

THE MASTER TEACHER: THE WAY FORWARD IN PRIMARY- TO-TERTIARY LEVEL EDUCATION

PAUL ANDREW BOURNE^{*}, CHARLENE SHARPE-PRYCE^{*}

INTRODUCTION

The concept of a master teacher or master learning owes its origin to the constructivist teaching-learning paradigm (Doolittle and Hicks, 2003; Duff and Cunningham, 1996; Jadallah, 2000). De Mesa and de Guzman (2006) postulated that the master teacher is an individual who understands classroom practices and pedagogical techniques, embedded in the constructivist teaching approach (see Noethen, 2006; Ryan, Cooper and Taver, 2013; Schiermeyer, 2010; Fosnot, 2005). The theory of constructivism emerged in the 1920s in Russia to explain a worldview (i.e. cosmology) that learning is an active process of social constructions (Piaget, 2013; Ertmer and Newby, 1993; Crotty, 2005; Cooper, 1993; Vygotsky, 1980; Roy Rosenzweig Center for History and New Media, 2016). The theory offered the perspective that people socially construct their reality (Crotty, 2005); suggesting that knowledge is a set of social constructions and not an abstract reality (Cooper, 1993; Ertmer and Newby, 1993) as purported by positivists projecting an objective reality (Kuhn, 1997).

The constructivist paradigm is predicated upon the premise that the learner is not a blank slate and that he/she comes into the learning environment with a whole setting of meanings, values, past experiences and cultural beliefs that impact on the learning process (Educational Broadcasting Corporation, 2004; University of Sydney, 2016; Fosnot, 2005;

Hackmann, 2004). It can be deduced from constructivism that the learner comes into the learning process with previous knowledge and that he/she will actively engage processes of deconstructions and constructions in an attempt to make sense of new information, which must be facilitated by a teacher who challenges the learning by way of questioning and challenging situations as well as paying attention to the students' autonomy and initiative (Brooks and Brooks, 1999). Hence, the learner is an active and reflective participant in the learning process as explained by Fosnot (2005). Concomitantly, constructivism's beliefs and assumptions are linked to social development theory (Vygotsky, 1980) as well as psychology (The University of Sydney, 2016). Given that the learner is not a blank slate, and enters the learning process with his/her prior experiences, the teacher should be able to coalesce all of this in a meaningful way in order to build new knowledge (Jackson, 2009).

The concept of the master teacher reflects the underlying assumptions of the constructivist teacher who has mastered the teaching-learning process and has brought a fervor and inspiration to the process reflective of the gamut of experiences and knowledge acquired and which are now employed to teach new concepts, fueling a debate on constructivism as pedagogy.

^{*} Department of Graduate Education and Leadership, Northern Caribbean University, Mandeville, Jamaica.
Correspondence E-mail Id: editor@eurekajournals.com

The University of Sydney (2016) captured the mood of the debate and opined that:

Constructivism is not a specific pedagogy. Piaget's theory of Constructivist learning has had wide ranging impact on learning theories and teaching methods in education and is an underlying theme of many education reform movements. Research support for constructivist teaching techniques has been mixed, with some research supporting these techniques and other research contradicting those results.

Many educational institutions and policy makers around the globe sought to address the deficiency in the educational system and in so doing were rejecting the traditional teaching style. Jamaica like the rest of the world had come to the reality that the traditional teaching style had failed in the process of educating the society. The 2007 cross-sectional probability national survey, using 1,338 participants, confirmed that education was among the top 10 national problems in Jamaica (Powell, Bourne and Waller, 2007). It is within this context that the master teacher concept influenced by constructivist learning gained prominence in Jamaica. The master teacher concept is in the broader context of constructivist learning, employing mixed learning theories that foregrounds the learner as a discoverer. Jackson (2009) opined that what separates the master teacher from the averaged teacher is the notion of teaching as a strategy and not simply an avenue for imparting information, which is referred to as 'a mindset towards teaching.'

CONSTRUCTIONISM: THE CONSTRUCTIVIST TEACHER

The principle of constructivism spans a wide continuum ranging from information processing and interactive-constructivist, to social constructivist and radical constructivist approaches (Yore, 2001). Moreno and Valdez

(2005) regard the function of a multimedia environment in the situated constructivist design, either as abundant reality or as simulation, to encourage learners to decipher knowledge on their own, to grasp and control the learning process by themselves, and to facilitate the exploration and reorganization of acquired knowledge. Bates (2000) contended that one of the tasks of education is to help to develop in the young useful and marketable skills that will be of use to others and therefore ensure employment. If Bates' perspective means the development of human capital of a society, particularly the young, it follows that educators must commence inquiries and/or experimentations that will be of critical importance in aiding the teaching-learning process. The constructivist teaching approach is typically student-centered discovery learning, which means it can have some transformational effect on the low performance of pupils.

In a constructivist learning environment the role of the lecturer shifts from being a source of knowledge to facilitating learning. Khine (2003) argued that students should not be left to explore alone, rather lecturers should provide support, coaching and modeling to the students to make certain learning takes place. Unlike the teacher-centered model, in which lecturers impart knowledge to students, "knowledge for constructivism cannot be imposed or transferred intact from the mind of one knower to the mind of another" (Karagiorgi and Symeou, 2005, p18). It is well documented in educational literature that reforms in education, especially in English language arts, mathematics, science, social studies and technology, were within the areas of literacy as a learning output, the students or learners, constructivism and pedagogy (Ford, Yore, & Anthony, 1997; Yore, nd). Yore (nd) postulated that those 'commonalities' have resulted in educational reforms that were never before. This reform places the learners' cognitive

abilities, past knowledge, ability of the learner to construct meanings, use this to understand a discipline squarely at the core of teaching (Yore, nd), and develops a new model for the constructivist classroom (National Research Council, 1996). The revolution of this new thinking gave rise to the constructivist teacher and some scholars refer to this person as a master teacher within a constructivist paradigm (Driver, 1997; Driver, et al., 1994; Noethen, 2006). The master teacher, therefore, aptly fits into a facilitative role as he/she having mastered the basics of teaching is able to stimulate and foster positive learning outcomes among the students (Johnson, 2011).

Yore (nd) summarizes how the reform has led to a new educational paradigm, particularly a teacher who is different from the traditional instructor to a facilitator, and that this has framed the new classroom, strategies and thinking about the teaching-learning process. He forwarded that:

What does this constructivist framework say about designing and evaluating teacher education programs and specifically the science education component of a program? The operant issue is teacher education -- not teacher training. Unfortunately, some programs are still based on the principles of normal schools rather than research-based principles. Clearly, we need to produce beginning teachers who are critical thinkers and reflective practitioners and to help practicing teachers to develop the critical stance and strategies necessary to become reflective practitioners. This involves more than just mimicry, mechanical use, and classroom management of inquiry science teaching (p. 6)

Clearly Yore's perspective offered a context of a new framework of the teaching-learning process, especially a new teacher that

integrates the needs of the learner, understands the characteristics of the learner including past experiences, the desired outcome and fashions teaching around all of those matters. He used the assumptions of the constructivist framework to speak of the new paradigm; but stopped short of using the concept to refer to this facilitator in the new paradigm. Even prior to Yore, Henriques (1997) had outlined different categorizations of constructivism and showed teacher-and-student in the framework; but stopped short of giving the new teacher a title outside of constructivist. Henriques (in Yore, nd, 5) detailed faces of constructivism and again the issue of master teacher was not coined to describe the new teacher (Table 1).

It was scholars like Johnson (2001) who forwarded the tenets of a master teacher of which he identified seven: create an atmosphere, an environment, and an attitude for learning; establish a reason to learn; train students how to learn; inspire students to achieve; establish accountability for learning; continually check learning gains; and, celebrate new learning. All the seven tenets of master teacher as introduced by Johnson are within the context of a constructivist teacher and therefore are subsumed in the constructivist learning paradigm. According to Crotty (2005) the term constructivism refers to the epistemological considerations focusing exclusively on 'the meaning-making activity of the individual mind' and constructionism focuses on 'the collective generation and transmission of meaning'. Constructivism is used in this paper as a theory to guide understanding of how students acquire critical questioning skills and how teacher (i.e. master teacher), who understands cognitive growth and learning style of each learner, is able to apply all this knowledge to the learning-teaching process.

Table 1. Four Faces of Constructivism (adapted from Henriques, 1997).

Feature	Information Processing	Interactive-Constructivist	Social Constructivist	Radical Constructivist
Worldview	Mechanistic	Hybrid	Contextualistic	Organistic
Ontological View	Realist	Naive Realist	Idealist	Idealist
Epistemic View	Absolutist (traditional)	Evaluativist (modern)	Evaluativist (postmodern)	Relativist (postmodern)
Judgment Criteria	Nature as Judge	Nature as Judge	Social Agreement as Judge	Self as Judge
Psychological Locus of Mental Activity	Private	Public and Private	Public	Private
Pedagogical Structure	Teacher	Shared: Teacher and Individuals	Group	Individual
Linguistic Discourse	One-Way: Teacher to Student	Two-Way: Negotiations to Surface Alternatives and to Clarify	Two-Way: Leading to Consensus	One-Way: Individual to Self (inner speech)

The beginning of the social constructivist movement in America was partially influenced by philosopher John Dewey who wrote *Democracy and Education* in 1916 (Dewey, 1997). He believed that education environment should be an interactive one in which individual can expand their body of knowledge. The main leader in constructivist thinking was Jean Piaget (Singer & Revenson 1996; Philips and Soltis, 1998). Piaget believed that learning is a continual process and reorganization in the mind. Through the lens of psychological constructivism Piaget contended that learning happens in a sequential pattern like steps. He also theorized that learning happens through a process of adaptation or accommodation of information into one's schema no matter the age of the learner. As children input new information they will be transforming "the input from the environment into their own mental structures. This will happen only if each child has a system that can make the required transformations" (Marek, 1997, p. 62). It was not until Piaget's ideas began to become

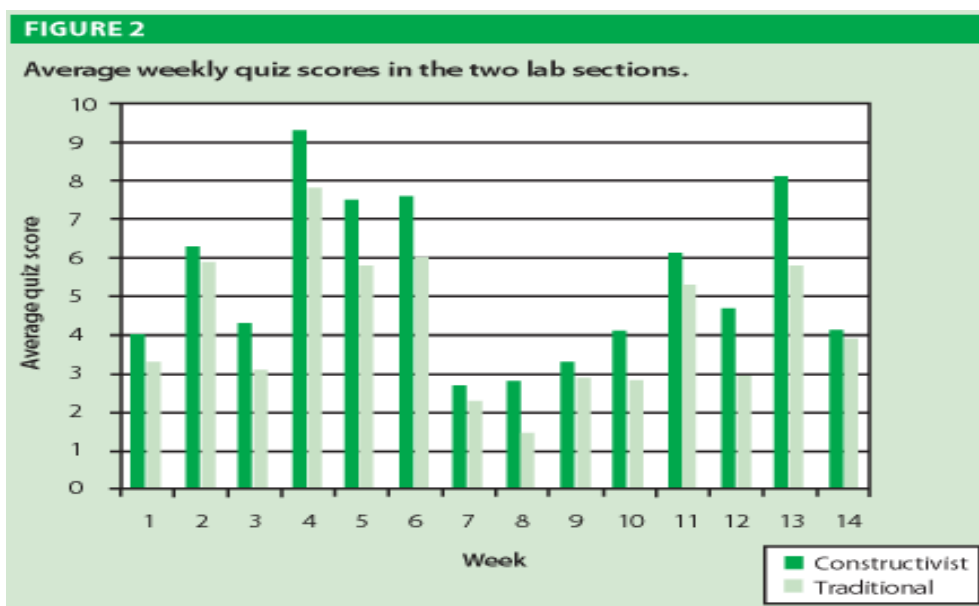
accepted in America in the late 1970's that social constructivism emerged and Vygotsky introduced the issue of proximal development (Kim, 2005, p.8-9). The Zone of Proximal Development was explained as the difference between the actual developmental level of the student and their potential of development through problem solving and more capable peers. Vygotsky postulated that students learning are influenced by not just the classroom but by society and culture. Connections between culture and society and the influences that they represent are essential in understanding outside influences that affect student learning (Bruner, 1996). Vygotsky opined that "if learning can be influenced by social mediation, then conditions can be created in schools than can help students learn" (Vygotsky, 1978 p. 86). He believed that we have learned from others by using psychological tools, such as counting systems, maps, conventional signs, and works of arts (Miller, 1993, p. 388).

Constructivism believes that “each individual constructs knowledge rather than receiving it from others” (McBrien & Brandt, 1997). Teaching can be considered as constructive when it is based on the idea that students learn best when they gain knowledge through exploration and active learning. Parr and Edwards (2004) posited that the learning theories can also be referred to as discovery learning, which is different from the traditional approach. One of the differences in teaching strategies was stated by Zoller (2000) who indicated the passivity of the learner in the traditional teaching methodology. Constructivist teaching is student-centered discovery learning rather than teacher based and Zoller (2000) opined that teacher-centered classroom has been found to be non-productive in some instances. Scheurman (1998) indicated that constructivist teaching paradigm has been challenged by some teachers because it requires more preparation than the traditional teaching paradigm.

In the constructivist approach the students participate in hands on activities and construct their own knowledge (Khalid and Azeem, 2012). Windschitl (1999) postulated that constructivist approach is not merely a set of instructional practice but a method of thinking about the child’s development and schooling. He further went on to say that in order to implement this movement a fundamental change in the method of student assessment, the physical structure of the classroom and also how activities are scheduled, and how teaching is evaluated is needed. Although the constructivist seemed to be the way forward

there are contradictory views about the effect of this approach with low-achieving students and those with learning disabilities. A study carried out in an elementary school in Finland revealed that the traditional approach actually produced significant improvement in student performance when compared to a constructivist approach (Kroesbergen, 2004), which is contradicted by study from Khalid and Azeem (2012). Using a sample of participants from teacher Education at a University in Lahore, Khalid and Azeem (2012) found that constructivist approach yielded higher scores in grammar, writing, and reading among compared to using the traditional approach.

A study conducted by Ottman (2010) found that both groups showed significant improvement under both approaches, but showed no significant improvement on the part of a specific approach (see also, Lord, 1997). Montague (2003) held the view that a constructivist approach is the best way to teach students with learning disabilities. While Travis and Lord (2004) did not study physically challenged students, they concurred with general perspective that learning outcome is greater using the constructivist compared to the traditional teaching style (see Figure 2). Not only did Travis and Lord (2004) established that higher students’ performance was discovered using the constructivist teaching style, they also found greater class attendance, suggesting that this approach stimulates and encourages the students into participating in the learning process compared to the traditional teaching approach.



Fosnot (1996) had earlier theorized that constructivism which emphasized self-regulatory learning offers more to the learner as he/she makes more sense of the world, applying and interpreting ideas, becoming an active participant and thereby provide insights for the learner. This cumulative experience of the learner (Piaget, 1973) anchors and deepens learning as the children are active participants and are not being fed with information without applying their meaning system, interpreting the ideas and making sense of them in a general context. Such an approach fosters learning as the students are interacting with the idea, and contextualizing the material. This active cognition (internal mental construction) is embracing learning by involvement as the learner is more than a vacuum who is merely accepting everything from the teacher (Stofflett, 1998; Virginia Association of Science Teacher, 1998).

The importance of incorporating constructivism into scientific teaching has already been recognized by most science educators with many studies carried out over the past 20 years (Trumper, 1997; Yore & Treagust, 2006). Trumper (1997), Yore and Treagust (2006) maintained that constructive knowledge is the result of students' thinking ability. Ideas are

constructed from pre-knowledge and from their social and cultural backgrounds. Ausubel (1968) suggested that the fundamental principle of constructivist instruction was to assess what students know and then to teach then accordingly. Such a perspective has been applied to the teaching of courses (including social studies; sciences; mathematics) and the results showed positive improvements in performance (Zhoa, 2005; Windschitl, 1999; Wigfield, 2009; Walker, 2000; Ng'ambi and Johnston, 2006; Ottman, n.d; Montague, 2003; Matlale, 2011; Martorella, 1998; Kirkpatrick and Cuban, 1998; Kim, 2005; Khalid and Azeem, 2012; Haladyna, 1985; George, 2010). The rationale for the increased performances of students using the constructivism is aptly captured in a perspective offered by Khalid and Azeem (2012.170) that "Learners, through social negotiation, continuously test their hypotheses and create new knowledge, correct previous knowledge, or confirm present knowledge' (Clearly, the constructionist approach is an active teaching-and-learning experience which offers the learners the same importance as the task, and the engagement of the students provides the avenue for innovative and creative involvement in small group settings (Yager, 1991; Curtis, 2006). Even at the

tertiary educational level, the constructivist approach has been employed and the results are similar to those at the primary to secondary educational level (Hussain, 2012; Gibbs, 1992; Li, 2001; Hussain and Sultan, 2010). In fact, Hussain and Sultan (2010) forwarded the perspective that the constructivist approach is even more suited at the tertiary level because of the interaction of the learning with a vast array of new knowledge and the depth of critical thinking that is expected of him/her (see also, Li, 2001).

THE TRADITIONAL TEACHING APPROACH

The traditional teaching approach (i.e., lecture approach) also called the expository approach is widely employed by teachers in the teaching-learning process. It is the oldest approach employed to teach (Agbulu, 2002). This teaching approach (lecture method) according to Khalid and Azeem (2012:170) 'is very common in education especially at university level). The goal of this approach is to impart information to the students. The teacher does most of the activity in form of talking while the students are passive, making it a teacher centered approach. Khalid and Azeem (2012) aptly summarized the traditional teaching approach when they opined that "[It] ignores the students consequently the mental level of interest of the students. It involves coverage of the context and rote memorization of the part of the students" (p. 170), suggesting that the students are vessels and their role is to absorb the material as against sharing their experiences, without the emphasis of lesson (or material) completion.

In the traditional teaching approach, the teacher is the messiah or the shepherd who is solely responsible for the learning process, and the students are the sheep who require instructions in order for learning to take place (Novak, 1964, 1977, 1987, 1990, 1993, 1998, 2010). Such an approach squarely places the

emphasis on the teacher and does not give the same importance to the learner, subject matter, context and evaluation that must be in harmony for effective learning to take place (Novak, 2011). It was Novak (2011) who opined that "Based on Ausubel's assimilation theory of meaningful learning and constructivist epistemology, the theory includes five elements: teacher, learner, subject matter, context, and evaluation, each of which must be integrated constructively to effect high levels of meaningful learning", implying that traditional teaching approach is ineffective because of its singled focus. The traditional teaching approach emphasizes rote learning that account for students being able to recite nursery rimes or spell but they are still unable to perform simple arithmetic such as $2+3$. Ausubel's theory contextualizes this matter by offering an explanation that rote learning accounts for the recital of knowledge by the students; but that there is no meaning learning taking place where the individual internalizes the spoken words (Ausubel, 1963; 1968; 1978).

The traditional approach has two basic skills which must be applied to enhance effective dissemination of information to the students. These skills include: clear and good command of language and must have the ability to write clearly and boldly on the chalkboard. With this approach the teacher knows everything and the learner is blank paying no attention to the feeling, actions and knowledge level of the learners (Novak, 2011). This approach is not enough to capture most students' attention, imagination, values, expectations, past knowledge and culture. Such a method assumes that the learner is a blank slate (or empty vessel) to be lectured (or impart information) to and like Khalid and Azeem (2012) noted "It did not involve students in creative thinking and participation in the creative part of activities: and further that "...the learning process, instruction remain

unilateral..." (p. 170). Learning by way of the traditional teaching method does not allow the students to take responsibility for their learning (Wiggins 1993) and places emphasis on the behavioural psychological approach to learning that dates back to the 1970s (Novak, 2011). Novak (2011) opined that educational psychologists have shifted from the behavioural approach to a cognitive approach of learning following the discovery of cognitive development theory by Piaget.

There are plethoras of works in educational literature that have coalesced around the ineffectiveness of the traditional approach to learning (). There is a consensus that this method of lecturing to pupils and not taking into consideration their past knowledge, feelings, actions, and social milieu, further justifies the need for new learning theories to replace the traditional teaching style. Novak (2011) postulated that traditional learning approach that is centered in behavioural learning theory collapsed in the 1980s because of the rise of cognitive development theory that offered more explanations for learning styles of people. He also contended that the advancement of research in neurobiology has totally revolutionized our understanding of human learning behaviour and so opens new frontiers in learning theories including conceptual learning in children (Carey, 1985; Gelman, 1999; Keil, 2011).

Simply using the same teaching style with different students is not highly likely to be effective as a another approach that takes into consideration learning styles, personality, past knowledge, experiences, feelings and actions of the learners. In fact, Carey (1985) found that children learning totally differently from adults, fundamentally because of the cognitive difference in their thought process. It can be deduced therefrom that accumulation of knowledge will be dissimilar and that imparting new knowledge must take this into

consideration. When this is framed within the context that social setting has a significant influence on the learning process (Vygotsky, 1926; 1962), it is not difficult to grasp why the traditional teaching approach had to be replaced by a more holistic teaching approach because one size suit cannot be tailored to fit everyone.

So, why the traditional teaching method (lecture approach) still continues in many schools and university? A group of scholars reiterated the sentiment that the teacher-centered approach continues to overshadow the constructivist teaching style in Malaysia (Selah and Aziz, 2012). The extent of the teacher-centered approach in teaching in Malaysia is captured in the findings of Selah and Aziz (2012) that 58% of teaching practice occurred with a small degree of interaction and that 92% of the in class discussions were lead by the teacher. Another finding that supports the preponderance of the traditional teaching approach was that 100% of the sampled student-teachers indicated that lesson was based on their approach inspite of being taught other pedagogies. Thus, the answer to the introductory question in this paragraph is simply, it is less time consuming than a constructivist teaching paradigm.

PEDAGOGY

Critical thinkers can be viewed as a reflective activist of pedagogy freedom. Freire (1997) favoured the autonomy of the student, responsibility for one's action in the world, and a universal human ethic that is lived in pedagogical practice. Teachers have a part to play by placing emphasis on learners ensuring the correctness of ideas and concepts. Learners should be placed in situations at all times where they can practice skills as this encourages reinforcement which is one of the benefits of the constructivist approach (Adeyemi, 2000). In studting Botswana Social

Studies teachers, Adeyemi (2000) encouraged the teachers to break from the traditional approach and embrace a more learner-centered approach. Adeyemi's perspective is embodied in the outcome in performance of students when the constructivist approach is employed to the teaching-learning process. Khalid an Azeem (2012) found a significant statistical difference between the mean scores of students taught by the traditional teaching approach and that of constructivist approach. Those pupils who were taught by the constructivist approach got higher grades than those taught by the traditional approach (Khalid and Azeem, 2012, 173), which is also case in mathematics by the two teaching methodologies (Kim, 2005). The justification for the effectiveness of the constructivist teaching approach compared to the traditional teaching style is fundamentally embedded in the learning style of the learner.

LEARNING STYLES

Learning styles emphasize the fact that individuals perceive and process information in different ways (Sullo 2011). Sullo (2011) opined that teachers should plan lessons that will incorporate all four learning styles, which are embedded on Piaget's work that revealed that children's cognition and experiences are developed at different stages (Piaget, 1973). The four learning styles are visual, auditory, kinesthetic, and reading and writing. Thorndike as (cited in Hergenbahn and Olson, 1993) also concurred with the aforementioned perspectives. Thorndike (2005); Bawaneh, and Ahmad Nurulazam, and Salmiza (2010a, 2010b, 2011) recommended that teachers of Social Studies use the Herrmann Whole Brain Model in classifying students depending on their learning styles. Hergenbahn (year) groups the learners into four learning categories; external,

procedural, interactive and internal learning. Each learning style dictates the type of instructional materials to be used. Jensen's study (2000a, 2000b) found that 98% of all learning enters the brain through the senses (see also, Tileston, 2005). Perricelli (2008) in a study with sixty-nine fourth grade students a variety of methods were used to teach social studies. After using the lecture method only 13% of the participants deemed social studies as important. However after using a variety of audio visual aids and a simulation, 82% suggested that social studies are an important subject.

Gray (2016), using a diagrammatic chart, presented that there are seven different styles of learning. It can be deduced from Gray's diagrammatic chart that an individual may possess different learning styles and that any person could have a combination of many styles of learning. Such a perspective opens the door for the complex of the learner, the challenge for the facilitator and that merely employing the traditional teaching methodology will not be as effective as constructivist teaching; because an individual learning is not set on a single platform.

Gray's diagrammatic learning style model shows a cyclical diagram depicting the interconnectivity between the different styles of learning and these envelopes the social, cognitive, physical, spatial and methodological aspects. Prior to Gray's learning style model, Dunn and Dunn (1978, 1992a, 1992b, 1993 and Dunn 1986) had laid a foundation of learning style that is widely used by other scholars. Their work on learning style is presented in a diagrammatic portrait of the brain (Figure 3). The brain is compartmentalized into two major sectors unlike Gray's model, the right and left-side of the brain.



Figure 2. Learning styles by Katie Gray (2016)

Each side of the brain is compartments into two segments and these are further expanded into outer layers, which take into seven types of learning proposed by Gray. It can be deduced from Dunn and Dunn's model that could operate from both side of brain to include left-side (i.e. analytic) and right-side (i.e. impulsive), which sets a platform that if teaching is going to be effective at all, it must address the dynamics of the how people operate. Unlike Gray, Dunn and Dunn identified five learning style of pupils 1) emotional support, 2) environmental, 3)

sociological composition, 4) physiological and 5) psychological components.

Like Dunn and Dunn, Gardner and Hatch (1989) utilized picturographs representing the human brain, with seven outer compartments. The outer compartment is cyclical diagram suggesting interconnectivity of each sub-sector (Figure 4). Gardner and Hatch forwarded the perspective is different at age level indicating that teacher education must in keeping with an understanding of the variations in learning styles of pupils.

Learning Styles Preferences (based on Dunn & Dunn, 1993)

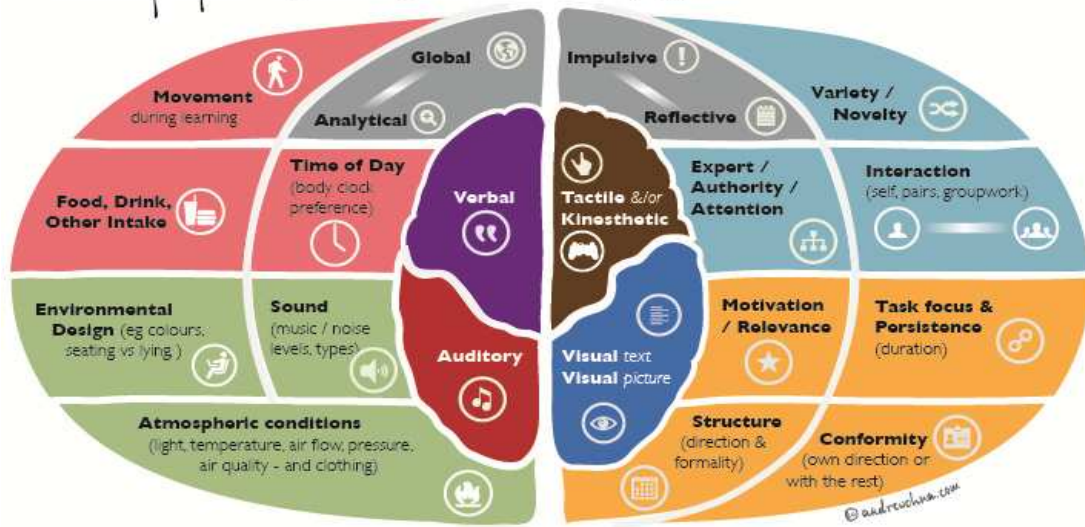


Figure 3. Learning Styles Model (based on Dunn & Dunn, 1993), Learning Preferences (retrieved from http://andrewchua.com/?page_id=22)

Thus, if learning is desired result of teaching, the issue of multiple intelligence must be understood by the facilitator and teacher cannot employ a simple lecture style because it is the easy teaching methodology to utilize. Gardner and Hatch (1989.10) succinctly capture the need to expand the traditional teaching

approach this way “The measures must involve materials that are appealing and familiar to children; there is little precedent for developing scoring systems that go beyond linguistic and logical criteria; and materials appropriate for one age group, gender, or social class may not be appropriate for others” .

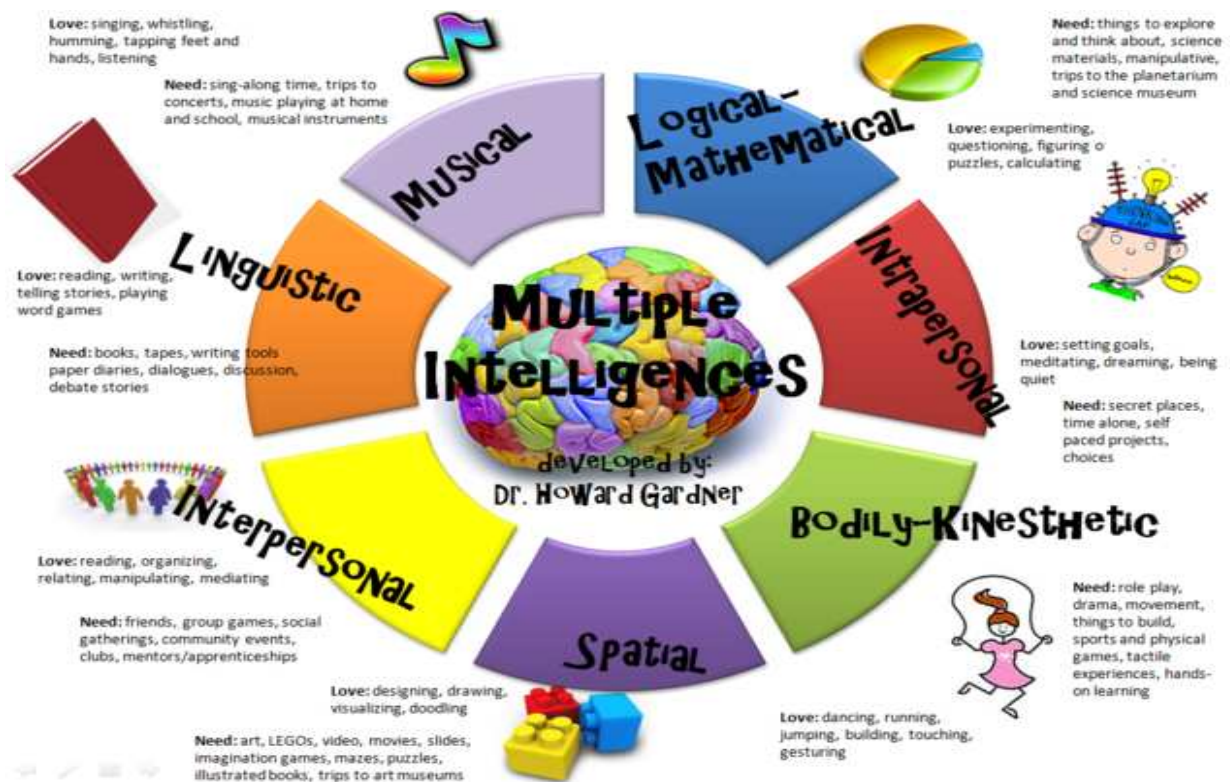


Figure 4. Multiple Intelligence Howard Gardner from <http://265725080178138949.weebly.com/learning-styles.html>

INSTRUCTIONAL MATERIALS

Instructional materials can be defined as items that are designed to serve as a major tool for assisting in the instruction of a subject or course. Black and Mc Clintok (1995) stressed the need of interpretation as being the hub to cognition and learning. Their design focuses mainly on the interpretive construction of authentic artifacts in the context of rich background materials spreading across different fields of study. This thinking which requires careful deliberation is also encouraged by constructivists (Kafai et al., 1997; Swain and Pearson, 2001; Walker, 2000). Instructional materials include the use the following materials; slides, field trips, simulation, resources personnel, books, posters, letters, electronic media, manipulative and other commonly acceptable instructional tools. Perricelli (2008), teachers viewed the textbook as the “easiest way to teach” (Governale, 1997). Mehlinger (1988), it takes time to prepare a good lesson, to select, preview and arrange for an appropriate audiovisual presentation.

MULTIMEDIA AND THE INTERNET

Multimedia is a 21st century tool, the tool can be used in all subject area to enhance learning. Multimedia/hypermedia is often referred to as the combination of sounds, graphics, texts, and images with a single information delivery system (Olwell, 1999; Rose & Fernlund, 1997). Multimedia /hypermedia, allows students to create individual or group presentations to develop skills in information retrieval and communication, or they can create presentations that promote evidence of understanding of social studies content and their own perspectives. Microsoft software such as Word, Excel and PowerPoint are often used in the social studies classroom. The internet is another vital instruction aid. Cassutto (2000) noted that the process of

collecting information from the internet helps students build critical thinking skills Therefore; the learner is interactive with the materials, making sense of it and internalizing it while collecting the material. Hence, this accounts a justification for the use of multimedia and/or information and communication technology (ICT) in the teaching-learning process (Ng’ambi and Johnston, 2006; Trucano, 2005; Onasany, Fakomogbon, Shehu and Soetan, 2010; Kolodziejczyk, 2009; Mbaeze, Ukwandu and Anudu, 2010; Mbah, 2010; McFarlane, 2001; Leuven, et al., 2004; Kirkpatrick and Cuban, 1998). While some empirical evidences suggested that ICT and/or multimedia have a positive effect on academic performance of students as well as attitude towards the course, the constructivist approach is not limited to technology as field trips offers yet another approach to the teaching-learning process.

FIELD TRIPS

Field trips can be in your community, in your classroom or far away. Field trips give the students the opportunity to ask questions, observe and think critically (Carroll, 2007; Kennedy, 2014; Pope, 2009). A study conducted by Kennedy (2014) on the benefits of field trips revealed that field trips connect advance concepts and theme in the students learning journey. A group of scholars aptly encapsulated the benefits of field trips as the out of school experience (Pugh and Bergin, 2005), with Scales (2012) finding that fourth grader was able to state all that she learnt on a field trip and argued for it usage in the teaching process. In educational literature there is consensus around the benefits of participatory and live experiences provide lasting imprints on the mind of the learner and that they optimize the learning experiences more than the traditional teaching approach (Coughlin, 2010; Knapp, 2000; Krakowka, 2012; Martin-Ordas, et al, 2012; Bevan et al., 2012). In fact, Coughlin (2010)

opined that “is optimized only when teachers actively integrate the content of the field trip with the curriculum” (p. 200), suggesting that field trips must be planned in order to enhance the desired outcome and that it should not be for mere frolic as well as rest time away for school.

ACADEMIC PERFORMANCE

One of the most critical factors of teachers’ and student’s performance is the establishment of desirable relationship. In pointing out the importance of this relationship, an atmosphere of security and ordered freedom should be created where they can express their opinions and at the same expect to be heard; where teachers and students does not feel threatened or fearful. Walters (1960) expressed that the development of a good relationship between student and teacher should be one where there is a buildup of self-confidence which is influenced first and foremost by the teacher’s personal attitude towards the students. However, if there is an atmosphere where teachers are plagued with violence from students and students’ relatives and friends, then this relationship becomes discoloured.

For many students, school is a key resource in their life (Morrison, Furlong & Morrison, 1994). Likewise, many teachers are gratified from their teaching experience and the extraordinary results their students produce as a result of their teachings. School is a place of opportunity where students can explore different things without fear (Konter 2000). However, if there is a perceived fear for their safety, the resource no longer exists. According to Abraham Maslow and his hierarchy of needs, safety is a basic need and must be met in order for children to achieve the cognitive outcomes that we intend as a result of schooling (Rice, 2006). If schools do not provide that need, a child’s education will be negatively impacted. In essence, in order for children to excel and teachers to perform

effectively and efficiently, the basic need of safety can be in question.

Poor academic performance can be described as a performance wherein the examinee scores fall below expected standard (Aremu, 2000). There are many factors that can contribute to poor performance: motivational orientation, self-esteem/self-efficacy, emotional problems, study habits and teacher consultation (Aremu and Sokan 2003). In order to measure academic performance, performance test are usually given. A performance test is “a device that attempt to gauge how well students can use basic knowledge and skills to perform complex task or solve problems under more or less realistic condition” (Snowman and Biehler, 2003, p. 536). Fischer and King (1995) recommended a major testing movement in the 1990s known as authentic assessment. The aim of this assessment is to evaluate using a method consistent with the instructional area and to gather multiple indicators of performance (Whiston, 2000, p.15-156). A study conducted by Lathi and Matlale (2011) revealed that an annual Inspectorate area report for period 2006, 2007 were low. Unfortunately, in 2008 the results indicated that the region schools’ performance has drastically dropped with the highest decline of 7.5%.

There is a convergence in the educational literature that there is a positive correlation between constructivist (or master) teaching and academic performance of pupils (Kim, 2002; 2005; Abbott and Fouts, 2003; Church, Elliot and Gable, 2001; Aydisheh and Gharibi, 2015). Using an experimental design, Kim (2005) found that by way of constructivist teaching approach on average the students’ performance was increased by 11 percentage points compared to the traditional teaching style, which was also discovered among a group of seventh graders who did mathematics (Lata

and Sharma, 2013) and the same result was also noted at the tertiary level (Hussain, 2012)

CONSTRUCTIVIST TEACHER: THE MASTER TEACHER

The poor state of the education system in Jamaica, especially the high failure of students at their respected grade level and on external accounts for the thrust in ascertaining a new paradigm that is counter to the one that is predominantly used by many schools, colleges and universities, the traditional teaching methodology (Powell, Bourne and Waller, 2007; UNICEF, 2005; Davis, 2004). Gordon (2012) found that of the 246,965 students in the secondary school system in Jamaica (2010/2011), 3.6% (n=8,798) are at the sixth form level which below the targeted figure of 20% (Gordon, 2012, p. 1). Clearly there is under-performance of students in Jamaica. There is another side to the discourse of the general failure of the education system in Jamaica as study revealed that 20% of the teachers at the secondary level in the public educational system are graduate trained. Like in Jamaica, the poor state of the education system in Malaysia, United States and other nations explain the call for the transformation of the lectured method to a constructivist approach to deal with dismally poor state of education system. Instead of broadly referring to the new paradigm that has emerged to address the poor state of the education system in many nations, some scholars and institutions have singled a concept of a master teacher and not the entire paradigm of constructivism.

Recognizing through empirical research that constructivist teacher applies a more holistic approach to the teaching-learning process and that the benefits are greater than of the traditionalist teacher, the State Board of Education Ohio (2007), like many other institutions, have come up with the concept of a master teacher who encompasses a

constructivist teacher. The State Board of Education Ohio (2007) remarked that "A master teacher demonstrates excellence inside and outside of the classroom through consistent leadership and focused collaboration to maximize student learning." It outlined seven pillars upon which a master teacher operates:

- a. Teachers understand student learning and development, and respect the diversity of the students they teach;
- b. Teachers know and understand the content area for which they have instructional responsibility;
- c. Teachers understand and use varied assessments to inform instruction, evaluate and ensure student learning;
- d. Teachers plan and deliver effective instruction that advances the learning of each individual student;
- e. Teachers create learning environments that promote high levels of learning and achievement for all students;
- f. Teachers collaborate and communicate with students, parents, other educators, administrators and the community to support student learning; and
- g. Teachers assume responsibility for professional growth, performance, and involvement as an individual and as a member of a learning community.

In 2015, the State Board of Education Ohio outlined that a master teacher who seeks renewal must be a licensed or certified teacher; have at least seven years teaching experience in the subject matter; worked at least 120 days during the school year, and must have worked as a teacher. The rationales for those requirements were based on mastery of the subject content and principles of teaching, a comprehensive understanding of the learning outcome, a good grasp of the learning styles of people, and a teacher who is a facilitator in the learning process instead of fostering teacher-centered approach, a student-centered

approach will be employed by this constructivist or master teacher. The Department of Education and Training, State of Queensland (2015) forwarded that the master teacher must be able “to make a real difference to student literacy and numeracy outcome”, suggesting that new paradigm is concerned with accountability, critical thinking, stimulating students’ interest and attitude and ultimately transferring the learners’ knowledge landscape.

The Department of Education and Training, State of Queensland (2015) suggested that the “Role of the Master Teacher Master[,] Teachers are responsible for leading activities and key tasks in their school and/or cluster. These include: working with instructional leaders to prioritize the teaching of literacy and numeracy within the school’s curriculum and teaching framework; improving and enhancing teaching practice for all staff by researching and modelling quality teaching across all year levels, and providing coaching and guidance to teachers and other staff in delivering quality teaching (Department of Education, 2015, p.1). It can be deduced from the Department of Education’s perspective that the master teacher is that facilitator who is able to transform the learner by a thorough understanding the learning process, mastery of the context, understanding of the social environment and is able to coalesce all of those in order to impart knowledge to the student because of an understanding of constructivism learning methodology.

The master teacher is providing the leadership for the learning process, challenging the learner, employing the learners’ own past knowledge to teach new concepts, setting a platform of real assimilation and learning and placing the learning squarely at the core of the learning process (Goldman, Wesner, Plack, et al, 2014; Goldman, Wesner, Karnchanomai, et al, 2012; Plack, et al., 2015; Goldman, Wesner and Karnchanomai, 2013) as well as employing

technology and other methodologies to aid the learning process. The literature has provided different perspectives on the matter of technology and its value to the teaching learning process. Clearly, the empirical evidence exists which support the use of constructivism in positively changing the performance of students, until the traditional approach to teaching (ie. teacher-centered or teacher-driven lesson).

The constructivist approach employs a wider and more flexible, cultured driven style in the teaching of subjects, like social studies (Fosnot, 1996). Such a perspective (constructivist approach) is modeled around the learner (self-regulatory process) in which there is active ideas, experiences, and understanding with a socio-cultural context. This does not imply that the traditional approach to teaching is ineffective, ancient and useless as it has its place in the teaching learning process (Hirsch, Jr., 1996). In fact, Hirsch, Jr. (1996) opined that the traditional approach to teaching is still effective in teaching mathematics and the science, suggesting that it has its place in the teaching-learning process. Despite the perspective of Hirsch Jr., Simon (1995) opined that

Constructivist theory has been prominent in recent research on mathematics learning and has provided a basis for recent mathematics education reform efforts. Although constructivism has the potential to inform changes in mathematics teaching, it offers no particular vision of how mathematics should be taught; models of teaching based on constructivism are needed. Data are presented from a whole-class, constructivist teaching experiment in which problems of teaching practice required the teacher/researcher to explore the pedagogical implications of his/theoretical (constructivist) perspectives (p. 114)

The master teacher who is from the school of thought of constructivism learning creates a learning outcome that is greater to that of the traditionalist teaching approach. The master teacher is not constant as he/she is continuously seeking new avenues to stimulate learning, spending time to understand the learners, recognizing their feelings, actions, past experiences and knowledge and blending all of these in a single melting pot for the purpose of increase real knowledge building. It is for this reason why the master teacher will engage in technology and group work as approaches to the teaching-learning process.

Diem (1999) who wrote that “how to use new tools and techniques in ways that will increase understanding and hone the skills needed to effectively use technology (p. 2), accommodates for the students’ performance in the discipline. One researcher contended that technology has not been effectively integration in the curriculum of many courses, including social studies, and that there is little evidence to support its transformational role on the learning process (Cuban, 2001). This means that technology is a sleeping giant as it relates to the teaching of social studies (Martorella, 1998) as the potential exist for its application to transforming the poor performance but there is an implementation deficiency gap (Ehman and Glenn, 1991).

The concept of the master teacher is not a new phenomenon as first master teacher seminar was carried out in 1962 under the guidance of Roger Garrison at Westbrook College in Portland, Maine (Pensocola State College, 2014). Pensocola State College forwarded that primary rationales for the seminar are excellence of teaching in American higher education; teachers are striving for mastery in their specializations, and exposing teachers to successful approaches in the teaching-learning process in order to build their skill levels. The master teacher is, therefore, a product of the

constructivist approach to learning and teaching.

Windschitl (1999) opined that the constructivist approach to learning is more than philosophy, principles, and techniques that encompass a model of instruction to culture at the educational institution. He contended that ‘constructivist approach’ requires a transformation which goes to how the children are taught, assessed, classroom milieu (physical structure) and how activities are arranged, structure and teaching is evaluated (see also, Condon, et al., 1993). As a result of the aforementioned perspective, there are many version of constructivist teaching approach. Zimmermann and et al. (1978) postulated that guided discovery learning can be employed in the teaching of students. Hence, it should not be surprising that the use of guided technologies have a positive influence on students’ performance (Matlale, 2011; Ottman, nd; Perricelli, 2008; Dahar and Faize, 2011) instead of the traditional approach to teaching. The constructivist teacher is totally different from the traditionalist teacher as he/she accommodates different learning style, creativity, learner’s interest and capabilities, and provides a platform for long-term learning outcome (Condon, et al, 1993; Khalid and Azeem, 2012).

The constructivist teacher, therefore, means a change of attitude towards the teaching-learning process, the learner, the facilitator, the social milieu and more time consuming than the traditionalist approach (Goss, Hunter, Romanes, et al. 2015). The learners are all not the same in terms of ability, knowledge, competence, experience, interest, expectations and cognitive development and the traditional teaching approach does not take those disparities into consideration, which is not the case for the constructivist teacher. Some scholars and organizations, instead of using constructivist teacher, utilize the word master

teacher (Schiermeyer, 2010). The terminology master teacher is used because this individual has mastered the context of the course, understanding the disparities in learning ability, the differences in the learning, the social milieu and how to infuse all of those in such a way that long-term learning takes place. Simply put, the master teacher blends the teaching approaches by employing a hybrid model of teaching that takes into consideration the dynamics and characteristics of the learner, the social environment, knowledge in keeping with the desired learning outcomes (Tsoi, 2009, 2010; Toh, Ho, Chew, et al, 2003; Toh and Tsoi, 2008).

Johnson (2011) opined “What makes for a master teacher?” Like the State Board of Education Ohio (2007), he outlined seven characteristics – but these were somewhat different - that constitute a teacher being called a master teacher. The seven characteristics were 1) Create an atmosphere, an environment, and an attitude for learning; 2) Establish a reason to learn; 3) Train students how to learn; 4) Inspire students to achieve; 5) Establish accountability for learning; 6) Continually check learning gains; and 7) Celebrate new learning. The characteristics of Johnson are in the overarching tenets of a constructivist teacher and collectively set a premise for the teacher being called a master at his/her craft (Brooks and Brooks, 1993, 1999). It should as no surprise that the constructive or the master teacher frames his/her lessons around terminologies such as analyze, classify, create, explore, evaluate, and predict as these are higher order skills that will result in learning instead of skills such as of recite, recall, and list. Those skills require the students to construct and deconstruct knowledge based on their experiences, and therefore the usage of the terminology constructivist teacher (Hussain, 2012), which is frequently referred to as a master teacher (Johnson, 2011; Jackson, 2009).

Jackson (2009) postulated that master teachers can be created by way of a mindset by way of the following: Always know the right questions that lead students to deeper thinking, increased motivation, and more ownership of learning; Anticipate which areas of a lesson might give students trouble and correct misconceptions before they cause learning problems; Use effective feedback to show students what they still need to do to reach an objective; and Organize your teaching knowledge into meaningful patterns that become the basis for your core teaching approach. The issues outlined by Jackson (2009) are clearly in keeping with the general framework of the constructivist teacher and therefore speaks to the congruence of master teacher and a constructivist teacher.

The matter of the master teacher has extended beyond a glossary to specific requirements, expectations and responsibilities. San Francisco Public Schools (SFUSD) (2012) outlined seven expectations of the master teacher to include maintenance of records of students’ performance, attendance, and activities. The responsibilities of the master teacher were framed around collaboration with staffers, co-teaching, displaying of teaching skills for other to view, and participation in professional development. One of the deductions that can be made from that of literature including the work of San Francisco Public School is that a master teacher must accept the responsibility of being a coach for other junior and other teachers or peer-mentorship, which extends to tertiary level education (Gottesman, 2009; Farrell, et al., 2004; Files, et al, 2008; Goldman, et al., 2013). In fact, the master teacher is equally created at the tertiary level because pedagogy at higher education surrounds the higher level skills such as problem-solving, analyze, evaluate, create, and synthesis, which Rassuli and Manzer (2005) are suppressed by

way of the lecture approach at tertiary level (see also, Schiermeyer, 2010).

REFERENCES

- [1]. Abbott, M.L. & Fouts, J.T. (2003). *Constructivist Teaching and Student Achievement: The Results of a School-level Classroom Observation Study in Washington*. Washington School Research Center, Seattle Pacific University. Retrieved from <https://spu.edu/orgs/research/ObservationStudy-2-13-03.pdf>, accessed on August 17, 2016.
- [2]. Adeyemi, M. B. (2000). *Social Studies in Bostswana: Social studies in African Education*. Gaborone: Pyramid.
- [3]. Agbulu, O.N. (2002). *Methodologies of vocational Agriculture and guidance*, Aboki Publishers.
- [4]. Aremu, A.O and Sokan, B.O. (2003). *A multi-casual evaluation of academic performance of Nigerian learner, issues and implications for national development*. and Ayodele, B.O, Nwazuoke and Oladiran, O. *Education this millennium Ibadan: Macmillan Nig. Ltd.*
- [5]. Aremu, A.O. (2000). *Academic performance 5 factors inventory*. Ibadan: Stirling-Holden Publishers.
- [6]. Ausubel, D. P. (1963). *The Psychology of Meaningful Verbal Learning*. New York: Grune and Stratton.
- [7]. Ausubel, D. P. (1968). *Educational Psychology: A Cognitive View*. New York: Holt, Rinehart and Winston.
- [8]. Ausubel, D. P., Novak, J. D., & Hanesian, H. (1978). *Educational Psychology: A Cognitive View (2nd ed.)*. New York: Holt, Rinehart and Winston.
- [9]. Aydisheh, F.H. & Gharibi, H. (2015). *Effectiveness of Constructivist Teaching Method on Students' Mathematic Academic Achievement*. Mediterranean Journal of Social Sciences, 6(6 S2): 572-579.
- [10]. Bates, A.W. (2000). *Managing technological change: Strategies for University and college leaders*. San Francisco: Jossey Bass.
- [11]. Bawaneh, A., Zain, A.N.M. & Salmiza, S. (2010a). *Investigating students' preferable learning styles based on Herrmann's whole brain model for the purpose of developing new teaching method in modifying science misconceptions*. Educational Research, 1(9), 363-372.
- [12]. Bawaneh, A., Zain, A.N.M. & Salmiza, S. (2010b). *Radical conceptual change through teaching method based on constructivism theory for eight grades Jordanian students*. The Journal of International Social Research, 3(14), 131-147.
- [13]. Bawaneh, A., Zain, A.N.M. & Salmiza, S. (2011). *The effect of Herrmann whole brain teaching method on students' understanding of simple electric circuits*. European Journal of Physics Education, 2(2), 1-22.
- [14]. Bevan, S., Vitale, T., & Wengreen, H. (2012). *Farm field trips provide sensory-based experiences with fresh, local produce*. Journal of Nutrition Education and Behavior, 44(3), 278-279.
- [15]. Black, J. B., & McClintock, R. O. (1995). *An interpretation construction approach to constructivist design*. In B. Wilson (ed), *Constructivist learning environment*. Englewood Cliffs. N.J: Educational Technology Publication.
- [16]. Brooks, J. G., & Brooks, M. G. (1993, 1999). *In search of understanding: the case for constructivist classrooms*. Alexandria, VA: Association for Supervision and Curriculum Development.

- [17]. Carey, S. (1985). *Conceptual Change in Childhood*. Cambridge, MA: MIT Press.
- [18]. Carroll, K. (2007). *A guide to great field trips*. Chicago: Zephyr Press.
- [19]. Cassutto, G. (2000). Social studies and the World wide web. *International Journal of Social Education*, 15(1): 94-101.
- [20]. Church, M. A., Elliot, A. J., & Gable, S. L. (2001). Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, 93(1), 43-54.
- [21]. Condon, M. W. F., Clyde, J. A., Kyle, D. W., & Hovda, R. A. (1993). A constructivist basis for teaching and teacher education: A framework for program development and research on graduates. *Journal of Teacher Education*, 44(5), 273-278.
- [22]. Cooper, P. A. (1993). Paradigm Shifts in Designed Instruction: From Behaviorism to Cognitivism to Constructivism. *Educational Technology*, 33(5), 12-19.
- [23]. Coughlin, P. (2010). Making field trips count: Collaborating for meaningful experiences. *The Social Studies*, 101(5), 200-210.
- [24]. Crotty, M. (2005). *The foundations of social research: Meaning and perspective in the research process*. London: SAGE.
- [25]. Cuban, L. (2001). *Oversold and underused: computers in the classroom*. Cambridge, M.A.: Harvard University Press.
- [26]. Curtis, K.M. (2006). *Improving students attitudes: A study of a mathematics curriculum innovation*. Doctor of Philosophy thesis, Department of Curriculum and Instruction, College of Education, Kansas State University, Manhattan.
- [27]. Dahar, M.A. & Faize, F.A. (2011). Effect of the Availability and the use of instructional material on academic Performance of students in Pujab (Pakistan). Retrieved from http://www.eurojournals.com/MEFE_11_01.pdf accessed on August 6, 2016.
- [28]. Davis, R. (2004). *Task Force on Educational Reform Final Report*. Retrieved from <http://jis.gov.jm/estp/docs/Reports/JA%20Education%20Reform%20TaskForce%202004.pdf>, accessed August 3, 2016.
- [29]. de Mesa, A.P. & de Guzman, A.B. (2006). Portrait of Filipino teachers' classroom practices: traditional or constructivist? *Educational Research for Policy and Practice*, 5(3): 235-253.
- [30]. Department of Education and Training, State of Queensland. (2015). *Master teachers*. Retrieved from <http://education.qld.gov.au/staff/development/pdfs/master-teachers-fact-sheet.pdf>, accessed on August 3, 2016.
- [31]. Dewey, John. (1997 edition). *Experience and Education*. Touchstone/Simon and Schuster.
- [32]. Doolittle, P.E & Hicks, D. (2003). Constructivism as a theoretical foundation for the use of technology in social studies. *Theory and Research in Social Education*, 31(1): 33.
- [33]. Driver, R. (1997). The Application of Science Education Theories: A Reply to Stephen R. Norris and Tone Kvernbekk. *Journal of Research in Science Teaching*, 34(10), 1007-1018.
- [34]. Driver, R., Asoko, H., Leach, J., Mortimer, E., & Scott, P. (1994). Constructing Scientific Knowledge in Classrooms. *Educational Researcher*, 23(7), 5- 12.
- [35]. Duff, T.M. & Cunningham, D.J. (1996). Constructivism: Implications for the design and delivery of instruction. In *Handbook of Research for Educational Communications and Technology*, edited by David H. Jonassen, 170-198. New York: Macmillan Library Reference.
- [36]. Dunn, R. & Dunn, K. (1993). *Teaching secondary students through their*

- individual learning styles: Practical approach for grades 7-12. Boston: Allyn and Bacon.
- [37]. Dunn, R. (2000). Learning styles: Theory, research, and practice. *National Forum of Applied Educational Research Journal*, 13 (1), 3-22.
- [38]. Dunn, R., & Dunn, K. (1978). Teaching students through their individual learning styles. Reston, VA: Reston.
- [39]. Dunn, R., & Dunn, K. (1992a). Teaching elementary student through their individual learning styles. Boston: Allyn & Bacon.
- [40]. Dunn, R., & Dunn, K. (1992b). Teaching secondary students through their individual learning styles. Boston: Allyn & Bacon.
- [41]. Dunn, R., & Griggs, S. (1998). Learning styles: Link between teaching and learning. In Dunn, R., & Griggs (Eds.), *Learning styles and the nursing profession* (pp. 11-23). New York: NLN Press.
- [42]. Educational Broadcasting Corporation. (2004). What is constructivism? Retrieved from <http://www.thirteen.org/edonline/concept2class/constructivism/>, accessed on August 4, 2016.
- [43]. Ehman, L.H. & Glenn, A.D. (1991). Interactive technology in the social studies. In J.P. Shaver (Ed), *Handbook of research on social studies teaching and learning*, pp. 513-522. New York: Macmillan.
- [44]. Ertmer, P. A., & Newby, T. J. (1993). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance improvement quarterly*, 6(4), 50-72.
- [45]. Farrell, S. E., Digioia, N. M., Broderick, K. B., & Coates, W. C. (2004). Mentoring for clinicianeducators. *Academic Emergency Medicine*, 11, 1346–1350.
- [46]. Files, J. A., Blair, J. E., Mayer, A. P., & Ko, M. G. (2008). Facilitated peer mentorship: A pilot program for academic advancement of female medical faculty. *Journal of Women’s Health*, 17, 1009–1015.
- [47]. Fischer, C. & King, R. (1995). *Authentic assessment: A guide to implementation*. Thousand Oaks: Corwin.
- [48]. Ford, C., Yore, L.D., & Anthony, R.J. (1997). Reforms, visions, and standards: A cross-cultural curricular view from an elementary school perspective. Paper presented at the Annual Meeting of the National Association of Research in Science Teaching, Oak Brook, IL, March 21. (ERIC, ED 406 168).
- [49]. Fosnot, C.T, (Ed). (1996). *Constructivism: Theory, perspectives and practice*. New York: Teachers College Press.
- [50]. Freire, P. (1997), *Critical Consciousness*, New York: Continuum.
- [51]. Gardner, H. & Hatch, T. (1989). Multiple intelligence go to school: Educational implications of the theory of multiple intelligence. *Educational Researcher*, 18(8): 4-10.
- [52]. Gelman, S.A., (1999). Dialog on early childhood science, mathematics and technology education: A context for learning. *Concept Development in Pre-school Children*. (<http://www.project2061.org/publications/earlychild/online/context/gelman.htm>).
- [53]. George, C.L. (2010). Effects of response cards on performance and participation in social studies for middle school students with emotional and behavioral disorders. *Behavioral Disorder*, 35(3):200-213.
- [54]. Gibbs, G. (1992). *Improving the quality of student learning*. Bristol: Technical and Educational Services Ltd.
- [55]. Goldman, E., Wesner, M. & Karnchanomai, O. (2013). Reciprocal peer

- coaching: A critical contributor to implementing individual leadership plans. *Human Resource Development Quarterly*, 24(1): 63-87.
- [56]. Goldman, E., Wesner, M., Karnchanomai, O. & Haywood, Y. (2012). Implementing the leadership development plans of faculty education fellows: A structured approach. *Academic Medicine*, 87(9): 1177-1184.
- [57]. Goldman, E.F., Wesner, M., Plack, M.M., Manikoth, N.N. & Haywood, Y. (2014). Secondhand learning from graduates of leadership development programs. *Journal of Workplace Learning*, 26(8): 511-528.
- [58]. Gordon, P-J. (2012). Secondary and Primary Education in Jamaica: Financial Requirements for Quality. Department of Economics University of the West Indies, Mona. Retrieved from <https://www.mona.uwi.edu/cop/sites/default/files/resource/files/Secondary%20and%20Primary%20Education%20in%20Jamaica.pdf>, accessed August 3, 2016.
- [59]. Goss, P., Hunter, J., Romanes, D., Parsonage, H. (2015). Targeted teaching: how better use of data can improve student learning, Grattan Institute.
- [60]. Gottesman, B. L. (2009). Peer coaching in higher education. Lanham, MD: Roman & Littlefield.
- [61]. Governale, J. (1997). Improving attitudes of students toward social studies. (ERIC Document Reproduction Service No. ED424173).
- [62]. Gray, K. (2016). Do learning styles teach us anything? Retrieved from <http://www.duarte.com/blog/do-learning-styles-teach-us-anything/>, accessed on August 6, 2016.
- [63]. Hackmann, D. G. (2004). Constructivism and Block Scheduling: Making the Connection. *Phi Delta Kappan*. 85, 697-702.
- [64]. Haladyna, J. M. (1985). Research on student attitude towards social studies. *Social Education*.
- [65]. Henriques, L. (1997). A study to define and verify a model of interactive-constructive elementary school science teaching. Unpublished PhD dissertation, Iowa City, IA: University of Iowa.
- [66]. Hergenhahn, B. R., & Olson, M. H. (1993). An introduction to theories of learning. Englewood Cliffs, NJ: Prentice Hall.
- [67]. Hirsch, Jr. E. E. (1996). Reality's revenge: Research and ideology. *American Educator*, 20(3):4-6, 31-42, 44, 46.
- [68]. Hussain, I. (2012). Use of constructivist approach in higher education: An instructors' observation. *Creative Education*, 3(2): 179-184.
- [69]. Hussain, I., & Sultan, S. (2010). Learning by doing: Outcomes of teaching a research course through group activities. Proceedings of the Annual International Conference on Computer Science Education: Innovation & Technology (CSEIT) 2010, Singapore City: Global Science and Technology Forum, 6-7 December 2010.
- [70]. Jackson, R.R. (2009). Never Work Harder Than Your Students and other principles of great teaching. ASCD.
- [71]. Jadallah, E. (2000). Constructivist learning experiences for social studies education. *Social Studies*, 91(5): 221-225.
- [72]. Jensen, E. (2000). Brain-based learning: a reality check. *Educational Leadership*, 57(7), 76-80.
- [73]. Jensen, E. (2000). Moving with the brain in mind. *Educational Leadership*, 58(3), 34- 37.
- [74]. Johnson, B. (2011, March 31). What Makes for a Master Teacher? George Lucas Educational Foundation. Retrieved from <http://www.edutopia.org/blog/master-teacher-definition-ben-johnson>, accessed August 4, 2016.

- [75]. Kafai, Y. B. Ching, C. C., & Marshall, S. (1997). Children as designers of educational multimedia software. *Computers and Education*, 29(2-3), 117-126.
- [76]. Karagiorgi, Y., & Symeou, L. (2005). Translating Constructivism into Instructional Design: Potential and Limitations. *Educational Technology & Society*, 8 (1), 17-27.
- [77]. Keil, F.C. (2011). Science Starts Early. *Science*, 331:1021-1022.
- [78]. Kennedy, M.D. (2014). The Benefit of Field Trips. University Honors Program Theses. Paper 60. Retrieved from <http://digitalcommons.georgiasouthern.edu/cgi/viewcontent.cgi?article=1064&context=honors-theses>, accessed on August 6, 2016.
- [79]. Khalid, A. & Azeem, M. (2012). Constructivist vs traditional: effective instructional approach in teacher education. *International Journal of Humanities and Social Sciences*, 2(5):170-177.
- [80]. Khine, S. M. (2003). Creating a Technology-Rich Constructivist Learning Environment in a classroom management module. In Khine, S. M. & Fisher, D. (Eds.), *Technology-Rich Learning Environments*, New Jersey: World Scientific, 21-39.
- [81]. Kim, J. (2002), The effects of teacher training as constructivist on teacher behavior and student achievements. *Faculty Research Papers on The Study of Education*. 18(2) Educational Development Research Institute, Chungnam National University.
- [82]. Kim, J. (2005). The effects of a constructivist teaching approach on student academic achievement, self-concept, and learning strategies. *Asia Pacific Education Review*, 6(1), Miller, E. (1991). *Men at risk*. Kingston: Jamaica Publishing House Ltd.
- [83]. Kirkpatrick, H. & Cuban, L. (1998). Computers make kids smarter—right? *TECHNOS Quarterly for Education and Technology*, 7(2):1-11.
- [84]. Knapp, D. (2000). Memorable experiences of a science field trip. *School Science and Mathematics*, 100(2), 65-72.
- [85]. Kolodziejczyk, I. (2009). ICT for education -the way ahead, but how? *Contemporary PNG Studies: DWU Research Journal* 11:26-38.
- [86]. Krakowka, A. R. (2012). Field trips as valuable learning experiences in geography courses. *Journal of Geography*, 111(6), 236-244.
- [87]. Kroesbergen, E. (2004). Effectiveness of explicit constructivist mathematics instruction for low achieving students in the Netherlands. *The Elementary School Journal*, 104(3), 233-251.
- [88]. Kuhn, T.S. (1996). *The structure of scientific revolutions 3rd*. Chicago: The University of Chicago Press.
- [89]. Lata, H. & Sharma, L. (2013). Effect of Constructivist Approach on Academic Achievement of Seventh Grade Learners in Mathematics. *International Journal of Scientific Research*, 2(10): 1-2.
- [90]. Leuven, E., Lindahl, M., Oosterbeek, H., & Webbink, D. (2004). The effects of extra funding for disadvantaged pupils on achievement. *IZA Discussion paper*, 1122.
- [91]. Li, W. (2001). Constructivist learning systems: A new paradigm. *International Conference on Advanced Learning Techniques*, Madison, 6-8 August 2001.
- [92]. Lord, T. R. (1997). A Comparison Between Traditional and Constructivist Teaching in College Biology. *Innovative Higher Education*, 21(3):197-216.
- [93]. Marek, E & Cavalla, A. (1997). *The learning cycle, elementary school and beyond*, revised edition. Heinemann. Portsmouth, NH

- [94]. Martin-Ordas, G., Atance, C. M., & Louw, A. (2012). Learning and motivation: The role of the episodic and semantic memory in episodic foresight. *Elsevier*, 43, 209-219.
- [95]. Martorella, P. (1998). Technology and the social studies or which way to the sleeping giant? *Theory and Research in Social Education*, 25:511-514.
- [96]. Matlale, J. L. (2011). Use of instructional materials in social studies. *European Journal of Educational Studies*, 3(1): 1-7.
- [97]. Mbaeze, I.C., Ukwandu, E., & Anudu, C. (2010). The influence of information and communication technologies on students' academic performance. *Journal of Information Technology Impact*, 10(3):129-136.
- [98]. Mbah, T.B. (2010). The impact of ICT on students' study habits. Case study: University of Buea, Cameroon. *Journal of Science and Technology Education Research* 1(5):107-110.
- [99]. McBrien, J. L., & Brandt, R. S. (1997). *The language of learning: A guide to education terms*. Alexandria, VA: Association for Supervision and Curriculum Development.
- [100]. McFarlane, A. (2001). Perspectives on the relationships between ICT and assessment. *Journal of Computer Assisted* 17:227-234.
- [101]. Mehlinger, H. (1988). Comments from the Dean: The 'Second Wave' of Reform. Chalkboard 37 4. (Available from the Indiana University School of Education Alumni Association, IMU M- 17, Bloomington, Indiana 47405.)
- [102]. Miller, E. (1994). *Marginalization of the black male: Insights from the development of the teaching profession*. Kingston: Canoe Press.
- [103]. Miller, P.H. (1993). *Theories of developmental psychology*, 3rd ed.. W. H. Freeman & Co. 7-19.
- [104]. Montague. M. (2003). Teaching division to students with learning Disabilities: a constructivist approach. *Exceptionality*. 11(3), 165-175.
- [105]. Moreno, R., & Valdez, F. (2005). Cognitive load and learning effects of having students organize pictures and words in multimedia environments: The role of student interactivity and feedback. *Educational Technology Research and Development*, 53, 35-45.
- [106]. Morrison, G.M., Furlong, M.J., & Morrison, R.L. (1994). School violence to school safety: reframing the issue for school psychologists. *School Psychol. Rev.*, 23(2): 236-256.
- [107]. National Research Council (1996). *National science education standards*. Washington, DC: National Academy Press.
- [108]. Ng'ambi, D., & Johnston, K. (2006). An ICT-mediated Constructivist Approach for increasing academic support and teaching critical thinking skills. *Educational Technology & Society*, 9 (3), 244-253.
- [109]. Ng'ambi, D., & Johnston, K. (2006). An ICT-mediated Constructivist Approach for increasing academic support and teaching critical thinking skills. *Educational Technology & Society*, 9 (3), 244-253.
- [110]. Noethen, K.G. (2006). *Teacher expertise and personal theories of learning: Master and novice science teachers' interpretations of a constructivist teaching episode*. Doctor of Philosophy thesis, Faculty of the Graduate School of Cornell University.
- [111]. Novak, J. D. (1964). Importance of conceptual schemes for science teaching. *The Science Teacher* 31(6):10.
- [112]. Novak, J. D. (1977). *A Theory of Education*. Ithaca, NY: Cornell University Press.
- [113]. Novak, J. D. (1990). *Concept maps and Vee diagrams: Two metacognitive tools*

- for science and mathematics education. *Instructional Science*, 19, 29-52.
- [114]. Novak, J. D. (1993). Human constructivism: A unification of psychological and epistemological phenomena in meaning making. *International Journal of Personal Construct Psychology*, 6, 167-193.
- [115]. Novak, J. D. (1998). *Learning, Creating, and Using Knowledge: Concept Maps as Facilitative tools in Schools and Corporations*. Mahwah, NJ: Lawrence Erlbaum & Associates. Spanish, 1998, Madrid: Alianza Editorial. Portuguese, 2000, Lisboa: Platano Edicoes Tecnicas. Italian, 2001, Trento: Edizioni Erickson. Finnish, 2003, Jyväskylä, Finland: PS-kustannus.
- [116]. Novak, J.D. (1987). Human constructivism: Toward a unity of psychological and epistemological meaning making. In Joseph D. Novak (ed.), *Proceedings of the Second International Seminar on Misconceptions and Educational Strategies in University*.
- [117]. Novak, J.D. (2010). *Learning, Creating, and Using Knowledge: Concept Maps as Facilitative tools in Schools and Corporations (2nd Ed.)*. New York: Routledge, Taylor-Francis.
- [118]. Novak, J.D. (2011). Theory of education: Meaningful learning underlies the constructive integration of thinking, feeling, and acting leading to empowerment for commitment and responsibility. *Aprehdizagem Significativa em Revista/Meaningful Learning Review*, 1(2): 1-14.
- [119]. Olwell, R. (1999) Physical isolation and marginalization in physics: David Bohm's Cold War exile, *Isis*, 90, pp. 738–756.
- [120]. Onasanya, S.A., Fakomogbon, M.A., Shehu, R.A., & Soetan, A.K, (2010). Learning information and communication technology skills and the subject context of introductory technology learning in Nigeria. *Journal of Artificial Intelligence* 1-8.
- [121]. Ottman, L.R. (n.d.). The effect of student-directed versus traditional teacher-centered presentations of content on student learning in a high school statics class. Retrieved from http://downloads.smarttech.com/media/sitecore/en/pdf/research_library/k-12/the_effect_of_student-directed_versus_traditional_teacher-centered_presentations_of_content_on_student_learning_in_a_high_school_statics_class.pdf, accessed August 6, 2016.
- [122]. Parr, B. & Edwards, M.C. (2004). Inquiry-Based Instruction in Secondary Agricultural Education: Problem-Solving—An Old Friend Revisited. *Journal of Agricultural Education* 45(4), 106-117.
- [123]. Pensacola State College. (2014). *The Florida Master Teacher Seminar, 2014*. Retrieved from http://www.pensacola.state.edu/wp-content/uploads/2014/04/FL_TeachingSeminar_2014.pdf, accessed August 5, 2016.
- [124]. Perricelli, D. (2008) Social studies and motivating factors: Views of fourth grade elementary students. Unpublished Master's thesis, Ohio University, Athens, OH.
- [125]. Philips, D.C. & Soltis, J.F. (1998). *Perspectives on learning*, 3rd ed. (Thinking about education series). New York: Teachers College Press.
- [126]. Piaget, J. (1973). *To understand is to invent*. New York: Viking Press.
- [127]. Piaget, J. (2013). *The construction of reality in the child (Vol. 82)*. Routledge.
- [128]. Plack, M.M., Goldman, E.F., Wesner, M., Manikoth, N. & Haywood, Y. (2015). How learning transfers: A study of how graduates of a faculty education fellowship influenced the behaviors and practices of their peer and organizations. *Academic Medicine*, 90(3): 372-378.

- [129]. Plack, M.M., Goldman, E.F., Wesner, M., Manikoth, N. & Haywood, Y. (2015). How learning transfers: A study of how graduates of a faculty education fellowship influenced the behaviors and practices of their peer and organizations. *Academic Medicine*, 90(3): 372-378.
- [130]. Pope, A. (2009). First person interactions: The benefits of field trip experiences to social studies education. Unpublished Master of Science thesis, San Marcos, Texas. Retrieved from <https://digital.library.txstate.edu/bitstream/handle/10877/3423/fulltext.pdf?sequence=1>, accessed August 6, 2016.
- [131]. Pope, A. (2009). First person interactions: The benefits of field trip experiences to social studies education. Unpublished Master of Science thesis, San Marcos, Texas. Retrieved from <https://digital.library.txstate.edu/bitstream/handle/10877/3423/fulltext.pdf?sequence=1>, accessed August 6, 2016.
- [132]. Powell, L., Bourne, P., & Waller, L. (2007). Probing Jamaica's Political Culture, vol. 1. Main Trends in the July-August 2006 Leadership and Governance Survey. Kingston: Centre of Leadership and Governance, the University of the West Indies at Mona.
- [133]. Pugh, K. T., & Bergin, D. A. (2005). The effect of schooling on students' out-of-school experience. *Educational Researcher*, 34(9), 15-23.
- [134]. Pugh, K. T., & Bergin, D. A. (2005). The effect of schooling on students' out-of-school experience. *Educational Researcher*, 34(9), 15-23.
- [135]. Rassuli, A. & Manzer, J. P. (2005). Teach us to learn: A multivariate analysis perception of success in team learning. *Journal of Education for Business*, 81(1): 21-27.
- [136]. Rose, S.A., & Ferlund, P.M. (1997). Using technology for powerful social studies learning. *Social Education* 61(3), 160-166.
- [137]. Roy Rosenzweig Center for History and New Media, George Mason University. (2016). Constructivism: Actively Building Knowledge. Retrieved from <http://teachinghistory.org/teaching-materials/ask-a-master-teacher/23896>, accessed on August 3, 2016.
- [138]. Roy Rosenzweig Center for History and New Media, George Mason University. (2016). Constructivism: Actively Building Knowledge. Retrieved from <http://teachinghistory.org/teaching-materials/ask-a-master-teacher/23896>, accessed on August 3, 2016.
- [139]. Ryan, K., Cooper, J.M., & Taver, S. (2013). Teaching for students learning: Becoming a master teacher, 2nd ed. Ohio: Wadsworth.
- [140]. Saleh, S. & Aziz, A. (2012). Teaching practices among secondary school teachers in Malaysia. *IPEDR*, 47(14); 63-67.
- [141]. San Francisco Public Schools. (2012). Master Teacher Program 2012-13. Retrieved from <http://www.sfusd.edu/en/assets/sfusd-staff/careers/Professional%20Development/Master%20Teacher%20Description.pdf>, accessed August 5, 2016.
- [142]. San Francisco Public Schools. (2012). Master teacher, 2012-13. Retrieved from <http://www.sfusd.edu/en/assets/sfusd-staff/careers/Professional%20Development/Master%20Teacher%20Description.pdf>, accessed on August 15, 2016.
- [143]. Scales, P. (2012). Trail mix. *Book Links*, 21(4), 40.
- [144]. Scheurman, G. 1998. From behaviorist to constructivist teaching. *Science Education* 62(1):6-9.

- [145]. Schiermeyer, B.L.S. (2010). Learning Communities Creating Master Teachers. Doctor in Education, College of Saint Mary. Retrieved from <http://www.csm.edu/sites/default/files/Schiermeyer.pdf>, accessed August 5, 2016.
- [146]. She, H.C. (2005). Promoting students' learning of air pressure concepts: The interrelationship of learning approaches and student learning characteristics. *The Journal of Experimental Education*, 7(1), 29-51.
- [147]. Simon, M.A. (1995). Mathematics pedagogy from a constructivist perspective. *Journal of Research in Mathematics Education*, 26(2): 114-145.
- [148]. Singer, Dorothy G. & Tracey A. Revenson. (1996). *A Piaget Primer: How a Child Thinks*. New York: Plume.
- [149]. Snowman, J. and Biehler R. (2003); *Psychology Applied to Teaching*, (Tenth Edition) Boston, Houghton Mifflin Illinois.
- [150]. Sollo, B. (2011). Learning styles. Retrieved from www.funderstanding.com/theory/learning-styles.
- [151]. State Board of Education of Ohio. (2007). Ohio Master teacher program. Retrieved from <http://www.nelsonvilleyork.k12.oh.us/Downloads/Master%20Teacher%20definition%20and%20criteria.pdf>, accessed on August 5, 2016.
- [152]. State Board of Education Ohio. (2015). Master teacher renewal processes and procedures. Retrieved from <http://education.ohio.gov/getattachment/Topics/Teaching/Professional-Development/Master-Teacher/FORM-S-MTR-Processes-an>, accessed on August 3, 2016.
- [153]. Stofflett, R.T. (1998). Putting constructivist teaching into practice in undergraduate introductory science. *Electronic Journal of Science Education* 3(2).
- [154]. Swain, C., & Pearson, T. (2001). Bridging the digital divide: A building block for teachers. *Learning and Leading with Technology*, 28(8).
- [155]. The University of Sydney. (2016). Constructivism. Retrieved from http://sydney.edu.au/education_social_work/learning_teaching/ict/theory/constructivism.shtml, accessed August 4, 2016.
- [156]. Tileston, D. (2005). *10 best teaching practices* (2nd ed.). Thousand Oaks, CA: Corwin Press. This book provides the classroom teacher with strategies for practical teaching. It focuses on differentiated teaching strategies, teaching for long-term memory retention, collaborative learning strategies, authentic assessment and higher order thinking skills.
- [157]. Toh, K. A., & Tsoi, M. F. (2008). The master science teacher. *Physics Education* 43(6), 620-626.
- [158]. Toh, K. A., Ho, B. T., Chew, M. K. C., & Riley, J. P. (2003). Teaching, teacher knowledge and constructivism. *Educational Research for Policy and Practice*, 2, 195-204.
- [159]. Travis, H. & Lord, T. (2004). Traditional and constructivist teaching techniques. National Science Teachers Association. Retrieved from <http://www.nsta.org/publications/news/story.aspx?id=49955>, accessed August 5, 2016.
- [160]. Trucano, M. (2005). *Knowledge maps: ICT in education*. Washington D.C: World Bank.
- [161]. Trumper, R. (1997). Learning Kinematics with a V-Scope: A Case Study. *Journal of Computers in Mathematics and Science Teaching* 16, 91-110.
- [162]. Tsoi, M. F. (2009). Applying TSOI Hybrid Learning Model to enhance blended learning experience in science education. *Interactive Technology and Smart Education*, 6(4), 223-233.
- [163]. Tsoi, M. F. (2010). Maximizing collaborative processes in blended

- learning: TSOI Hybrid Learning Model [Keynote address]. *International Journal of the Computer, the Internet and Management*, 17(3), 19.11-19.17.
- [164]. UNICEF. (2005). Quality Education. Retrieved from http://www.unicef.org/jamaica/promoting_quality_education.html, accessed August 3, 2016.
- [165]. Virginia Association of Science Teachers (VAST). (1998). What is constructivism and what does it mean for science educators? *Current Topics in Science Education*.
- [166]. Vygotsky, L. S. (1926; 1962). *Thought and Language*. Cambridge, MA: MIT Press (edited and translated by Eugenia Hanfmann and Gertrude Vakar).
- [167]. Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*. Harvard university press.
- [168]. Walker, M. (2000). Learning how to learn in a technology course: A casestudy. *Open Learning*, 15(2), 173-189.
- [169]. Whiston S. C. (2000), *Principles and Application of Assessment in Counseling*, Belmont, Books/cole.
- [170]. Wigfield, K. R. (2009). *handbook of Motivation at School*. New York: Library of Congress Cataloging-in-Publication Data.
- [171]. Wiggins, G. (1993). *Assessing student performance: Exploring the purpose and limits of testing*. San Francisco: Jossey-Bass Publishers.
- [172]. Windschitl, M. (1999). The challenges of sustaining a constructivist classroom culture. *Phi Delta Kappan*, 80(10), 751-55.
- [173]. Windschitl, M. (1999). The challenges of sustaining a constructivist classroom culture. *Phi Delta Kappan*, 80(10), 751-55.
- [174]. Yager, R.E. (1991). The constructivist learning model. *The Science Teacher* 58(6):53-57.
- [175]. Yore, L. D., & Treagust, D. F. (2006). Current realities and future possibilities: Language and science literacy-empowering research and informing instruction. *International Journal of Science Education*, 28(2-3), 291-314.
- [176]. Yore, L.D. (nd). What is Meant by Constructivist Science Teaching and Will the Science Education Community Stay the Course for Meaningful Reform? Retrieved from <http://wolfweb.unr.edu/homepage/crowther/ejse/yore.html>, accessed August 3, 2016.
- [177]. Yore, R. E. (2001). What is meant by constructivist science teaching and will the science education community stay the course for meaningful reform? *Electronic Journal of Science Education*, 5(4). Retrieved from **Error! Hyperlink reference not valid.**, accessed August 3, 2016.
- [178]. Zhao, Y. &. (2005). What elementary students and teachers say about social studies. *Social Studies*, 216-22.
- [179]. Zimmerman, M.J., & Sassenrath, J.M. (1978). Improvement in arithmetic and reading and discovery learning in mathematics (SEED). *Educational Research Quarterly*, 3: 27-33.
- [180]. Zoller, U. (2000). Teaching tomorrow's college science courses: Are we getting it right? *Journal of College Science Teaching* 29(6):409-414.