CONSTRUCTIVISM: NEW PHILOSOPHY TO MEET CHALLENGES AND FUTURE NEEDS OF VOCATIONAL - TECHNICAL EDUCATION IN NIGERIA

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Abstract
In the past millennium, the implicit learning theory underlying the curriculum and practices of vocational-technical education (VTE) in Nigeria has been behaviourism. The unfolding theory of constructivism - an opinion that accepts as valid only constructive proofs and entities demonstrable by them may have implication for challenges, future needs and prospects for VTE practice in Nigeria soonest. This paper presented constaictivist principles in the light of the fundamental requirements of VTE towards meeting her challenges, future needs and prospects in Nigeria as we progress in the new millennium with a new name for a hopeful redesigned profession. Three basic types of construction were discussed, cognitive constructivism being the most compatible with VTE. To lay the future foundation and further building of the learning theory of VTE, a more thorough examination of the relative efficacy of behaviourism and cognitive constructivism is recommended.

Introduction
In the 1990s, the learning theory underlying the curriculum and pedagogy of vocational technical education (VTE) in Nigeria has been behaviourism, but the current emerging theory of constructivism may have implications for the challenges, future needs and prospects for VTE practice in Nigeria soonest. Preparation of workers for entry into and advancement in the work place in this millenium requires an educational programme that not only provides job skills, as VTE tried doing in Nigeria throughout the 1990s, but also higher-order-thinking, problem solving and collaborative work skills. Ideal behaviourist theory does not, adequately address these kinds of learning, but the constructivist may. Constructivist principles are discussed owing to the fundamental requirements of VTE and her challenges, future needs and prospects in Nigeria as we progress in the new millennium with a new name for a hopeful redesigned profession.

Three basic types of constructivism were discussed, cognitive being the most compatible with VTE. To lay the future foundation and further building of the theory of VTE, a more thorough examination of the relative efficacy of behaviourism and cognitive constructivism is recommended.

To embrace such a foundational change, leaders in the profession must re-think many of the fundamental assumptions underlying the vision, mission, curriculum and practice of VTE. May be such a re-thinking is quite due now.

Constructivism: New Philosophy for VTE in Nigeria
Domains of study and practice, such as VTE in Nigeria, are founded upon both implicit and explicit theoretical frameworks. These frameworks allow scholars to organize and synthesize knowledge and conjecture within a field and serve to describe, explain and predict behaviour and experiences. Scholarly works of Camp and Hillison (1983); Doty and Weissman (1984) lay credence to established theoretical frameworks that still guide VTE is based primarily on the works of David Snedden and Charles Prosser from the early 1990s. Nigeria imitated American's VTE system, whose implicit learning theory underpinning before-the Smith Hughes Act, has been behaviourism (Dobbins, 1999; Doolittle and Camp, 1999; Wirth, 1972). In America, the foundational work on VTE was built more than seventy - five years ago. Ever since, much has changed during the heated, sometimes rancorous, debates between David Snedden and John Dewey from 1910 to 1920. This culminated in polarizing educational community in the United States (Wirth, 1972). Conversely, such has not been experienced in Nigeria. Mayer (1992) asserts that since the late 1980s, three learning theory metaphors have dominated education as a whole: learning as behaviourism; information processing; and constructivism.
These changes have resulted from, and allowed for, new insights concerning the nature of learning and knowledge.

The Past Foundation Theories of VTE

The much-touted social efficiency doctrine postulated by David Snedden and effectuated by Charles Prosser is the unifying theory underlying VTE in the United States in the first part of last millenium (Camp, 1982-1983), and same adopted in Nigeria. Supporters of this doctrine held that only an efficient society could create a positive environment in which the individual could prosper and find satisfaction. Furthermore, they contend that public schools were an arm of the social system; and as such, they had an inherent mission to further the good of the society by contributing to its efficiency. Clearly, VTE, as envisioned by Snedden and Prosser, made up one of the bulwarks of social efficiency, in that the preparation of a well-trained, compliant workforce was a sine qua non of an efficient society (Wirth, 1972).

Theoretical Framework Underlying Social Efficiency

Six fundamental theories formed the basis of social efficiency as Snedden and Prosser applied the doctrine to VTE in the early 1900s (Camp, 1983):

1) **Sociometric Stratification**: - Sociologists insist that in all societies, the development of social classes was a natural, and an essential phenomenon. Movement between classes are possible, but a stable social system rightfully made social mobility difficult.

2) **Probable Destiny**: - This theory was an intrinsic result of socio-economic stratification which claims that social classes are inherently stable, so that a person born into working-class family will probably live and die as a member of the working class.

3) **Psychometrics**: - Psychological measurement, an emerging science then, was viewed as capable of determining each students' probable destiny as a simple matter of testing. Classifications into academic or vocational tracks would then be reliable and scientifically based.

4) **Social Control**: - Its theory posited that for any society to exist, its members must adhere to both implicit and explicit norms of the society.

5) Pedagogy: - Though never formulated as a single, coherent theory, it involved the systematic study of teaching and learning. Works of various scholars concurred that VTE's pedagogy must be based on organized, rigidly sequenced, hands-on approach to teaching.

6) **Behaviourism**: - As the early emerging learning theory, behaviourism provided the final foundation for social efficiency. Thoradike (1983) contended that learning consists of the formation of links between specific stimuli and responses through the application of rewards. Snedden and Prosser reasoned that psychometrics and sociology would enhance school to guide students into their ideal educational tracks based on their probable destinies (Wirth, 1972). Behaviourism science provided the mechanism while pedagogical science provided the processes by which the schools would teach students the right work and moral habits. Those habits would lead them to a voluntary compliance with social norms in compliance with social control theory.

Contemporary Vocational and Technical Education

Those early debates from 1910 to 1920 concerning VTE developments seem to have little to do with realities of early 21st century VTE. But, as Dobbins (1999) argued, behaviourism remains the learning theory underlying current VTE thinking. To reinforce his argument, he pointed to the links between behavioural learning theory and the structuring which is still pervasive in VTE (Finch and Crunkilton, 1999). The use of performance objectives according to Dobbins to provide structures for lesson plans, criterion-referenced measures task completion (Newcomb, Me Craken, and Warmbrow, 1983) and reliance on incumbent worker task-lists for the primary source of curriculum (Finch and Crunkilton, 1999) derive directly from behaviourist learning theory. From the above submissions, it seems clear that a curriculum designed to provide a specific pre-determined skills demonstrated to employer standards does not represent knowledge constructed internally by the students, but rather knowledge and skills extremely imposed on the student.

In recent past decades, leaders in general education have moved to embrace information
processing and constructivism. Numerous theorists in VTE have advocated similar changes in various dimensions in the underlying theoretical framework of this profession (e.g. Hill, 1994; Gregson, 1997; Grub, 3997), some of which are anchored in constructivist philosophy. Nevertheless, Bragg (1997) called into question, notwithstanding, change can be excruciatingly slow in the profession. Indeed, the single most pressing impediment to fundamental theoretical change in VTE has been the requirement that the profession provide trained worker^ for occupations based on definable worker competency lists and to document the success of the workers through placement follow-up and reporting. That regulatory and structural constraint has tended to militate against a fundamental break from the historical behavioural perspective (Dobbins, 1999).

**Time for Reconsideration**

It is seen that behaviourism was one of the primary theoretical foundations of the social efficiency doctrine at the time of Smith Hughes Acts (Camp, 1983). Dobbins firmly claims that till today, behaviourism remains the primary basis in learning theory for both the curriculum and pedagogy of VTE as practiced in the classroom and laboratory. Behaviourism is fundamental to the way we do business in VTE; as the state of knowledge in education and psychology advances, it is incumbent on scholars to re-examine all aspects of our profession's theoretical -foundations. Calls have been received for a new look; "clearly focused conceptual framework", and more recently a plea for scholars to work toward a reasoned, intellectually sound conceptual framework for research in the VTE profession (Doty and Weissman, 1984; Lynch, 1996 and 1997; and Osborne, 1999). With the rapid development in occupational, educational and computer technologies, the old ways of teaching students specified and well-established set of skills and knowledge must be called into question, and to enhance students' ability to construct viable knowledge and adapt to it is paramount.

**Constructivism: The Emerging Learning Theory**

The concept that learners construct their own knowledge from experience is termed constructivism (Fosnot, 1996). Some professional bodies e.g. National Academy of Science (1996), National Council for the Social Studies (1994), recently have embarked upon educational reform efforts that have all embraced constructivist principle within their theoretical framework. Constructivism is a theory of learning that has roots in both philosophy and psychology. The essential core of constructivism is that learners actively construct their own knowledge and meaning from their experiences (Steffe and Gale, 1995; Fosnot, 1996). Philosophically, this essence relies on the concept that while reality may exist separate from experience, it can be known through experience, resulting in a personally unique reality. Von Glasersfeld (1984, 1995) proposed three essential tenets of constructivism, to which a fourth is considered in the light of recent writings:

1) Knowledge is not passively accumulated, but rather, is the result of active cognizing by the individual;
2) Cognition is an adaptive process that functions to make an individual's behaviour more viable given a particular environment;
3) Cognition organizes and makes sense of one's experience, and is not a process to render an accurate representation of reality; and
4) Knowing has roots both in biological/neurological construction, and in social, cultural, and language-based interactions (Gergen, 1995; Garrison, 1997; Larochelle, Bednarz and Garrison, 1998). Constructivism acknowledges the learners' active role in the personal creation of knowledge, the importance of experience (both individual and social) in this knowledge creation process, and the realisation that the knowledge created will vary in its degree of validity as an accurate representation of reality. These four fundamental tenets provide the foundation for basic principles of the teaching, learning and knowing processes described by constructivism.
The Constructivist Continuum

Constructivism is not a unitary theoretical position, rather, it is always described as a continuum. Typically, this continuum is divided into three broad categories: cognitive, social, and radical constructivisms (Moshman, 1982; Von Glasersfeld, 1995; Anderson, 1993).

Cognitive Constructivism

This represents one end of the continuum. It is ideally associated with information processing and its reliance on the component processes of cognition (Dole and Sinatra, 1998). It emphasizes only the first two of the four previously mentioned tenets. The tenets emphasize lead to defining principles that maintain the external nature of knowledge and the belief that an independent reality exists and is knowable to the individual. Knowledge from this position, is the result of the accurate internalization and (re)construction of external reality. The results of interrealization process are cognitive processes and structures that accurately correspond to processes and structure that exist in the real world. This claim, that reality is knowable to the individual, differentiates cognitive constructivism from both social and radical constructivism. Mayer (1992) believed that this perspective of learning focuses on (a) the procedure or processes of learning, (b) how what is learned is represented or symbolized in the mind, and (c) how these representations are organized within the mind.

Though this concept may be "weak", it embraces only two of the four epistemological tenets (Von Glaserfeld, 1984). Its pattern of knowledge construction is considered primarily a technical process of creating mental structure, but has little bearing on the nature of the subjective knowledge within the mind, which is its greatest undoing among other forms.

Radical Constructivism

This represents the opposite end of the constructivism continuum from the cognitive constructivism. It fully embraces the first three epistemological tenets, viz - that knowledge acquisition is an adaptive process that results from active cognizing by the individual learner, rendering an experientially based mind, not a mind that reflects some external reality.

The adaptive nature of knowledge underscores that internal knowledge which does not match external reality, but rather is a viable model of experience (Von Glasersfeld, 1995). These viable models are created within an individual, influenced by the context within which an activity was experienced, and relative to the accomplishment of a particular goal. Thus, according to Staver (1995), "knowledge of the knower, not the knowledge of the external world; improving knowledge means improving its viability of fit in, but match with, an external world". An assessment of this concept considers it a "strong" form of constructivism. Furthermore, it is concerned with the construction of mental structures, the position of cognitive constructivists, and the construction of personal meaning. In this sense, radical constructivism involves a greater degree of construction, structure and meaning, rather than only one, structure.

Social constructivism

This lies somewhere between the transmission of knowledge reality of the cognitive constructivists, and the construction of a personal and coherent reality of the radical constructivists. The above, unlike cognitive and radical constructivisms, emphasizes all four of the previously mentioned tenets. These emphases lead to defining principles that maintain social nature of knowledge, and the belief that knowledge is the result of social interaction and language usage, and, is a shared, rather than an individual experience (Prawatt and Flodden, 1994). Furthermore, this interaction always occurs within a socio-cultural context, resulting in knowledge that is bound to a specific time and place (Vygotsky, 1978; Gergen, 1995). These views are pontificated by Bakhtin (1984), as he posits that "truth is not be found inside the head of an individual person, it is born between people collectively
searching for truth, in the process of their dialogic interaction. "Truth, in this matter, is neither the objective reality of cognitive constructivist nor the experimental reality of the radical constructivists, but rather is a socially constructed and agreed upon the truth resulting from "co-participation in cultural practices" (Cobb and Yackcl, 1996).

**Constructivist Pedagogy**

Summarily, cognitive constructivists emphasize mental constructions of reality. Radical constructivists emphasize the construction of a coherent experiential reality. Constructivists pedagogy, the link between theory and practice, suffers from the breadth of its theoretical foundations. Many theorists and practitioners (Brooks and Brooks, 1993; Driscoll, 1994; Jonassen, 1991) have generated constructivists pedagogies with an array of results. These pedagogies commonly share a set of core design principle, but tend to vary greatly in their peripheral principles. The whole theoretical and practical constructivist consensus, however, across all the types of constructivism, indicate that eight factors are essential in constructivist pedagogy. These essential eight factors are:

1. Learning should take place in authentic and real-world environments.
2. Learning should involve social negotiation and mediation.
3. Content and skills should be made relevant to the learner.
4. Content and skills should be understood within the framework of the learner's prior knowledge.
5. Students should be assessed formatively, serving to inform future learning experiences.
6. Students should be encouraged to become self-regulatory, self-mediated, and self-aware.
7. Teachers serve primarily as guides and facilitators of learning, not instructors.
8. Teachers should provide for and encourage multiple perspectives and representations of content.

These eight principles provide the essence of constructivist pedagogy, emphasizing the students' role in knowledge acquisition through experience, puzzlement, reflection and construction. Pedagogy is founded upon dynamic interplay of mind and culture, knowledge and meaning, and reality and experience.

**Vocational and Technical Education and Constructivism**

The early 1990s, philosophical debates settled the question of the role of VTE for many years (Wirth, 1972). The profession would prepare workers for skilled positions in the workplace through a public system of pre-employment, on-the-job training, skill upgrading, and worker-retraining programme. To the extent that the role remains central in VTE today, even in a changing society and workplace, certain practices must remain central to practice in the profession. In order for VTE to meet its obligations to society, to the education community, to business and industry, and to its student-clients, we must continue to identify employability and workplace skills and to transmit those skills to students. The precise nature of those skills may have changed from repetitive, manipulative tasks to problem-solving, collaborative tasks (McNabb, 1997), yet the fact remains that providing employability and workplace skills is a fundamental task for VTE. The classical approach to identifying those skills has been, and remains today the identification and prioritization of competencies needed on the job using community input and job or task analysis (Finch and CrunkiKon, 1999).

Through a constructivist view lens, this employability and workplace approach, however, adds new dimension of interest. Indeed, while there is a base set of knowledge and skills that a student needs to understand and perform today, he also must be prepared to adapt to the knowledge and skills that will be needed in the future. In addition, the concept that teaching involves the transmission of knowledge and skills from the teacher to the students must be replaced by a new understanding of students' knowledge construction and the reciprocal relationship between teacher and student. In fact, students are not the “behaviour machines" of the behaviourists, rather, students are the self-regulated, mental model building, socially interacting, meaning-making individuals of the constructivists (Grubb, 1997). Radical constructivists claim that a personal reality is viable for an individual (but overlook that, which may not match another's personal reality), VTE emphasizes a commonly accepted and knowledge reality, a reality within which students must function effectively. For example the proper wiring of an electrical switch is well known and is quite easily taught to students. In addition, this wiring knowledge reflects the way electricity actually works, not the way the students thinks it might work, except he thinks
in conformity with the actual way. Thus radical constructivism does not support VTE's teaching of specific solutions of specific problems. While radical constructivism fails to support VTE's teaching of an historical, domains-specific knowledge base, social constructivism's overemphasis on the social origin of knowledge is likewise unacceptable. Social interaction, negotiation, and consensus are certainly aspects of quality VTE, however, they are not the entire of it. Social constructivism has much to offer VTE, however, its extremism limits its full adoption. Finally, cognitive constructivism strikes a balance not attainable through radical and social constructivism. Cognitive constructivism recognizes that individuals construct unique mental models based on differing experiences, a concept that is central to radical constructivists beliefs. However, cognitive constructivists also emphasize the ability of individuals to construct similar, if not identical, mental models based on similar or identical experiences. This ability to construct similar mental models supports the VTE requirement of students learning a core set of historically reliable knowledge and skills. In addition, cognitive constructivists agree with the social constructivists that social interaction is a source of knowledge; however, the former emphasize that social interaction is only one source, of many, for the acquisition of knowledge and skills. Thus, cognitive constructivists do not get caught in the web of "consensus = truth".

Conclusion

Vocational and technical education remains in fact if not expressly, founded on the learning principles of behaviourism. Many scholars and reformers in the profession have advocated changes that implicitly relied on cognitive constructivist principles. Nevertheless, scholars in the profession have yet to expressly address the shift from behaviourism to constructivism. Time has come for scholars in the profession to conduct a serious examination of the learning theory underlying VTE. It may be that cognitive constructivism will be found to be a better solution than behaviourism to serve as the learning theory foundation for VTE curriculum and pedagogy. Assuming that is the case, significant rethinking may be in order for how do we determine, structure, and deliver the content of education for workplace preparation in the future? For the proponents of such movements as Open Apprenticeship Scheme, Self Empowerment Scheme, School - To - Land Programme, Poverty Eradication Programme, Poverty Alleviation Programme, Vocational and Technical Skills Acquisition Programme, Capacity Acquisition Programme, etc. such a rethinking may be absolutely essential.

References


