The objective-based curriculum design for technological and vocational schools in Taiwan

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ABSTRACT: The curriculum design concerning technological and vocational education differs significantly from the standard educational curriculum design. School authorities must provide opportunities for students enrolled at technological and vocational schools to be creative and innovative, to solve problems and to learn the necessary skills for their future careers. Due to the increased level of globalisation, curriculum design for technological and vocational education must also consider industrial structures and social changes. The objective-based curriculum design can provide students with improved problem-solving skills. Differentiation and the development of distinctive characteristics are useful strategies for technological and vocational schools to survive in Taiwan. The emphasis of this article is on the specificity of the school curriculum design and exploring the principles and process of curriculum design for technological and vocational education. In this article, the authors also comment on an original objective-based curriculum design model for technological and vocational schools in Taiwan. In-depth interviews were the key inquiry tool used in this study.

INTRODUCTION

According to Dennis Lawton, the Academic Secretary of the Universities Council for the Education of Teachers (UCET), *It is usually better to see the curriculum not as a bolt-on complication to school organisation but as an integral aspect of a changing culture* [1].

Technological and vocational education can offer students opportunities to be creative and innovative, to solve problems and to learn new skills. However, the curriculum design for technological and vocational education must cope with social changes and industrial structures.

Curriculum specialists need to recognise that the curriculum design for technological and vocational education is different from the curriculum design for standard educational needs. An objective-based curriculum design can provide students with enhanced problem-solving skills. Developing differentiation in terms of what is offered, as well as promoting distinctive characteristics, can be useful strategies for technological and vocational schools to survive in Taiwan.

In this article, the authors' emphasis is on the specificity of the technological and vocational school curriculum design. They also explore the principles and process of curriculum design for technological and vocational education. Furthermore, an objective-based curriculum design model for technological and vocational schools in Taiwan is discussed. The key inquiry method for this study was in-depth interviews.

RATIONALE

After reviewing the literature related to curriculum design, it becomes apparent that a great deal of the research focusing on technological and vocational education curriculum design can be broken up into different categories.

Zuga stated that curriculum design in technological and vocational education centres around five categories as follows:

- Technical performance or processes;
- Academic focus on the specific body of knowledge relating to industry and technology;
- Intellectual processes that concentrate on critical thinking and problem solving;
- Social reconstruction through realistic or real world situations;
- A personal, learner-centred focus on individual needs and interests [2].

Curriculum specialists must recognise which purpose is the goal for an individual programme before determining the focus of the curriculum. Recognition of the purpose may also benefit teachers, who must be able to make accurate choices about teaching materials and in their actual teaching.

Curriculum design involves various theoretical and practical issues. In his report on *The Eight-year Study*, Giles used the term *components* to show the relationship of four basic curricular parts. The components of the general curriculum are as follows:

- Aims, goals and objectives;
- Subject matter or content;
- Learning experiences (instructional strategies, resources and activities);
- Evaluation approaches [3].

The curriculum design also involves various philosophical issues, as well as practical issues. Although not all curriculum designs will neatly include the same four components noted by Giles, all designs do have components that demand attention.

Technological and vocational education should encourage students to study the following:

- Processes used by technologists to develop new technology (this may include critical thinking and problem solving);
- Areas of technology which represent the accumulated knowledge of practice (specific technological applications);
- Impacts of technology on society and the environment [4].

A reasonable explanation of technology was postulated by Wright, Israel and Lauda, when they stated: *Technology is the practice used to develop, produce, and use artifacts and the impacts these practices have on humans and the natural world* [5].

When considering a curriculum design, educators must also examine it in several dimensions, specifically:

- Scope;
- Sequence;
- Continuity;
- Articulation;
- Balance.

Goodlad and Su pointed out that *scope* refers to the horizontal organisation of the substance of the curriculum [6]. Scope not only refers to cognitive learning, but also to affective learning or spiritual learning. It provides students with not only the depth and range of content, but also all the varieties and types of educational experiences that are created to engage students in their learning.

Sequence is the vertical relationship among curriculum areas. Smith, Stanley and Shores stated that educators have four principles to follow when they plan the curriculum, namely:

- Simple to complex learning;
- Prerequisite learning;
- Whole to part learning;
- Chronological learning [7].

Piaget's research has provided a framework for sequencing content and experiences and relating expectations to what is known about how individuals function at various cognitive levels [8].

Apart from Piaget's theory of cognitive development, it has also been discovered that the human brain is affected greatly by experiences that occur within an educational environment. Since the human brain evolves, what is provided to it in terms of curricula helps maximise the brain's evolution. During this evolution, the influence of school experience becomes part of the emerging adult brain; therefore, the content and experiences presented by educators allow the human brain to program itself to deal with the dimensions of the curriculum.

Continuity is related to the reappearance in the curriculum of certain major ideas or skills about which educators feel students need to increase their depth and breadth of knowledge over the length of the curriculum.

Integration emphasises the horizontal relationships among various content topics and themes involving all domains of the knowledge recognised. It is a design feature to bring all the bits and pieces of the curriculum into a close relationship in a manner that enables the individual to comprehend the knowledge as being unified.

Articulation refers to the interrelatedness of various aspects of the curriculum. This relation can be either vertical or horizontal. In horizontal articulation, curriculum decision makers strive to meld the contents of one part of an educational programme with content that is similar or else has a logical link.

Articulation is difficult to achieve for several reasons. One reason is that curricula arranged by subjects often pay no attention to connections with any other subject matter. Another reason is that we are not as far along in cooperative curriculum development as our educational talk might indicate. It is sometimes difficult to achieve articulation from one school to another school. Also, there is the need for articulation among school districts, as well as within school districts.

When designing a curriculum, educators are also concerned that appropriate weight be given to each aspect of the design so that distortions do not occur. Keeping the curriculum *in balance* requires continuous fine-tuning of the curriculum, as well as a balance in one's view of the philosophy and psychology of learning, so as not to fall prey to a particular *drummer* or popular *tune*.

Most curriculum specialists tend to be influenced by various designs instead of sticking to one single or pure design. However, the way in which a specialist designs a curriculum is rooted in his/her approach to, and definition of, *curriculum*. Whereas the curriculum development tends to be technical and scientific, the design will be more varied and more based on a specialist's values and beliefs about education, priority of schooling, and views of how students learn [9].

According to Ornstein, the following tips must be considered when curriculum specialists try to process their design:

- Curriculum specialists must comprehend the rationale for the course in context with the goals of the school;
- Curriculum specialists must understand the objectives of the course according to the guidelines from educational authorities;
- Curriculum specialists have to clarify the focus of the course: should it be subject matter, learner-centred social needs, or both of these dimensions in some particular balance?
- Curriculum specialists must identify the important components, ie content, skills, attitudes and/or values;
- Curriculum specialists must examine the components of the design to see if they:
    - Meet the objectives of the course;
    - Address all the key thinking processes;
    - Match students' abilities according to the data obtained from a needs assessment;
    - Stimulate students' interest;
    - Are feasible in terms of content, skills and attitudes.
- Curriculum specialists must decide what components can be utilised as a framework for planning;
- Curriculum specialists must show their design to experienced colleagues, supervisors or other experts [10].

Olds, Moskal and Miller considered that high-quality assessments can provide educators with information that they can use to move the field forward. In many ways, the advancement of engineering education depends on assessment [11].

A curriculum must be implemented throughout a school district for evaluative purposes if it is to make any impact on student learning. Implementation means getting educators to shift from the current programme to the new programme. This requires an adjustment of the following:

- Personal habits;
- Ways of behaving;
- Programme emphases;
- Learning spaces;
- Existing curricula and schedules.

People always play key roles when change occurs. Players who may be involved in curriculum change may include students, teachers, administrators, consultants, parents and political officials interested in education. Different people can play different roles at different times in the change process depending on their skills.

According to Ornstein and Hunkins, the following steps seem to be common in most assessors' discussions:

1. *Focusing on the curricular phenomena to be evaluated*: assessors determine just what they are going to evaluate, as well as what design they will use;
2. *Collecting the information*: assessors identify the sources of information essential for consideration and the means to collect that information;
3. *Organising the information*: assessors organise the information and make it usable for the intended audience;
4. *Analysing the information*: assessors select appropriate analysis techniques;
5. *Reporting the information*: assessors decide on the nature of the reporting; the final report would have detailed statistical data;
6. *Recycling the information*: the need for curriculum information involves a continuous re-evaluation and reassessment [9].

METHOD

In-Depth Interviews

Since the objective-based curriculum design for technological and vocational schools is a new topic in Taiwan, the researchers decided to interview specialists to further the local understanding and obtain high quality information. In-depth interviews were the key inquiry tools used in this study. Interviews were conducted in 2006 at six vocational schools located in Taiwan: two in the north, two in the centre and two in the south.

After reviewing the related literature, the researchers constructed several interview questions. Next, six principals were contacted, as well as two experienced curriculum design specialists who had been working on the curriculum design for vocational schools in Taiwan for quite a few years.

Lastly, 30 teachers, who taught various subjects in one of the six vocational high schools headed by the principals selected, were chosen as interview subjects. An interview guide was developed containing open-ended questions, together with some general background data questions. This guide formed the procedure for all interviews.

Key questions outlined in the guide were as follows:

- What is your opinion about the current curriculum for technological and vocational schools in Taiwan?
- Do you think an objective-based curriculum design is suitable for designing a curriculum for technological and vocational schools in Taiwan?
- What elements must be considered when a curriculum specialist designs a curriculum model?
- How might you know that a curriculum model is suitable?

The six school principals were initially called to make appointments with them. At the same time, it was asked that teachers be assigned randomly to be the research subjects. Soon after, the researchers visited the participants at their offices. In this study, the participants were encouraged to relate their recent or current experiences; they were given scope to recall those incidents that had made an impact on them, and the interviewer used probing questions in order to attempt to elicit more detailed responses.

The data collection process adopted a triangular correction. Three researchers interviewed the same subjects at different times. Upon the completion of this step, all the information was combined so as to compare the results and to make the final conclusions. This procedure was undertaken in order to enhance the reliability of the results.

RESULTS

The interviews produced a number of interesting results as follows:

- Four principals, two curriculum design specialists and 24 teachers suggested that the curriculum design for technological and vocational education must be more flexible than that for the standard curriculum design, because those students need not only academic subjects, but also better technological training for their future careers;
- Three school principals, one curriculum design specialist and 20 school teachers believed that critical thinking and problem-solving training are important principles for designing a curriculum for technology and vocational schools. An objective-based curriculum can be helpful in developing these skills;
- Five school principals, one curriculum design specialist and 23 school teachers responded that objective-based learning must be highlighted for vocational school systems;
- All six principals, one curriculum design specialist and 28 school teachers commented that the curriculum design must harmonise with the school's purposes. Therefore, different types of schools should emphasise different curriculum categories and offer various elective courses to students;
- Two school principals, two curriculum design specialists and 20 teachers considered curriculum certification as a very important issue for assessing the suitability of curriculum design.

DISCUSSIONS

Technological and vocational educational reform continues to be a big business in Taiwan. School authorities need to think differently, think big and think about the curriculum design in different manners. After interviewing curriculum design specialists, principals and teachers, the researchers created a model of the objective-based curriculum design that considers industrial structures, learners' interests and the social

environment for technological and vocational schools in Taiwan. This is illustrated in Figure 1.

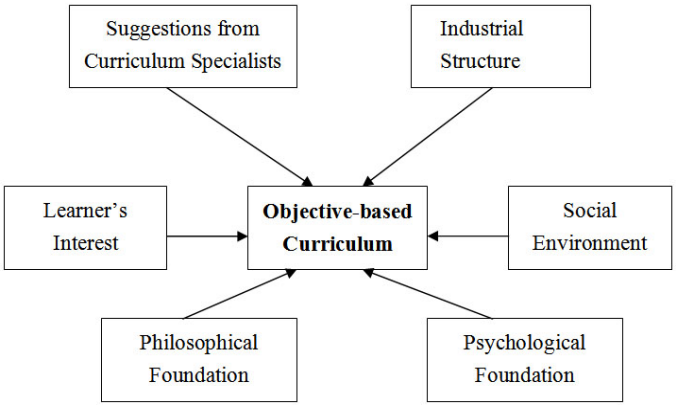

Figure 1: A model of the objective-based curriculum design.

The curriculum design is a complicated procedure so there is a need for qualified people to serve as generalists and specialists in a curriculum. These people must be able to maintain a curriculum balance in terms of goals, subject matter and learning activities; this is a difficult task given the numerous special-interest groups who wish to impose their brand of education on schools.

Different types of schools can decide on their own requirements and the courses they will use in order to meet these requirements. Elective courses in curriculum programmes or similar courses with different content are recommended. The process of the objective-based curriculum design is shown in Figure 2.

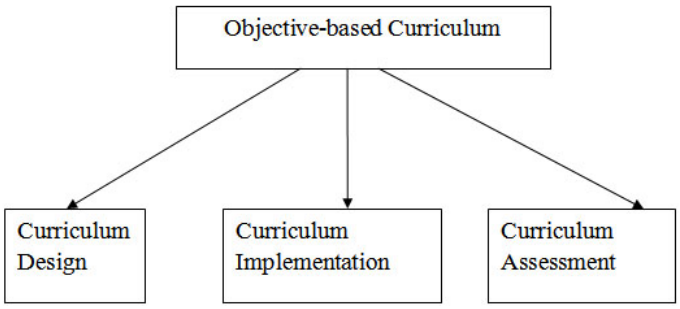

Figure 2: The process of the objective-based curriculum design.

LIMITATIONS AND OPPORTUNITIES FOR FUTURE STUDY

The major limitation of this project is that only a small portion of people who deal with the curriculum design for technological and vocational education in Taiwan were interviewed. Further efforts need to be made in order to obtain more objective opinions from suitable research subjects and to give useful suggestions to educational authorities in Taiwan.

Further quantitative and qualitative research also needs to be undertaken in order to evaluate the model presented in this article.

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