In Search of a Psychology of Teaching and Learning for the 21st Century

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ABSTRACT This paper reviews the influences of three educational psychologies – namely behaviourism, cognitivism and constructivism, on the practice of education during the 20th century up to these early years of the 21st century. The purpose of the review is to assess how far we have come, as educationalists, in understanding the various aspects of the enterprise of education – from the point of view of educational psychology. Overall, in consideration of the main arguments reviewed in this paper, the writer surmises that the search for an educational psychology for the 21st century must seriously consider the possibility of a blended or eclectic theoretical paradigm, arising out of the efforts and gains of the 20th century; that such a paradigm would emphasize the complementarity of these three perspectives, rather than focusing on their differences.

INTRODUCTION

It will not be an exaggeration to state that the 20th century saw an unprecedented wave of theorisation about teaching and learning at the three levels of formal, non-formal or informal education. In this whole milieu of theorising, educational psychology played a leading role in influencing the practice of, and thinking about, education (Kola 2017; Tracey and Morrow 2017). In particular, three main educational theories emerged: behaviourism, cognitivism and constructivism (Harasim 2017). There is little doubt that current educational thought and practice (that is, teaching and learning) have been heavily influenced by one or other of these three perspectives – or some combination thereof. As Tracey and Morrow (2017: 4) aver, "in all areas of life, people perceive the world through their theoretical lenses, whether or not they are aware that these lenses exit." With specific reference to theories of teaching and learning, Tracey and Morrow (2017: 4) illustrate this point by suggesting that "a mother who gives her child a treat when the child is well behaved but punishes the child when the child is poorly behaved is applying Behaviourism, even though she may be unaware of it." Accordingly, Tracey and Morrow (2017: 6) underline the importance of understanding educational theories by stating as follows:

"Teachers with a firm grasp of educational and psychological theories have a clear basis for making instructional decisions. Their understanding of educational theory provides them with a foundation for understanding why they are choosing the instructional practices that they use."

Jonassen contends that these three educational psychologies can actually be classified under two constructs: Objectivism and Constructivism – and places both behaviourism and cognitivism under Objectivism (Jonassen 1991). According to Jonassen (1991: 9) objectivism has its roots in *realism* (a belief in the existence of the real world, external to humans and independent of human experience), and *essentialism* (the existence of some essential properties that make something what it is). This view was earlier stated by Von Glasersfeld (1977: 34 in Cooper 1993: 16), that objectivism "is based on two illogical premises: that what we learn is a replica of some independent, well-structured world and that this independent, ontological reality determines our experiences." However, whether logical or illogical, these premises define Objectivism, and this paper merely examines the influences of both Objectivism and Constructivism on the processes of teaching and learning.

However, these are not the only ontological characterisations of educational perspectives

obtaining in educational circles, as Dede (2008: 45) opines:

"Many alternative conceptual frameworks exist for describing the relationships among learning theories, pedagogical strategies, instructional designs, and information and communication technologies… each school of thought posits basic principles and theories about learning; these inform the goals and models that school of thought has for instruction, which in turn influences the group's perspective on the design of pedagogical media… Each school of thought is not a single unified theory, but rather a collection of theories distinct from each other, but loosely related by a common set of fundamental assumptions."

Thus, in a parallel manner to the designations of behaviourism, cognitivism and constructivism, Dede (2008: 45) makes reference to the terms Objectivism, Pragmatism and Interpretivism. In this regard, he characterises Objectivists as holding the view that "reality is external and is objective, and knowledge is gained through experiences" – and therefore believe that since learning is based on experience, instruction must centre on "manipulating environmental factors to create instructional events inculcating content and procedures in ways that alter students' behaviors". Dede construes pragmatism as holding the view that "reality is mediated through cognitively developed representations, and knowledge is negotiated through experience and thinking" and thus believes that since learning involves both experience and thinking, instruction must centre on "helping learners develop interrelated, symbolic mental constructs that form the basis of knowledge and skills." With regard to Interpretivism, Dede reports that Interpretivists hold the view that "reality is internal, and knowledge is constructed" and, therefore, that since learning involves constructing one's own knowledge, instruction must centre on "helping learners to actively invent individual meaning from experience" (Dede 2008: 45).

Objective of the Study

This paper reflects on the three dominant educational psychologies that emerged in the 20th century as key theoretical perspectives undergirding much of the thinking about the practice and theory of education – namely behaviourism, cognitivism and constructivism.

Research Question

More specifically, the paper sought to answer the following research question:
- Do the three educational psychologies of behaviourism, cognitivism and constructivism, individually and/or severally, place educational practitioners and researchers on a comfortable pedestal for the educational challenges of the 21st century?

METHODOLOGY

This was a critical literature study based on the analysis of different authors' views on the three dominant educational psychologies of behaviourism, cognitivism and constructivism. Typically, a critical literature study provides an up-to-date critical review of what is currently known about the subject of interest, and offers some insights into the subject (Zhao et al. 2003; Galvan and Galvan 2017). According to Grant and Booth (2009: 93) a critical literature study "goes beyond mere description of identiûed articles and includes a degree of analysis and conceptual innovation." Thus, in this study, the author attempted not only to describe the main aspects of each of the educational psychologies under review, but to also offer fresh insights on their applicability to both research and classroom practice. Content analysis was used to analyse the data (Oplatka 2017).

OBSERVATIONS AND DISCUSSION

In reflecting on the three educational psychologies, it may be important to start with the view that in the minds of some researchers, the three may, in fact, be reduced to only two, namely Objectivism versus Constructivism (Jonassen 1993). In this regard, Jonassen's contention is that the basic assumptions of both behaviourism and cognitivism adhere to the basic tenets of objectivism. Thus, in following this argument, it is important to examine the two sets of assumptions underlying each of these two educational psychologies separately to see how they both cohere – and then contrast such assumptions with those upon which constructivism is embedded.

Behaviourism

Notable among the scholars associated with behaviourism are Burrhus Frederic (BF) Skinner,

whose work focused primarily on rats and pigeons, building upon the works of earlier researchers like Ivan Pavlov, working with dogs; John B. Watson, who further extended Pavlov's work to humans – in the person of Little Albert; and Edward Thorndike who worked with cats, but evolved and popularised a theory of learning that came to be known as Behaviourism. As a relative latecomer to the field of experimentation that studied animal behaviour, Skinner's views were slightly less extreme than those of, for instance, Watson (McLeod 2007). However, collectively, behaviourists significantly influenced educational practice for the better part of the 20th century – and, one would argue, to the present day.

Put briefly, behaviourists placed no deliberate emphasis on the internal mental events that took place in the 'mind' of the animals they studied. Rather, their main concern was on studying the observable behaviours the animals exhibited following the introduction of a particular stimulus – thereby focusing almost exclusively on "the causes of an action and its consequences" (McLeod 2007: 1) at the exclusion of the mental processes that led to the observed actions and consequences. In this regard, Cooper (1993: 17) reports that behaviourism sits on the two assumptions: (a) that knowledge is based in some reality, which the learner is expected to learn and understand, and (b) that the measure of what is learned has to be based upon external, observable actions.

Moving into reinforcement theory, Bullock (as quoted by Cooper 1993: 12) states that the basic assumptions of behaviourism are that (a) analysis of human behaviour lies in the observation of external events (environmentalism), in which the environment is the significant factor in determining human behaviour; and (b) reinforcement, where the consequences of an individual's actions are understood to affect subsequent behaviour. In agreement, Cooper (1993: 12) contends that "reinforcement and the concepts that are developed from reinforcement-stimulus control, chaining, shaping, competing and enhancing repertoires, and interpersonal and intrapersonal behaviours – are central to behaviourism." As such, "because the existence of the mind could not be proven from the observation of Behavior, and because behaviourists were concerned primarily with discovering the laws of human Behavior, the mind was an unneces-sary construct in the learning process" (Jonassen 1993: 6).

For his part, Dede (2008: 46) sums up behaviourism as follows:

"Behaviourist theories of learning assume that knowledge is an absolute, reflecting universal truths about reality. Human behaviours, such as learning, are purposive, but are guided by unknowable inner states. Relationships between contextual instructional variables (stimuli) and observable, measurable student behaviours (responses) are the means to generate learning. Learning is indicated when a correct response follows the presentation of an instructional environmental stimulus. Instruction uses immediate consequences to reinforce behaviours to be learned and to repress incorrect responses to a pedagogical stimulus."

Accordingly, within the aegis of behaviourism, Dede (2008: 46) surmises that:

"… The purpose of education is for students to acquire skills of discrimination (recalling facts), generalization (defining and illustrating concepts), association (applying explanations), and chaining (automatically performing a specified procedure). The learner must know how to execute the proper response as well as the conditions under which the response is made. Knowledge and skills are transferred as learned behaviours; in classic Behaviourist instruction, internal mental processing is not considered as part of instructional design or assessment. Student motivation to achieve these goals is extrinsic, by associating pleasant stimuli with correct answers and neutral or even negative stimuli with incorrect responses."

To Jonassen (1991: 11) the role of education, within the aegis of objectivism, "is to help students learn about the real world; students are not encouraged to make their own interpretations of what they perceive; the teacher or the instrument interprets events for them. Learners are told about the world and are expected to replicate its content and structure in their thinking."

Thus, behaviourists have been criticised for almost exclusively focusing on observation outcomes of learning, without paying any attention to the internal mental processes that give rise to the observed behavioural changes. In the minds of most critics of behaviourism this has been the major limitation that brought about the ontological metamorphosis from behaviourism to cognitivism – as Ally (2008: 7) explains:

"Behaviourists claim that it is the observable Behavior that indicates whether or not the learner has learned something, and not what is going on in the learner's head. In response, some educators claimed that not all learning is observable and that there is more to learning than a change in Behavior. As a result, there was a shift away from behaviourist to cognitive learning theories."

One pedagogical characteristic of behaviourism has been an instructional approach commonly referred to as Direct Instruction (also called "whole-group" or "teacher-led" instruction). Direct instruction is characterised by being concerned principally with conveying 'factual' information/knowledge and providing learners with very few choices regarding the learning process. Typically, also, direct instruction deals with big-groups of learners – notwithstanding that direct instruction may also, in fact, be rendered on a one-to-one basis between teacher and learner. Another characteristic of direct instruction is that the focus is usually on the teacher, rather than the learner. However, some advantages have also been associated with direct instruction, namely, that it allows for information or learning tasks to be given to the class at the same time and in the same way, better time management when there are time constraints associated with the coverage of the subject matter, the teacher focuses on specific learning outcomes at a particular time, and less preparation required on the part of the teacher.

The second legacy of behaviourism was the ascendancy of an instructional design movement which ushered in, amongst others, programmed instruction. Programmed Instruction was implemented with the support of technology, and was based on the premise that information can be imparted to students in small "doses" and reinforcement for correct answers is immediately given. As Cooper (1993: 12) observes, "programmed instruction was behaviourally based and was characterized as having three stages: analysis, design, and evaluation." He hastens to add that these stages "map to the general scientific approach (hypothesis generation, experimental design, and hypothesis testing."

With regard to the effectiveness of behaviourism as an enabling educational psychology behind the processes of teaching and learning, Cooper (1993: 13) reports that "numerous studies have been conducted demonstrating the effectiveness of behaviourally-based instructional software in general, and on the utility of feedback in particular." Furthermore, it has also been reported that a relationship exists "between the underlying theoretical rationale of computer-based instruction and the effectiveness of that instruction at different learner-ability levels; and furthermore that "there is evidence to suggest that lower-ability learners perform better in well-structured, behaviourally oriented instructional environments, whereas higher-ability learners perform better in less-structured environments" (Cooper 1993: 13).

Cognitivism

Jonassen (1991: 6) contends that there was continuity in the journey from behaviourism to cognitivism, in the sense that "the cognitive revolution first enlisted the neo-behaviourists, who posited a role for the mind but relegated it to 'black-box' status because they could not comprehend or understand it." However, subsequently, this revolution "concluded by not only acknowledging the mind, but also by studying its functions and processes." Thus, Jonassen (1991: 6) posits that "the exclusion of the mind from the learning process by Behavioral laws was a primary theoretical cause of the paradigm shift in learning psychology" from behaviourism to cognitivism. On his part, Cooper (1993: 14) also supports the notion of a gradual shift from behaviourism to cognitivism, and attributes this to the complexity in the learners' actions which had to be matched by a similar level of complexity in the instructor's actions.

According to Dede (2008: 43, 48) cognitivism developed out of "various psychological theories that underlie differing models within the general framework of cognitivist instruction." In agreement, Yilmaz (2011: 205) acknowledges the plurality of the origins of cognitivism as follows:

"Cognitivism is not based on the works of a single theorist or a unified group of theorists. Rather, it is informed by a number of theorists' contributions and is quite multifaceted. The following theorists and accompanying theories have contributed to the continuous growth of cognitive theories: Piaget's Theory Of Individual Cognitive Development, Vygotsky's Theory Of Social Cognitive Growth or Zone Of Proximal Development, Festinger's Cognitive Dissonance Theory, Spiro's Cognitive Flexibility

Theory, Sweller's *Cognitive Load Theory*, Bruner's *Cognitive Constructivist Learning Theory*, and Tolman's *Theory Of Sign Learning* as a bridge between behaviourism and cognitive theory."

Notably, however, the contributions by Vygotsky, which led to social constructivism, and Piagét's work, which led to cognitive constructivism are often singled out as having defined constructivist psychology (Kola 2017). In particular, Piagét's work has been acknowledged for bringing about a clearer understanding of children's thinking at different stages of their development, and that his research and publications subsequently became the driving force behind the shift from behaviourist, to cognitivist and then to constructivist views of educational research and learning (Hassard and Dias 2009). To Seker (2008: 176) "constructivism was shaped by the principles of cognitive psychology."

Yilmaz (2011: 205) joins other researchers in singling out Jean Piagét and Lev Vygotsky as having had the most profound influence on the cognitive movement. In Yilmaz's words, "out of the spectrum of cognitive theories, the individual cognitive trend deriving from Piaget's studies and the sociocultural trend based on Vygotsky's works constitute the backbone of cognitivism." In this vein, Yilmaz (2011: 205) speaks of a "dramatic shift from behaviourism to cognitive theories" as a result of "the works of Edward Chase Tolman, Jean Piaget, Lev Vygotsky, Jerome Bruner, and German Gestalt psychologists." In elaborating on this point, Yilmaz stated that "in the 1920s, Tolman's experiment with rats suggested that rats knew how the maze in which they were put was structured because they had its mental map." Accordingly, Tolman asserted that rather than an automatic response to an event, Behavior had both purpose and direction and occurred without reinforcement (Yilmaz 2011: 205).

Cooper (1993: 16) traces the advent of cognitivism to Chomsky's challenge on structural linguistics (based on behaviourism) in favour of transformational grammar which, he contends, "began the revolution in thinking that was the beginning of the transition to cognitive learning theory." According to Cooper (1993: 14) "central to the notion of cognitive analysis is a model of the internal workings of the mind, the identification of functional components to handle information filtering, storage in short-term memory, semantic encoding for storage in long-term

memory, and retrieval when required." Jonassen (1991: 6) affirms cognitivists' focus on the internal workings of the mind in his remark that cognitive psychology "is concerned not so much with Behavioral responses, but rather with what learners know and how they acquire it", and that "cognitive activity is embodied in mental states that enable humans to construct mental representations and manipulate them through the use of symbols." So, "unlike the behaviourists, who were only concerned with what learners do, cognitive psychologists are interested in what learners know and how they come to acquire it" (Jonassen 1991: 6). Affirming this point, Cooper (1993: 14) poignantly avers that the cognitive approach began with the "initial conceptions of short- and long-term memory … through the notions of automatic and controlled processing to our current understanding of the cognitive structure model." Fundamentally, therefore, Cooper surmises that the notion of 'cognition' deals with sensory receptors, executive control, working memory, and long-term memory, where "long term memory, for example, holds the knowledge base, which comprises content, skills, and strategies." Accordingly, "sensations are received through the senses into the sensory store before processing occurs" (Ally 2008: 8).

Contextualizing this within the aegis of cognitivism, Ally explains as follows:

"Cognitivists see learning as an internal process that involves memory, thinking, reflection, abstraction, motivation, and metacognition. Cognitive psychology looks at learning from an information processing point of view, where the learner uses different types of memory during learning."

In this model, the short-term memory is also referred to as the 'working memory', and Ally opines that this working memory has limited capacity – thereby necessitating that information reaching this 'chamber' "be organized or chunked in pieces of appropriate size to facilitate processing" (Ally 2008: 9). If this is done appropriately, it will facilitate the efficient and meaningful processing of the information in line with the information already present in learners' "cognitive structures".

Accordingly, Ally further explains:

"After the information is processed in working memory, it is stored in long-term memory. The amount transferred to long-term memory is determined by the quality and depth of process-

ing in working memory. The deeper the processing, the more associations the acquired new information forms in memory. Information transferred from short-term memory to long-term memory is either assimilated or accommodated in long-term memory. During assimilation, the information is changed to fit into existing cognitive structures. Accommodation occurs when an existing cognitive structure is changed to incorporate the new information" (Ally 2008: 10).

However, according to Ally information stays in the working memory for only approximately 20 seconds, and that if it is not processed efficiently during this time, it is not transferred to long-term memory for storage (Ally 2008: 9). Even before the information gets to the working memory, Ally explains that due attention should have been paid to the incoming sensory information – thereby stressing the importance of what happens between the sensory receptors and the sensory store.

Thus, according to Ally (2008: 7):

"Cognitive psychology claims that learning involves the use of memory, motivation, and thinking, and that reflection plays an important part in learning. They see learning as an internal process, and contend that the amount learned depends on the processing capacity of the learner, the amount of effort expended during the learning process, the depth of the processing, and the learner's existing knowledge structure."

In similar vein, Dede (2008: 48) explains the basic assumptions of cognitivism as follows:

"Cognitivist theories of learning assume that reality is objective, but mediated through symbolic mental constructs. Students learn through mastering building blocks of knowledge based on pre-existing relationships among content and skills. Instructors organize and sequence these building blocks to facilitate optimal mental processing. Knowledge acquisition is a mental activity that also entails internal coding and structuring by the student. Successful learning is dependent not only on what the teacher or pedagogical medium presents, but also on what the student does to process this input, storing and retrieving information organized in memory."

Thus, extending this reasoning to the instructional process, cognitivists believe in using 'cognitive learning models' which help "isolate mental operations in order to discover the most effi-cient mapping of external reality onto learners" (Jonassen 1991: 7). Explaining this further Jonassen puts it as follows:

"Information-processing theorists, for instance, use cognitive task analysis to represent the mental operations that must be performed to accomplish the task, assuming that a most appropriate sequence of mental activities exists; these activities are externally manipulated by the teacher or the instruction ... Even Piagét, whose epistemological theory is alleged to be one of the most constructivistic, assumed that mental constructions were representations of the real world to which the learner had to 'accommodate'" (Jonassen 1991: 7).

In accordance with the above explanations, two aspects of cognitivism that significantly affected the instructional process were concept mapping and learning hierarchies. Concept mapping was born out of cognitive psychology's contention "that information is stored in long-term memory in the form of nodes which connect to form relationships; that is, in networks" (Ally 2008: 10). Thus, the use of concept maps, as a teaching and learning tool, became a major factor meant to enable the learner to make the kind of connections that were conceptualised to characterise the academic models being studied. As Ally (2008: 10) advises, "information maps that show the major concepts in a topic and the relationships between those concepts should be included in the online learning materials." He further extols the benefits of concept mapping by stating that "information map generation requires critical reflection and is a method for externalizing the cognitive structure of learners", and that "to facilitate deeper processing, learners should be encouraged to generate their own information maps" (Ally 2008: 10). Within the family of cognitivists, the significance of concept maps to their instructional arsenal was earlier advanced by Stoyanova and Kommers (2002: 126) who saw concept mapping as "an effective tool for eliciting, representing and communicating knowledge … in a way that is meaningful and beneficial …"

Incidentally, even Thorndike, who is both revered and vilified for being a behaviourist subscribed to the notion of internal connections in his remark that "we now understand that learning is essentially the formation of connections or bonds between situations and responses, that the satisfying-ness of the result is the force that

forms them, and that habit rules in the realm of thought as truly and as fully as in the realm of action" (as quoted by Resnick 1975: v).

One major aspect that sets cognitivism apart from behaviourism is the idea of addressing individual learner differences. In coming up with approaches to address individual differences among learners, instructional systems technology (IST), largely built on the notion of concept mapping. However, although this was ontologically positioned within the aegis of cognitivism, for a period of time IST depended on behavioural theoretical foundations. As Jonassen (1991: 6) explains, "during the 1990s, IST consciously rejected many (though certainly not all) of its Behavioral assumptions and accommodated a new set of psychological assumptions about learning from the cognitive sciences." Jonassen (1991: 6) further explained this point as follows:

"Fundamental IST processes, such as task analysis, Behavioral objectives, criterion-referenced evaluations and mathemagenic strategies all reflect a Behavioral tradition. For instance, the first true technology of instruction – programmed instruction – was essentially an application of operant conditioning wherein the learner's Behavior was shaped by the reinforcement of desired learning behaviours."

Over time, however, IST developed into the "Open Systems Model of the Learner", which was a "more organismic view of the learner as one who interacts with the environment and acquires knowledge, skills, and competence from it" (Jonassen 1991: 6-7). This was characterised by less reductionist forms of cognitive instructional strategies, leading to more holistic approaches to conceiving learner interactions. Thus, over time, the effort to accommodate individual differences brought about increased complexity which could not satisfactorily be addressed by instructional approaches founded on behaviourism – such as programmed instruction. Programmed instruction was one of the hallmarks of behaviourism, but now the need "to accommodate the evaluation of individual learner requirements and capabilities, among them cognitive styles and the ability to apply cognitive strategies" began to break behaviourism at the seams. As such, "some mechanism for determining the task in terms of cognitive analysis, rather than procedural decomposition, had to be developed" (Cooper 1993: 14).

As already stated, learning hierarchies were another important feature of cognitivism which, incidentally, were also embraced by some behaviourists, such as Thorndike (in Resnick 1975: 5), as reflected in the following statement:

"Learning hierarchies are nested sets of tasks in which positive transfer from simpler to more complex tasks is expected. The 'simpler' tasks in a hierarchy are not just easier to learn than the more complex; they are included in or are components of the more complex ones. Acquiring a complex capability, then, is a matter of cumulating capabilities through successive levels of complexity. Transfer occurs because simpler tasks are included in the more complex. Thus, learning hierarchies embody a special version of a 'common elements' theory of transfer."

For his part, Jonassen (1991: 7) explains that "most cognitive psychologists begin with the assumption that the role of mental activities is to represent the real world." To illustrate this, Jonassen (1991: 8) posits that people may agree on the description of a particular physical objective, such as a book, but that what each reader believes the book to be "and, more important, what each reader believes it to mean, may not be easily referenced to any objective reality, at least none that appears obvious."

As such, Jonassen (1991: 8) sums up the argument as follows:

"If our learning theory assumes that we construct meaning for objects and events by interpreting our perceptions of them according to our past experiences, beliefs, and biases, then each of us mentally represents our own personal reality. Each reality is somewhat different, because each person's experiences and resulting apperceptions are different. These differences in interpretations are proof, ipso facto, of the individual constructed nature of reality."

However, by stressing the notion of individually constructed reality in the above quotation, Jonassen appears to be creating a bridge between cognitivism and constructivism.

To Yilmaz (2011: 204) the most distinctive instructional approaches which typify the cognitive perspective on learning are "cognitive apprenticeship, reciprocal teaching, anchored instruction, inquiry learning, discovery learning, and problem-based learning." As such, Yilmaz believes that "because cognitivism is concerned with illuminating how the process of learning

occurs in different contexts by offering strategies that promote students' learning, teachers can benefit from this invaluable learning paradigm in their effort to help students attain the subject's goals" (Yilmaz 2011: 211).

Overall, cognitivists have been criticised for assuming the existence of mental structures or models in the minds of experts, without experimental evidence to support such an assertion, or even just to suggest so. The assumption of the existence of mental models further came with the implication that the learner's behaviour was internally initiated all the time. There was a further contention that "the cognitive scientists have misused the metaphor of storage and retrieval, replaced experimentation and evaluation with descriptions of experiments and assessment of expectations, and have raised feelings and mental states to the status of *causes* of behaviour" (Cooper 1993: 15-16). Thus, the third criticism of cognitivism relates to the learning of rules, in terms of which Cooper (1993: 16) has the following to say:

"When an organism learns a rule, the cognitivist concludes that the organism knows the rule. Skinner suggests that there is no evidence to suggest that the organism necessarily knows anything and, with repeated practice and the development of automaticity, the rule becomes unnecessary anyway."

The notion of 'algorithmic learning', especially as promoted by ISTs within cognitivism, makes it difficult to see the ontological distinction between behaviourism and cognitivism, hence the following question:

Are Behaviourists and Cognitivists Cuts from The Same Cloth?

There is a view that behaviourists and cognitivists are 'cuts from the same cloth', mainly because both of them see "knowledge as having a defined 'structure' in the mind of the expert who possesses it" (Cooper 1993: 15). Thus, in particular, cognitivists see the instructional process as one where the main task is to "replicate the knowledge structures of the expert in the mind of the learner" (Orey et al. 1991: 7). In the main, therefore, both behaviourism and cognitivism have conceptions of instruction which "seek to analyse, decompose, and simplify tasks to make instruction – and by inference, learning – easier and more efficient." Thus, with regard

to IST, Orey et al. explain that in order to replicate the expert's knowledge in the learner, "the domain expert's knowledge must be mapped into symbols a computer can store and manipulate, and presented to the learner in an organized manner" (Orey et al. 1991: 7). Consequently, the cognitive approach became synonymous with the 'systems approach' with an emphasis on 'information processing' models. It is Jonassen's contention, therefore, that "most of Behavioral psychology, most of cognitive psychology and IST are firmly rooted in objectivism" (Jonassen 1991: 9). Thus, taking behaviourists and cognitivists together as one group of 'objectivists', Jonassen (1999: 215) surmises as follows:

"Objectivist conceptions of learning assume that knowledge can be transferred from teachers or transmitted by technologies and acquired by learners. Objectivist conceptions of instructional design include the analysis, representation, and resequencing of content and tasks in order to make them more predictably and reliably transmissible."

Therefore, one could say that there are some overlaps between behaviourism and cognitivism with regard to their ontological foundations.

Constructivism

Von Glasersfeld (in Tobias and Duffy 2009: 3) attributes the first constructivist theory to an Italian philosopher, Giambattista Vico, going back to the 18th century. For their part, Berns and Erickson (2001: 2) contend that constructivism developed between 1910 and 1920, rooted in the theories of John Dewey. Duit et al. (2008: 2) opine that "constructivist ideas developed by merging various cognitive approaches with a focus on viewing knowledge as being constructed" and that these approaches were influenced by the "Piagétian interplay of the concepts of assimilation and accommodation, as well as by Kuhnian ideas of theory change in the history of science and radical constructivism." In this regard, Duit et al. (2008: 3) assert that "certain limitations of the constructivist ideas of the 1980s and early 1990s led to their merger with social constructivist and social cultural orientations that more recently resulted in recommendations to employ multi-perspective epistemological frameworks in order to adequately address the complex process of learning."

Dede (2008: 51) also agrees with the view that constructivism came about as a result of a merger of "the various social science theories that underlie differing models within the general framework of Constructivist instruction" and that these theories "were developed by diverse groups over the past century." More specifically, Dede (2008: 51) singles out a number of researchers as the persons "whose theories were formative in developing this school of thought."

In similar vein, Tobias and Duffy (2009: 3), as well as Kola (2017), also trace the resurgence in interest in constructivist thinking to the works of Vygotsky (1978), Dewey (1916), Piagét (1952), and Bruner (1966). In this regard, Kola (2017: 59) avers that "constructivist theories have their roots in Piaget and focus on the active character of the learner, interacting with the environment either singly or with others."

Tobias and Duffy believe that "the growth of constructivist theory and its application to instruction" was given greater impetus by articles written by Brown, Collins and Duguid, Resnick, as well as Lave and Wenger. In their article, Brown et al. (1989) "argued that knowledge is situated in the activity of the learner and is a product of that activity and the context and culture in which it occurs." Resnick (as quoted by Tobias and Duffy 2009: 4) "contrasted learning in everyday activities to the design in school and explored how those two contexts or situations affected what is learned." She noted four contrasts between the two situations: schools typically involved (a) socially shared activities rather than individual learning, (b) direct engagement rather than decontextualized symbolic thinking, (c) the use of cognitive tools rather than unaided thought, and (d) learning situation-specific skills rather than general skills. On their part, Lave and Wenger "extended the situativity framework to a more ethnographic analysis of learning in communities [and by so-doing] their study of communities of practice demonstrated the role of situated learning through apprenticeship and, most importantly, the development of identity as one participates in a community of practice" (Tobias and Duffy 2009: 4).

With regard to the assumptions made by constructivists, Jonassen (1991: 11) explains that "constructivism claims that reality is more in the mind of the knower, that the knower constructs a reality, or at least interprets it, based upon his or her apperceptions." In particular, radical constructivists:

"Believe that there is no real world, no objective reality that is independent of human mental activity ... our personal world is created by the mind, therefore, no one world is any more real than any other. There is no single reality or any objective entity that can be described in any objective way; rather, the real world is a product of the mind that constructs that world. A less radical form of constructivism holds that the mind in instrumental and essential in interpreting events, objects, and perspectives on the real world, and that those interpretations comprise a knowledge base that is personal and individualistic. The mind filters input from the world in making those interpretations" (Jonassen 1991: 11).

In concurrence, Dede (2008: 50) reports as follows:

"Constructivist theories of learning assume that meaning is imposed by the individual rather than existing in the world independently. People construct new knowledge and understandings based on what they already know and believe, which is shaped by their developmental level, their prior experiences, and their sociocultural background and context."

To Von Glasersfeld (1989: 1), "constructivism is a theory of knowledge with roots in philosophy, psychology, and cybernetics" based on two main principles, namely that (a) knowledge is not passively received but actively built up by the cognizing subject, and (b) the function of cognition is adaptive and serves the organization of the experiential world, not the discovery of ontological reality. In this regard, Von Glasersfeld believes that the application of constructivist theory has had "far-reaching consequences for the study of cognitive development and learning as well as for the practice of teaching, psychotherapy, and interpersonal management in general." Furthermore, Von Glasersfeld (1989: 2) believes that the revolutionary aspect of constructivism "lies in the assertion that knowledge cannot and need not be 'true' in the sense that it matches ontological reality, it only has to be 'viable' in the sense that it fits within the experiential constraints that limit the cognizing organism's possibilities of acting and thinking."

Likewise, Dede (2008: 50) posits that "knowledge is embedded in the setting in which it is used" and that "learning involves mastering authentic tasks in meaningful, realistic situations." Accordingly, Dede opines that learning takes place

as "learners build personal interpretations of reality based on experiences and interactions with others, creating novel and situation-specific understandings." As such, instruction must be provided in a way that fosters "learning by providing rich, loosely structured experiences and guidance (such as apprenticeships, coaching, and mentoring) that encourage meaning-making without imposing a fixed set of knowledge and skills" (Dede 2008: 50-51). Thus, the pedagogic emphasis of constructivism is on how one *constructs* knowledge, individually and/or in a social context – which is understood to be "a function of previous experiences, of mental structures, and of beliefs that one uses to interpret objects and events" (Jonassen 1991: 7).

Constructivism is a broad term used by philosophers, curriculum designers, psychologists and others who agree with the idea that constructivism revolves around two central ideas, namely (a) that learners are active in constructing their own knowledge, and (b) that social interactions are important in this knowledge construction (Tan 2016; Kola 2017). In an earlier elaboration, Reiser (2001: 63) explained that the instructional principles associated with constructivism included requiring learners to (a) solve complex and realistic problems; (b) work together to solve those problems; (c) examine the problems from multiple perspectives; (d) take ownership of the learning process (rather than being passive recipients of instruction); and (e) become aware of their own role in the knowledge construction process.

Advancing this point further, and in reference to the earlier work of Dabbagh, Dede (2008: 52) outlines the following four principles as undergirding a constructivist approach to instruction – that (a) instruction is a process of supporting knowledge construction rather than communicating knowledge; (b) the role of the teacher is a guide, rather than an expert transferring knowledge to novices' "blank slates"; (c) learning activities are authentic and centre on learners' puzzlement as their faulty or incomplete knowledge and skills fail to predict what they are experiencing; and (d) teachers encourage students in reflecting on experiences, seeking alternative viewpoints, and testing viability of ideas.

Similarly, Berns and Erickson (2001: 2) are also of the view that constructivism, as a model of teaching and learning requires students to "construct their own knowledge by testing ideas based on prior knowledge and experience, applying these ideas to a new situation, and integrating the new knowledge gained with pre-existing intellectual constructs." Berns and Erickson (2001: 2) also aver that constructivism "calls for active participation in problem solving and critical thinking regarding an authentic learning activity that students find relevant and engaging." These views were earlier made by Jonassen (1999: 215) as follows:

"Constructivist conceptions of learning ... assume that knowledge is individually constructed and socially co-constructed by learners based on their interpretations of experiences in the world. Since knowledge cannot be transmitted, instruction should consist of experiences that provide interpretable experiences and facilitate knowledge construction."

Dede (2008: 52) contends that "potentially, constructivist approaches can teach a very broad spectrum of knowledge and skills, in contrast to current versions of Behaviourist and Cognitivist instructional designs." He hastens to add, however, that the efficiency of constructivist learning technologies for material that can be taught through behavioural and cognitivist approaches is questionable. Thus, he posits that "content and skills that are relatively invariant regardless of individual perspective (example, arithmetic operations, Newtonian physics) are learned more quickly when taught as 'truths' than when taught through exploratory approaches which, in extremely "unguided forms, involves students slowly reinventing civilization" (Dede 2008: 52). However, the counter argument is that constructivism helps students learn even the relatively invariant content disciplines "with more depth and engagement and with greater meaning and transfer to life settings" (Dede 2008: 52).

Seker (2008: 176) sums up constructivist learning as follows:

"Learning within the framework of constructivist learning perspective is connected with personal processes. In these processes, novel notions and experiences are connected with what the learner has already learned ... Moreover, in the classroom environments where constructivist approach is adopted, it is more likely to meet students who are synthesizing the new information according to their former knowledge, experiences, belief and attitudes

and then shaping the information and finding their own meanings within the information rather than the students who are ready to receive the information."

The notion of learners making connections between the new and the old is not unique to constructivism, neither is it new in educational circles. It appears that the main distinguishing aspect between objectivism and constructivism is that whereas the former aims to achieve a specific, predetermined endpoint with regard to the mental connections that the learner makes, the latter appears to suggest that this is neither desirable nor possible, given the individually determined nature of this conceptual endpoint. The question that remains to be clarified by the constructivists is how the acknowledgement of the individual nature of *knowing* subsequently enables the classroom teacher to ensure that all individuals in his/her class attain specified learning outcomes in accordance with parental and curricular expectations; furthermore, that the learners do not just arrive anywhere with these mental connections, especially in overcrowded classrooms, where the teacher cannot give adequate individual attention to learners.

CONCLUSION

It appears that as we pursue the search for an adequate, relevant, appropriate and robust educational psychology for the 21st century, we have some unfinished business from the 20th century; the business of consolidating what is currently espoused concerning how learners learn – and, therefore, how teaching must be conducted to result in optimum learning for the diversities of the learners in the modern classroom. Most classrooms today are multicultural, multiracial, mixed gender, heterogeneous for learning styles and social class. To what extent, therefore, can educators rely on what they know today from the doctrines of behaviourism, cognitivism and constructivism to guide effective and optimal learning and teaching in the schools? Is the current repertoire of knowledge and understanding adequate, or should the search for a theory of teaching and learning for the 21st century continue outside, or on top, of behaviourism, cognitivism and constructivism? In contemplating answers to these questions, the writer believes that the 20th century made major gains in the race towards educators' understanding of how humans learners. However, as of the end of the century no consensus has emerged regarding which one, or combinations, of the three educational psychologies was or were the best to guide curriculum development and implementation. During the first half of the century, behaviourism dominated and in the second half cognitivism and constructivism carried more currency. However, behaviourism refused to go away. The notion of learning as "change in behaviour" still persisted and was reluctantly embraced by both cognitivists and constructivists as they both attempted to implement curricula founded on their doctrines outside behaviourism. Yet, in their efforts, they have continued to recognise the desirability and importance of teaching and learning towards predetermined learning outcomes. The implementation of curricula which espouse constructivism as their bedrock and foundation, such as the South African National Curriculum Statement, rely of the *a priori* formulation of learning outcome statements. So, it would be justified to conclude that the 20th century ended with the acceptability of the notion that there was enough room and purpose in the classroom for behaviourism, cognitivism and constructivism to co-exist and reinforce each other for the benefit of the students – in their diversity.

RECOMMENDATIONS

From the fore-going, two major recommendations are justified. Firstly, that the 21st century must build on the eclectic position that behaviourism, cognitivism and constructivism are three sides of the same object. Thus, educationalists must continue to work to consolidate current understandings of these three dominant educational psychologies. Secondly, researchers and practitioners must continue to explore other more robust theoretical perspectives to meet the demands of the fast and ever-evolving classroom and virtual learning and teaching environments. Certainly, the absence of one all-encompassing theoretical framework to inform teacher professional research and practice points to some unfinished business from the previous millennium. Accordingly, much work still lingers and awaits further research and classroom application.

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