



## Incorporating Automation and Database In Curriculum Modeling

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### Abstract

We review the theory of curriculum and some current curriculum models. A new curriculum model, which is essentially a fusion of the basic elements in the existing models, has been proposed. This new model has provisions for a research finding database. In addition, a formal attempt at streamlining the automation of the educational curriculum has been made.

**Keywords:** curriculum, curriculum modeling, curriculum reform, automation and database.

### 1.0 Introduction

Educational curriculum has been defined by several authors and from differing perspectives/approaches: the essentialist approach and the disciplines approach (Ughamadu, 1992; Rakum and Aliu, 2000; Anyanwu *et al.*, 2004).

Other views of curriculum exist also. The progressive educationists view curriculum as learning experience (Wheeler, 1972; Mkpa, 1982; Alberty and Alberty, 2000). Defining curriculum as learning experiences implies that all aspects of human development such as the cognitive, affective and psychomotor are accommodated, with the learner being the major concern of curriculum. Other educationists define curriculum as plan for action or learning (Taba, 1962; Beauchamp, 1972; Hurst, 1974; Socket, 1976). In this regard, curriculum becomes synonymous with a lesson plan. Further still, other authors define curriculum as intended learning outcomes or objectives. Indeed, this definition brings out the doctrine of dualism in curriculum conceptualization. Also this definition highlights the distinction between curriculum as being concerned with what results and instruction as concerned with what happens.

The general view is that curriculum encompasses all and separating one from the other dangerously limits the scope of curriculum. Hence, Tanner and Tanner (1975) views curriculum as the planned and guided learning experiences and intended learning outcomes, formulated through the systematic reconstruction of knowledge and experience under the auspices of

the school, for the learner's continuous and willful growth in personal social competence, for the cognitive, affective and psychomotor development of the learner. The basic elements of curriculum are objectives, content or subject matter, learning experiences or activities and evaluation while its components include programmes of studies, activities and guidance.

The process of curriculum planning is a continuous one that involves the planner(s) passing through some phases including selection of the aims, goals, objectives/learning experiences and content and organization of the learning experience and content and finally evaluation. While going through these steps the planner is involved in different kinds of choices and decisions about general aims, objectives and educational experiences. As such there exists the need to obtain data from different sources or consider some factors, which will influence him in the process of curriculum planning. These factors will serve as sources of data and influence curriculum development. The factors include the society, economy and economic life of society, culture, philosophy of education, nature of organized knowledge, the learner, aims and objectives of education and finally the political organization or government with its philosophies and power machinery.

Schools achieve the educational goals of any society through the vehicle of curriculum, since it embodies all the systematically planned learning experiences presented to learners in schools with the basic aim

of achieving desired changes in the learner's behavior so that he can function effectively in society. Scope, sequence, continuity and integration are the important elements in the organization of learning experiences and content. Hence, different perceptions of how best to organize learning experiences and content results in different patterns of curriculum organization or theories. These theories are the subject-centered, child-centered and reconstructionism theories.

Modern curriculum development has basically two phases: the research and development phase and the evaluation phase. While the research and development phase is periodic where ideas are tried out, modified and retried until the curriculum developer is satisfied with the final product, the evaluation phase gives judgment as to the values or worth of the resulting programme.

Finally, curriculum reform and improvement provide us with opportunity to re-examine the design/re-design of an existing curriculum package, workability of research findings geared towards improving teaching and learning in our school system etc. Additionally, re-engineering the educational curriculum, which is closely related to curriculum reform and improvement process is a database approach to this aspect of curriculum reorganization. We have also examined its feasibility in this paper.

## 2.0 Models of Curriculum Planning

Generally curriculum development involves the selection of objectives, content and learning experiences as well as the organization of these learning experiences and also their evaluation to determine the extent to which they are effective in achieving the stated objectives. Several models of curriculum planning exist including the Tyler, Wheeler, Nicholls and Nicholls and the Guile models.

The rationale development by Tyler (1975) is a sequentially linear relationship between four basic questions and the associated planning framework as shown in Figure 1.

However, Wheeler (1980) developed a five-phased cyclical curriculum development model. This sequentially cyclic and continuous model also shows that the curriculum development process goes on

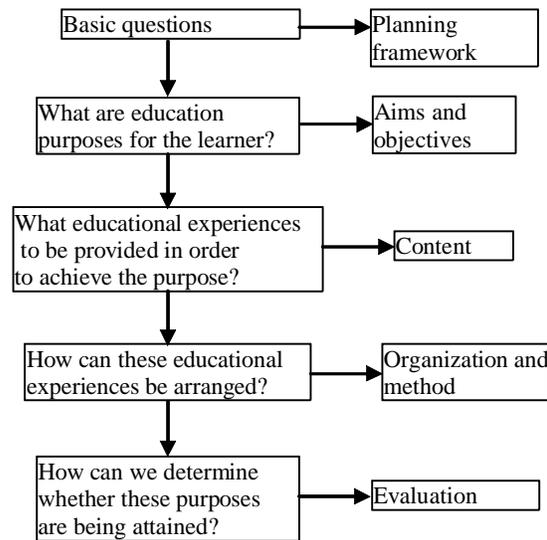


Figure 1: Tyler's linear model

and on from one step to the other, always in motion as far as the needs of society and the objectives is changing, as shown in Figure 2.

Similarly, the model developed by Nicholls and Nicholls (1975) shows, like the Tyler and Wheeler models, that the curriculum development process begins with the objectives, which should come from the local environment including the pupil's home. Again, situation is very much emphasized. Situation here includes pupils, teachers, schools and localities. This model is represented in Figure 3.

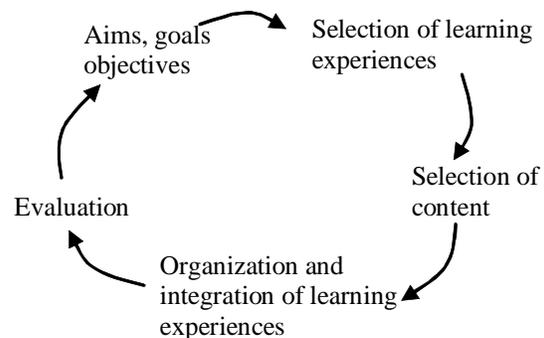


Figure 2: Wheeler's cyclic model

Finally, the Guile's model (Anyanwu *et al.*, 2004) represents a four-step approach to curriculum development and portrays the interdependence of functions in the curriculum development process. The interrelationship of the different steps show that the objectives are linked and interrelated to the content, learning experiences and evaluation which means that all the other steps in the process are di-

rected towards achieving these aims and objectives. The Guile’s model is shown in Figure 4.

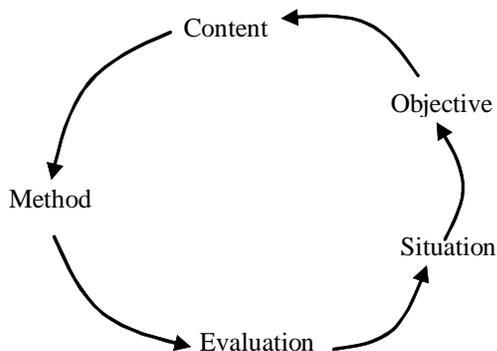


Figure 3: Nicholls and Nicholls cyclic model

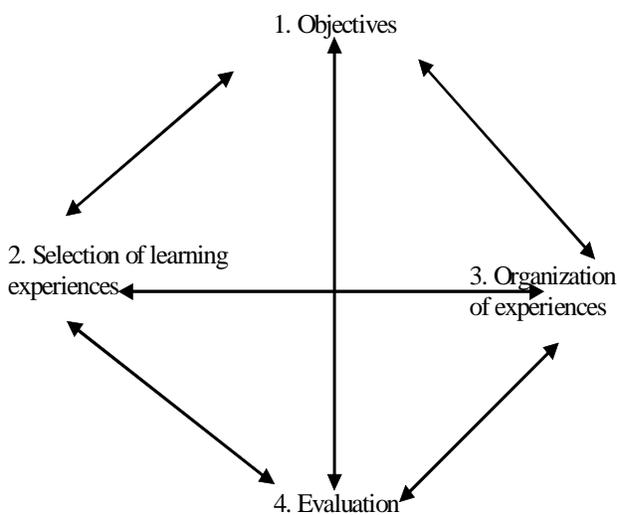
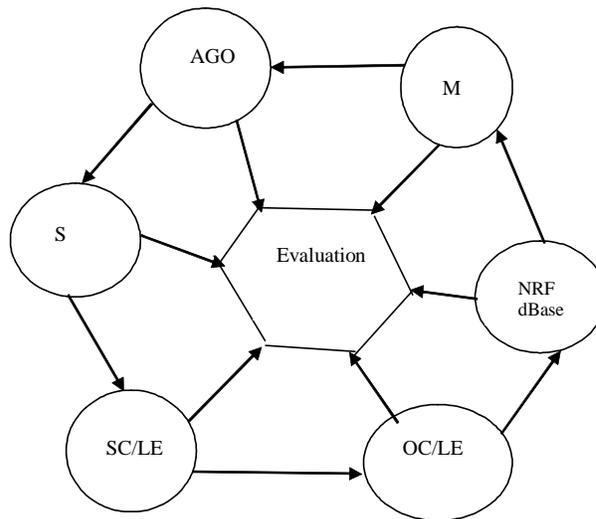


Figure 4: Guile's model

We propose a new model, which will incorporate all the basic features of these four models as earlier reviewed. This universal model of curriculum has the following features:

- It incorporates all the essential features present in existing models.
- The model, which is cyclical, shows that all the steps involved are subject to evaluation processes independently.
- Most importantly, it has provision for new research findings database that will ensure that new research results are continuously integrated into the existing curriculum package and made available to schools, so that the learner is adequately informed and receives updated knowledge. This model is shown in Figure 5.



**Key**

M	Method
AGO	Aims, Goals and Objectives
S	Situation
SC/LE	Selection of content / Learning experiences
OC/LE	Organization of content / Learning experiences.
NRF dBase	New research findings database

Figure 5: The Universal model

- The universal model, just like the Wheeler and Nicholls and Nicholls models is a cyclical and continuous model anchored on an evaluation hub.

As expected for any given locality/National policy on education, not all the elements of the universal model may be equally relevant. Expectations of the National polices on education should be dominant here. This agrees with the view of Lawton (1975) that the school curriculum is essentially a selection from the culture of the society. Therefore, the teacher selects those elements of the universal model that suits his locality while planning his lesson notes.

### 3.0 Curriculum Reform and Improvement/ Software Development Processes

#### 3.1 Curriculum Evaluation

The concept of curriculum evaluation has been examined by ( Cronbach, 1963; Metfessel and Micheal, 1967; Anderson, 1969; Ughamadu, 1992; Nworgu, 2002). Modern curriculum development

is composed of two phases-the research and development (formative evaluation) phase and the evaluation (summative evaluation) phase. During the research and development phase ideas are tried out, modified and retried until the curriculum developer is reasonably satisfied with the final product. The evaluation phase give judgment as to the value of the resulting programme. Formative evaluation is that evaluation conducted during the development stage of the curriculum and usually gives feedback, which would help the curriculum developer to modify the curriculum prior to its final adoption. Summative evaluation on the other hand is used to assess the over all effectiveness of the programme at the end of a course of instruction, with the aim of determining the extent to which instructional objectives have been achieved.

Since the curriculum content forms the basis for curriculum development, it is therefore very imperative that curriculum evaluators do examine the curriculum document at the planning stage to determine if the content represents the philosophy, goals, aspirations and objectives of the society. Moreover, they must ensure that new ideas and concepts arising out of recent researches are incorporated in the curriculum due to the dynamic nature of knowledge.

### 3.2 Curriculum Reform and Improvement

Several workers have variously defined, the concept of curriculum reform (Tyler, 1949; Wolf, 1976; Doll, 1979; Okeke, 1985). Generally, we can define curriculum reform and improvement as a process of entirely changing an existing curriculum or aspects of it in order to create a better and value- laden alternative, where the change process may effect the curriculum planning frame work: objectives, learning experiences and content, their organization, methodology and evaluation steps. The ultimate aim for any curriculum reform and improvement exercise is to make the existing curriculum package become relevant and useful to the child and his society.

Fundamentally, curriculum reforms and improvement exercises are undertaken due to the uncertainty that lies ahead and the need to assure that the younger generation will have a secure future. They provide opportunity to re-examine education systems, course

contents and existing teaching methods (Abbatt, 1980; ETF, 2000), workability of new research findings geared towards improving teaching and learning in our schools system and also to ensure that the curriculum meets up with the changes in the needs and aspirations of both the pupil and the society.

### 3.3 Processes of Curriculum Reform and Improvement / Software Development

Ugwoke (2007) has carried out comparative study of the current methods of curriculum reform and improvement versus the processes of software development life cycle. The result showed the procedure adopted during curriculum reform and improvement, and those of the life cycle models of software development are fundamentally similar. Highlights of the the observed similarities are given below:

- Identification of needed reform/problem area = the software requirement phase.
- Determination of new objectives/goals to solve the identified problems = the software specification phase.
- Outlining the content of improvement, assigning responsibilities, organizing work-shops, seminars/conferences, sourcing for fund, etc = the software planning phase.
- Field testing of the new curriculum package = the software design phase
- Dissemination and adoption of new curriculum package = the software implementation phase.
- Institutionalizing of the new curriculum package = the software integration phase.
- Taking care of further curriculum reforms = the software maintenance phase.

A closer look at these seven steps or phases reveals a striking similarity in approach in the two procedures. It appears that all the seven procedures carried out in performing the process of curriculum reform and improvement are basically repeated in the software life-cycle model. In the light of these similarities in approach, it is likely possible that a curriculum reform and evaluation package product could also be automated easily. A computerized version of such new curriculum package can easily be developed, once the details of the seven steps of

the curriculum reform and improvement are clearly specified by the curriculum expert(s). Then, the rapid prototyping model life-cycle could be used to do the job, since it is a document driven prototype with feed back loops.

#### 4.0 Summary and Conclusion

Curriculum includes all the learning experiences and intended learning outcomes systematically planned and guided by the school through the reconstruction of knowledge for the cognitive, affective and psychomotor development of the learner (Anyanwu et al., 2004). The basic elements of curriculum are objectives, content or subject matter, learning experiences or activities and evaluation, its components is programmes of studies activities and guidance.

Several models of curriculum planning exist including the Tyler, Wheeler, Nicholls and Nicholls, and the Guile's models; with their characteristic features. In the new curriculum-planning model we have developed in this paper, we have fused all the basic elements in these four existing models into one model, especially highlighting the importance of evaluation in each step. This new model, which we call the universal model of curriculum planning, has the additional feature of providing for a database, as one of its steps. All the steps are, moreover, hinged on an evaluation hub, so that each step could be independently evaluated at any stage of the curriculum planning process.

We have also looked at the process of curriculum reform and improvement. Ugwoke (2007) has shown some striking similarities between the procedures adopted by curriculum experts during the curriculum reform and evaluation process and the basic life-cycle prototyping model of software development (Schach, 1992; Whitten, Bentley and Dittman, 2004). These close similarities in the two procedures imply that a computerized format of a new curriculum package could be provided once the curriculum experts involved can specify the details involved.

In conclusion, automating the curriculum of tertiary institutions in Nigeria will therefore involve determining the curriculum reform and improvement

requirements, for each institution involved and then developing its software equivalent, perhaps using the waterfall life-cycle model (Schach, 1992; Whitten, Bentley and Dittman, 2004) since it is a document driven prototyping model.

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