

ASSESSING THE READABILITY OF TEXTBOOKS FOR COMPUTER STUDIES AS PROPOSED BY THE DELTA STATE EDUCATIONAL BOARD

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Abstract

This study is designed to ascertain the readability levels of some textbooks used in the teaching of computer studies in primary and post primary schools in Delta State, Nigeria. X-raying the challenges of constructivism as applied to STM requires urgent intervention on the curricular and instructional material of our educational system, as we may have nothing to offer students in the 21st century – drawing us into technological isolation. We must thus, uphold *internationalization* by devising appropriate strategies against *detritorializing* knowledge with constructivism, which in turn will help to redefine our educational goals to meet globalization as a means of networking and unification. Constructivism gives a description of individual, group and organizational adoption patterns of technology for teaching and learning across disciplines at the various schools and educational levels. It will help images exemplary practices for teaching, learning and research as well as highlights evidences linking technology integration, readability and quality students learning.

Introduction

Within a few years after the Europeans arrived and made their first contact in Nigeria, they introduced formal education into Nigeria. One of the first three subjects introduced were arithmetic at the primary level and the first three arithmetic texts used to aid the teaching of this subject includes *Efficiency*, *Shillings* and *Larcombe's* arithmetic. These were written by British authors, some of who had never been to Nigeria, not to talk of having a good knowledge of the Nigerian culture. Thus, most topics represented in such textbooks (having no prior knowledge of our cultural background) become unrealistic in the Nigerian context. This is because we require the known to learn about the unknown.

Constructivism is the concept that a learner constructs meaning for himself as he learns. Hence, individually and socially, he constructs meanings and knowledge as he learns. Though taught by a teacher, they learn the same concept independently and by their cognitive abilities, construct their *own* independent, fundamental understanding, irrespective of what *meaning* the teacher attributes to the concept. Bloom (1956) notes educational goals as a function of the *cognitive*, *affective* and *psychomotor* domain respectively and Phillips (1995) notes three distinct roles of learners' constructivism as:

- (a) *Active* learner in which knowledge and understanding are actively acquired
- (b) *Social* learner in which knowledge and understanding are socially constructed
- (c) *Creative* learner in which knowledge and understanding are created or recreated

The learner possesses an *active* role accompanied by social or creative roles, which result from learner's motivated search for knowledge. Teachers in the course of sharing ideas must interact with the learner using an *established* language format. This helps to further enhance understanding and thus justifies the educational system. One is thus justified to say that these textbooks formerly used depict foreign cultures used in the Nigerian environment (a problem in the teaching of most subjects today).

One cannot talk about computer science as a field of study without emphasis to mathematics. Recently, the Delta State government and its education board launched the integration of computer studies at the primary and secondary school levels, which is to be implemented in phases. To ensure success, knowing the place of computer literacy in today's society, they employed *few* experts and *many* non-experts to help with the adoption and adaptation of suitable textbooks that will aid the effective teaching and learning of computer. This arose with the need and challenges placed on the society by the information age in order to equip today's student with the information, ever-growing societal changes.

Principles of the Constructivist Learning Model

The following are principles of constructivist thinking that every learner keeps in mind:

1. Learning is an *active* process, consisting of both meaning construction as well as constructing the system for these meanings.
2. Knowledge construction is *mental* – since it happens in the mind of the learner.
3. *Language* influences a great deal what we learn – because learning is a social activity associated with connections the learner makes with others.
4. Learning is *contextual* – since the learner cannot learn isolated facts or theories in abstract ethereal land, separate from real world situations.
5. *Motivation* is a key in learning, because we need to know the way in which this knowledge being acquired can be used.
6. *Knowledge* is important to learning. We cannot comprehend new ideas without having some structure developed from previous knowledge to build on.
7. Learning is not *instantaneous* as it takes time for concepts to be assimilated.

Jonassen (1991) notes that constructivism proposes an educational environment that supports multiple interpretations or perspectives to reality, knowledge construction as well as a context-rich and experience-based activity. Hence, it will focus on knowledge *construction* rather than knowledge *reproduction* as students construct knowledge from experiences, mental structures and beliefs used to interpret objects and events, which cannot be done outside the mind. The constructivist model has tasks that uses real world relevance and is integrated across curriculum that provide the appropriate level of difficulty or learner involvement. It is rather impossible for a learner to become masters of all content areas.

This goes on a long way to stress the fact that instruction is anchored in some meaning, real, world context. The ideas and interest of the learner drives his capability in the entire learning process, because teachers are flexible in that sometimes they are knowledge giver and other times, facilitators (Strommen and Lincoln, 1992). Holden (1994) notes that *learning* is a *constant* parameter and time, the variable in such a setting. Dwyer (1991) notes that constructivist setting is learner centered rather than curriculum centered – since it is a dynamic learning process.

These principles comprise of socially mediated activities that are divided into acquisition and participation metaphors of learning. Hence, constructivism in all totality stresses an environment of learning in which knowledge is generated based on the learner's ability to construct knowledge from his environment. Dougiamas (1998) notes the four dimensions as thus: *trivial, radical, social* and *cultural* constructivism.

Intertwining Challenges for Readability and Constructivist Model

Though STM has gained recognition, it is yet to get out of the shackles. Overcoming the challenges of STM requires producing systems of international caliber that will help put African trajectories in perspective by comparing them with other experiences in the rest of the world. With the unified objective of STM as above and considering the present influence of constructivism in our educational system, challenges to be addressed are:

- a. **Nativism:** Cultural constructivism projects racism. This distorts the fundamental unity in science because cultural constructivism represents knowledge as meanings that allow a user to convey an idea in different languages. Thus, conveys different meanings even when referring to same objective state – insofar the grammatical structures of the spoken language differs. It also believes that meaning is connected with linguistics, while *applied* science believes meaning as objective states of nature that transcends linguistic boundaries. Going by cultural constructivism, every spoken language must construct its own periodic table for atoms, molecule configurations and recreate nature to suit their cultural and linguistic boundaries. The nativism of cultural constructivism and empiricism of applied sciences are too *parallel* and hence, may never meet at the tabernacle of internationalization and globalization.
- b. **Poor interpretation of globalization:** Poor globalization in scientific enterprises is often misconstrued not as co-construction of knowledge but as nativism. The global network ensures unification of science via interaction and exchange of concepts and ideas, innovations and skills amongst experts with organization scattered all over the world. It does not urge individuals

and research units to be localized and restricted by culture. Competition should be encouraged and circulation of intelligence should become the rule. Current cultural constructivism in science education programme is faced with the big challenge of capacity building, establishment of research networks and dialogues with various Africans in diasporas and with other worlds.

- c. **Territorialism:** The false belief that only autochthonous people are physically living in Africa can produce within a closed circle limited to themselves, a legitimate scientific discourse on the realities of the continent (Abonyi, 2005). This forces the issue of territorialism of knowledge to the fore – making it a criminal assumption of cultural constructivism to think that generation of knowledge does not transcend cultural boundaries. Ideas formed from different cultural perspectives should not be encouraged – due to gradual predominance of idea similarities over their differences. These similarities alone by virtue of their many appearances, imprints themselves upon the mind, while individual differences that changes from case to case, fail to attain the like fixity and performance. Early inventors such as Faraday, Newton and Edison to mention a few, transcended ethnic boundaries. Faraday discovered the electricity, which was further worked on by Richardson and Edison. This same electricity known to them is the same known to us today, here in Nigeria – to show that their theories transcended ethnic boundary. Today’s educational curriculum and instructional material are being *territorialized*, designed like the STAN series, IRDI amongst other journal/publication, conferences around themes such as “You and your environment”. The question is how territorialism in STM meets the challenges of internationalization and globalization in Nigeria in the 21st century.

Scope of the Study

The study is designed to help ascertain the readability of textbooks used in the teaching and learning of computer studies (as proposed) in Delta State senior secondary school level at the various levels. The textbooks are “Computer studies for secondary schools I, II and III” as written by Aghware F.O (College of Agbor), Okonta E.O (Federal College of Education Technical, Asaba) and Ojugo A.A (College of Physical Education, Mosogar)

Research Questions

The study will answer the following questions namely:

- a. To what extent are these proposed textbooks readable at the classes for which they are proposed for approval in?
- b. Are the textbooks as proposed by Delta state educational board more readable than standard textbooks already in use/adopted by teachers in private owned schools?

Methods

The computer studies textbooks selected under study are proposed for approval by the Delta state education board for use in senior secondary I, II and III. Questionnaires were distributed to ascertain the readability of these proposed textbooks as against the standard textbooks used by the private owned schools. A total of 100 qualified computer science teachers were selected based on stratified sampling from the various schools (government and private owned). This will help buttress the answers collected from the various respondents - to avoid falsehood of results collected.

Readability is the ease in which a student reads a textbook and understands. This can be determined by legibility of letters/words, vocabulary in terms of wordlength and word frequency, sentence structure, number of syllabus etc. For this study, Flesch’s readability evaluation model for textbooks was adopted – it involves drawing up 100-words passages at 10-pages interval from each of these textbooks and using the formular RS denoted below to calculate the mean readability score for each of these textbooks as thus: $RS = (206.835 - SYL) * 0.846 - (100/SEN) * 1.015$

SYL – stands for the number of syllabus contained in the 100-words drawn from the 10-page interval; while *SEN* – stands for the number of sentences. Wahome (1979) and Okpala (1992) interpreted these readability scores for each textbook under study based on Flesch’s readability score, relative to the Nigeria as thus using table 1 below.

Table 1 shows Flesch’s Interpretation of Readability Data Relative to Nigerian School (source: Abacus volume 22 No.1 September 1992, Pg 69)

Classes	80 – 89	70 –79	60 – 69	50 – 59	40 – 49	30 – 39	20 – 29	10 – 19
SSS 1	FE	STD	FD	D	VD	EVD		
SSS 2		FE	STD	FD	D	VD	EVD	
SSS 3			FE	STD	FD	D	VD	EVD

The keys are FE (Fairly Easy), STD (Standard), D (Difficult), VD (Very Difficult) and EVD (Extremely Very Difficult) respectively.

Research Question 1: To what extent are these textbooks readable at the classes for which they are proposed for approval in?

This is seen in tables 2 and 3 respectively using the data collected and analyzing them using simple percentage formular. The keys for tables 2 and 3 are VG (very good), G (good), A (appropriate), P (poor) and VP (very poor) for the classes under study.

Table 2 shows C.S French’s Evaluation in Percentage

Items Stated	VG	G	A	P	VP
Legibility of words			66		
Organization of thoughts		88			
Layout, Design and Illustration with Photos		65			
Understandability And Clarity			68		
Examples & Exercises			90		
Explanation Of Difficult Concepts			88		
Application To Real Life situations		68			
How Current is Text Coverage					90

Results show that 66% of respondents agree that the legibility of word employed by C.S French is appropriate for the classes under study; while, 88% agree that concepts and thoughts as organized by C.S French is good. 65% agrees that the layout, design and illustrations of photographs used by C.S French is good; while 68% agrees that the textbooks is quite understandable and denotes clarity for the classes under study. 90% agrees that the examples and exercises used in the text is simply appropriate. 88% agrees that their explanations of difficult concepts are appropriate. 68% agrees that the textbook’s application to real life concept and situation is good; while 90% agrees that the textbook does not contain enough current issues for the classes under study.

Table 3 shows proposed textbooks’ Evaluation in Percentage

Items Stated	VG	G	A	P	VP
Legibility of words	90				
Organization of thoughts			88		
Layout, Design and Illustration with Photos		65			
Understandability And Clarity			68		
Examples, Problems & Exercises				80	
Explanation Of Difficult Concepts				58	
Application To Real Life situations			64		
How Current is Text Coverage		59			

Results show that 90% of respondents agree that the legibility of word used by native authors are very good for the classes under study; while, 88% agree that concepts and thoughts as organized is appropriate. 65% agrees that the layout, design and illustrations of photographs used by the same textbook is good; while 68% agrees that the textbooks is good and quite understandable and denotes

~~Assessing the Readability of Textbooks for Computer Studies as Proposed by the Delta State Educational Board~~ clarity for the classes under study. 80% agrees that the examples and exercises used in the text is poor and inappropriate. This may be due to the fact that the author reads from various sources and makes references to their examples. 58% agrees that its explanation of difficult concepts is also poor. 64% agrees that the textbook's application to real life concept and situation is appropriate; while 59% agrees that the textbook contains current issues for the classes under study.

Research Question 2: Are the textbooks proposed by Delta state educational board more readable than standard textbooks already in use and adopted by teachers in the privately, owned schools.

Table 4 shows the readability score for each of textbook under study

	Items / Classes	SSS1	SSS2	SSS3
Control Variable	C.S French series "Intro to computer"	71.23 STD	78.42 STD	88.65 FE
Experimental Variable	Introduction to computer for secondary schools by Okonta, O.E, Aghware F.O and Ojugo, A.A	48.99 D	68.12 STD	23.33 VD

Table 4 provides readability levels for each textbook using Flesch's model for textbook evaluation. Table 1 observes Flesch's interpretation of the readability scores (RS) used in the Nigerian context to show that the higher the RS of a textbook, the lower the number of pupils for which the textbook is standard; and the lower the RS, the higher the class level for which the textbook is standard. A close look at Flesch's model for the proposed textbook against those used in private owned school, showed that C.S French is good or standard for SS1 and SS2 respectively; while it was very easy for those in SS3. It was observed that Okonta's text was standard only for SS2; but difficult and very difficult for SS1 and SS3 respectively. Teachers noted that indigenous authors copy verbatim foreign idea without explaining in their own ideas. This adds no finesse to their work as other scholars can easily point out which work was copied.

Summary and Findings

A constructivist (technology-rich) class meets five goals: independent, individualized, interactive, intuitive and interdisciplinary. This must be complemented with the existing classroom teaching to provide teachers with active participation with their students for meaningful learning. Non-governmental societies should explore avenues for short-term courses in various subject areas (especially science and technology) at all levels.

Conclusion

The challenges placed by constructivism on our curricular and instructional material as used by our current educational system requires immediate attention or we may have nothing to offer students in the 21st century in terms of scientific development. This will draw us into technological isolation. It also images exemplary practices for teaching, learning and research as well as highlights evidences linking technology integration, readability and quality students learning.

Recommendations

Appropriate assessment in a constructivist-model should be evaluated due to the nature of the teaching/learning output that emanates from its environment. With constructivism a valid perspective for delivering knowledge (as studies have shown), it provides a valid set of criteria for evaluating the outcomes instruction – using these nine points for appropriate assessment in such a constructivist setting is as thus:

1. Technology forces constructivism and used to facilitate communication with parents
2. Assessment will be *outcome* and *context* based as well as *student* centered
3. A grading system must be developed which provides meaningful feedbacks because grades must be contracted where required
4. Assessment technique must be developed which reflects instruction outcomes
5. There must be non-graded options and portfolio assessment
6. There must also be self, peer and teacher's assessment

7. Performance standard must be developed

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8. Students are videotaped as they work. This is a part of their portfolio

9. Focus of the learning must be on originality, which is important to evaluating how the learner goes about constructing his/her own knowledge rather than the products

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