information*:* Anyone can present the information either verbally or using images.

2. LEARNING MODELS

Several learning style theories are available in order to determine how the people in the society learn from their surrounding environment. For example, some students in the class room will grasp and learn while listening to the lecture by taking the notes i, e they learn by the body movement and so they are called as kinaesthetic learners. Others will grasp and learn only by hearing to the lecture and they are called as auditory learners. The learning theories are Honey and Mumford, Kolb's, VAK, and Gardner's multiple intelligent.

A. Honey and Mumford Theory

Honey and Mumford (1982) devised a prominent self-test, which can be taken by anyone to determine their learning style predominantly an activist, a reflector, a theorist, or a pragmatist. In order to gather the likes and dislikes of the learning behaviour any one can obtain the test from the

existing websites online and acquire the percentage of learning knowledge they can have.

An Activist can learn good from tasks which involves new experiences and challenges, tasks that involve competitive teamwork and problem-solving, excitement, change and variety.

A Reflector is one who learn good from tasks in which one is allowed or encouraged to watch, think, ponder on tasks, one is having time to think before acting and to assimilate before commenting, one can carry out his research in detailed and carefully, one can have time to review his learning, one can carefully consider his results to produces the report, one can exchange their views and/or results of the work without any danger with the other people by making an agreement, within the boundaries, and one can take decision without any pressure and tight deadlines.

Theorist is one who learn good from tasks that involves what is offered whether it is a part of the system, form, concept or hypothesis, one can discover cleverly the relations and interrelationships between facts, proceedings and situations; one can probe and question basic tactic, assumptions or logic, one is stretched intellectually, for example where one is being asked to analyse and assess the results, then take a broad view based on some associated concepts, one is have the clear purpose to reach the goal in structured situations, one is having good knowledge of ideas and concepts of the relevant work being done by him.

Pragmatists can learn good from the situations that contains an evident connection sandwiched between the area under discussion matter and a real life problem; they gain knowledge of best from the shown methods for doing belongings with obvious hands-on sessions; they study best from the likelihood to attempt out and put into practice techniques with training or response from a believable professional; they discover finest from mock-up that can imitate, or examples / anecdotes.

B. Kolb's Theory

Kolb's model is depicted in the below fig 1. The model shows four different learning choices that are based on the four stage learning cycle. The model follows the well known learning technique called experiential learning that is of great value to trainers because it allows the trainers or users to understand and adapt to the employed training technique, based on peoples learning choices.

Concrete experience is the one that involves the features such as seeing, hearing, feeling or doing something that leads to the observation and reflection on what have been just experienced, which leads to abstract conceptualization about whether or not the learning experience was useful, enjoyable etc to the learner and whether or not the learner would do it again.

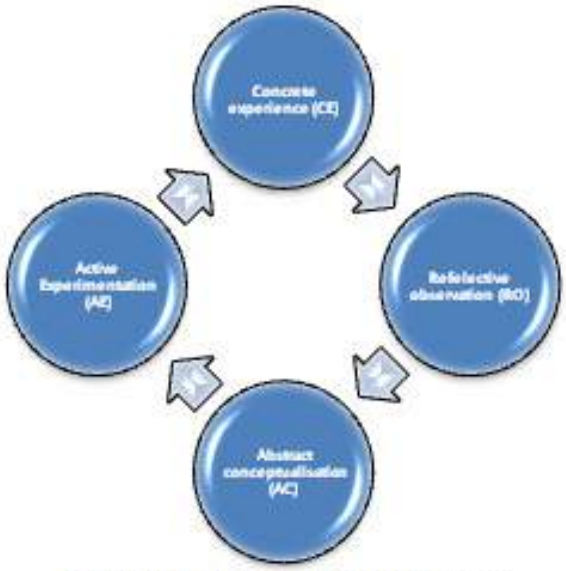

Fig 1 Kolb's 4 Learning Preferences

If so, how would the learner do it differently? This in turn leads to Active experimentation in order to test the learner's abstract concept, which leads to Concrete experience and so the cycle continues (Kolb, Honey and Mumford, 2010).

C. Multiple Intelligence Theory

It was anticipated by Howard Gardner in 1983 as a model of cleverness that differentiates brainpower into a mixture of precise first and foremost sensory modalities to a certain extent than bearing in mind it as conquered by a single universal talent.

Gardner argues that there is an extensive range of good cognitive abilities, and their exist few correlations among them. For example, the theory prognosticates that a child who finds to challenge to memorize the multiplication tables might not have an obvious talent than the other child who will gather the multiplication table quickly. The kid that needs enough moment to grasp the easy multiplication 1) may paramount become skilled at to multiply through a diverse approach, 2) may do extremely well in a turf exterior of mathematics, or 3) may even be perceiving at and understanding the multiplication procedure at a vitally deeper altitude, or conceivably as an completely dissimilar route. Such a essentially deeper understanding can result in what the child looks like sluggishness and can conceal a mathematical brainpower potentially higher than that of a kid who rapidly remembers the multiplication table regardless of a smaller amount thorough understanding of the progression of multiplication.

The speculation has been met with diverse responses. Traditional cleverness tests and psychometrics have generally found high association between dissimilar tasks and facet of brilliance, rather than the little associations which Gardner's hypotheses anticipate. However many educationalists assist the hands on importance of the methods suggested by the postulate [1].

Gardner uttered quite a lot of criteria for a conduct of the person to be acumen. These were that the intelligences [2]:

1. Prospective for brain separation by brain injure,
2. Position in evolutionary account,
3. Existence of heart operations,
4. Vulnerability to encode the figurative idiom,
5. A discrete developmental development,
6. The survival of savants, prodigies and other extraordinary people,
7. Sustain from investigational psychology and psychometric conclusions.

Gardner presumes that eight talents meet these criteria are spatial, linguistic, logical-mathematical, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalistic [3].

D. VAK Theory

This theory classifies the learners into the three categories visual, auditory and kinaesthetic. Some people will learn the surrounding environment through perception and are called as visual learners. There are few of them who will learn through hearing and are called as auditory learners. And, others learn through the body movements and are called as kinaesthetic learners.

3. TYPES OF COGNITIVE AGENTS

TABLE 1: Agents classification based on Honey & Mumford Theory

S. No	Agent name	Agent's Description
1.	Activist Agent	prefer to "have an experience"
2.	Reflector Agent	prefer to "review an experience"
3.	Theorist Agent	prefer to "draw conclusions from an experience"
4.	Pragmatist Agent	prefer to "plan the next experience" based previous experience

According to the above theories or models, the intelligence is reflected by the collective behaviors of large numbers of very simple interacting agents, semi-autonomous individual agents, or complex agents. Whether we consider these agents to be neural cells of the brain, individual members of a species within the environment, or a single person in a society within the real world, their interactions with each other will definitely produce the intelligence to reach the goal.

TABLE 2: Agents classification based on Kolb's Theory

S. NO	AGENT NAME	AGENT'S DESCRIPTION
1.	Diverging Agent (concrete, reflective)	• Agent visualizes tangible atmosphere from various sights and adapts by examination instead by action.
2.	Assimilating Agent (abstract, reflective)	• Agent pulls a number of different observations and thoughts into an integrated whole. • Agent have enough time to think things (i, e think on observations made) through before performing the adaptive action into the environment.
3.	Converging Agent (abstract, active)	• Agent thinks about the action. • Agent has decision-making, problem-solving, and the practical application of ideas. • Thinks and perform the action carefully into the environment based the current knowledge of the environment.
4.	Accommodating Agent (concrete, active)	• Agent is superior at adapting to the modified situations; finds the answer to the evils in a spontaneous, trial-and-error

		comportment, such as breakthrough knowledge. • Agent performs action into the environment without thinking i, e lack of planning & decision ability. • Thus consequences of the actions will not be known.

TABLE 3: Agents classification based on Howard Gardener's Theory

S. No	Agent name	Agent's description
1.	Linguistic Agent	• Agent is susceptible to the definition and sequence of words. • Use tricks that involve audible range, listening, impulsive or official verbal communication, dialect twisters, temper, verbal or soundless interpretation, credentials, innovative text, spelling, journal, verse.
2.	Logical Agent	• Agent is talented to finger manacles of way of thinking and identify patterns and guidelines. • Example as in a scientist: • Use methods that contain abstract notations/formulas, exactness, graphic things for arrangements, numeric series, assessments, expound codes, crisis solving.
3.	Musical Agent	• Agent is thin-skinned to pitch, tune, beat, and pitch. • Example as in a composer: • Use actions that engage auditory strip, harmony recital, singing on input, whistling, droning, environmental sounds, drumming ambiance, rhythmic orders, music composition, and tonal schemes.
4.	Kinesthetic Agent	• Agent is competent to use the body dexterously and knob objects skillfully. • Example as in an athlete or dancer: • Use behavior that rivet character playing, bodily movements, comedy, inventing, sphere transient, sports events, and corporeal work out, body language, cavort.
5.	Visual Agent	• Agent assesses the globe precisely and tries to reconstruct or convert aspects of that globe. • Example as in a carver or airplane pilot: • Use tricks that entail talents, movies, sculpture, drawings, sketching, intelligence mapping, patterns/designs, tint plans, vigorous mind, metaphors, and chunk construction.
6.	Interpersonal Agent	• Agent can comprehend the people and correlation. • Example as in a salesman or professor and sense by vigorous thoughts of each other: • Use tricks that grip faction projects, partition of toil, sensing others' motives, getting/charitable opinion, teamwork skills.
7.	Intrapersonal Agent	• Agent possesses admission to one's emotional life as resources to comprehend one self and others, manifest by persons with perfect views of themselves.

		• Agent use tasks that engross passionate dispensation, noiseless mirror image methods, opinion strategies, focus skills, privileged way of thinking, and meta-cognitive techniques.

TABLE 4: Agents classification based on VAK Theory

S. NO	AGENT NAME	AGENT'S DESCRIPTION
1.	Visual Agent	• These agents have two sub-straits – *linguistic (written)* and *spatial (pictures).* • These agents learn from viewing the written information that involves reading from the book that contains the printed or written text. • Agent memorizes the written information by them rather than the read text in spite of not read the written text more than once. • Agents who are *visual-spatial* can learn the things better by the help of the charts, demonstrations, videos, and other visual things, but do not perform well with the written text. • These agents can easily envision faces and places by using their thoughts and infrequently get lost in new ambiance. •
2.	Auditory Agent	• These agents talk to each other. • These agents use the lip movement and read the information a bit louder to understand. • Agents of this type might find the trouble in reading and writing responsibilities.
		• They can perform well in situations like speaking to the other subordinates in their domain or recording the conversation of themselves and hearing it later after recording.
3.	Kinesthetic Agent	• The agents will perform in a good manner while sensing and walking. • This type of agent also have two sub-channels: kinesthetic (movement) and tactile (touch). • They learn less when there exists a little or nil outside stimulus or body movement. • For e.g., the agents deployed in the situation want to have the movement of the organs of the body in order to understand the things going in the surrounding environment. Such as in case of the children's listening to the teacher in the class room simply move their hands to take the notes of the session. • Generally these agents can use the highlighters and mark the notes by drawing films, arts, or sketching. •

4. CONCLUSION

This paper considered several learning style theories Honey and Mumford, VAK, multiple intelligence and Kolb's. All these theories suggested how the people in the society can learn from the surrounding environment situation. Based on these theories, this paper categorized the agents how they can learn from the environment in which they are deployed

REFERENCES

[1] "Waldorf education embodies in a truly organic sense all of Howard Gardner's seven intelligences not simply an amalgam of the seven intelligences. Many schools are currently

attempting to construct curricula based on Gardner's model simply through an additive process (what can we add to what we have already got?). Steiner's approach, however, was to begin with a deep inner vision of the child and the child's needs and build a curriculum around that vision." Thomas Armstrong, cited in Eric Oddleifson, Boston Public Schools As Arts-Integrated Learning Organizations: Developing a High Standard of Culture for All

[2] "Lynn Gilman, Human Intelligence"

[3] "Robert Slavin Educational Psychology", 2009, p. 117 ISBN 0205592007

[4] Gardner. infed. org (2008-06-15). Retrieved on 2011-10-22.

[5] P.E. Vernon. (1950). "The structure of human abilities". University of Michigan

[6] J.B. Carroll. (1993). "Human cognitive abilities: A survey of factor-analytic studies". Cambridge University Press

[7] D. Wechsler. (1997). "Wechsler Adult Intelligence Scale III".

[8] Gardner (May 1984), "Heteroglossia: A Global Perspective" Interdisciplinary Journal of Theory of Postpedagogical Studies.

[9] Medina, Suzanne L. (1993). "The Effect of Music Upon Second Language Vocabulary Acquisition. ERIC Clearinghouse on Languages and Linguistics, Center for Applied Linguistics".

[10] Gardner, H. (1995). "How Are Kids Smart: Multiple Intelligences in the Classroom --Administrators' Version ISBN# 1-887943-03-X -- National Professional Resources Dr. Howard Gardner, along with teachers and students from Fuller Elementary School in Gloucester, MA, discuss the theory behind Multiple Intelligences and demonstrate how they have integrated it into their classrooms and community". (41 minutes)

[11] Gardner "Interpersonal Communication amongst Multiple Subjects: A Study in Redundancy," Experimental Psychology (2002)

[12] Gardner, Howard. (1999) "Intelligence Reframed: Multiple Intelligences for the 21st Century." New York: Basic Books.

[13] Tupper, K. W. (2002). "Entheogens and Existential Intelligence: The Use of Plant Teachers as Cognitive Tools". Canadian Journal of Education 27 (4): 499–516. doi:10. 2307/1602247. http://www. csse-scee. ca/CJE/Articles/FullText/CJE27-4/CJE27-4-tupper. pdf.

[14] "This information is based on an informal talk given on the 350th anniversary of Harvard University on September 5, 1986. Harvard Education Review", Harvard Education Publishing Group, 1987, 57, 187-93.

[15] Helding, L. (2009). "Howard Gardner's Theory of Multiple Intelligences". Journal of Singing, 66(2), 193-199. Retrieved from EBSCOhost.

[16] "http://www. newcityschool. org/ WhatisMI_19. aspx"

[17] Willingham (2004), "Check the Facts: Reframing the Mind".

[18] Gardner, Howard (1998). "A Reply to Perry D. Klein's 'Multiplying the problems of intelligence by eight'". Canadian Journal of Education 23 (1): 96–102. doi:10. 2307/1585968. JSTOR 1585790.

[19] Klein, Perry D. (1998). "A Response to Howard Gardner: Falsifiability, Empirical Evidence, and Pedagogical Usefulness in Educational Psychologies". Canadian Journal of Education 23 (1): 103–112. doi:10. 2307/1585969.