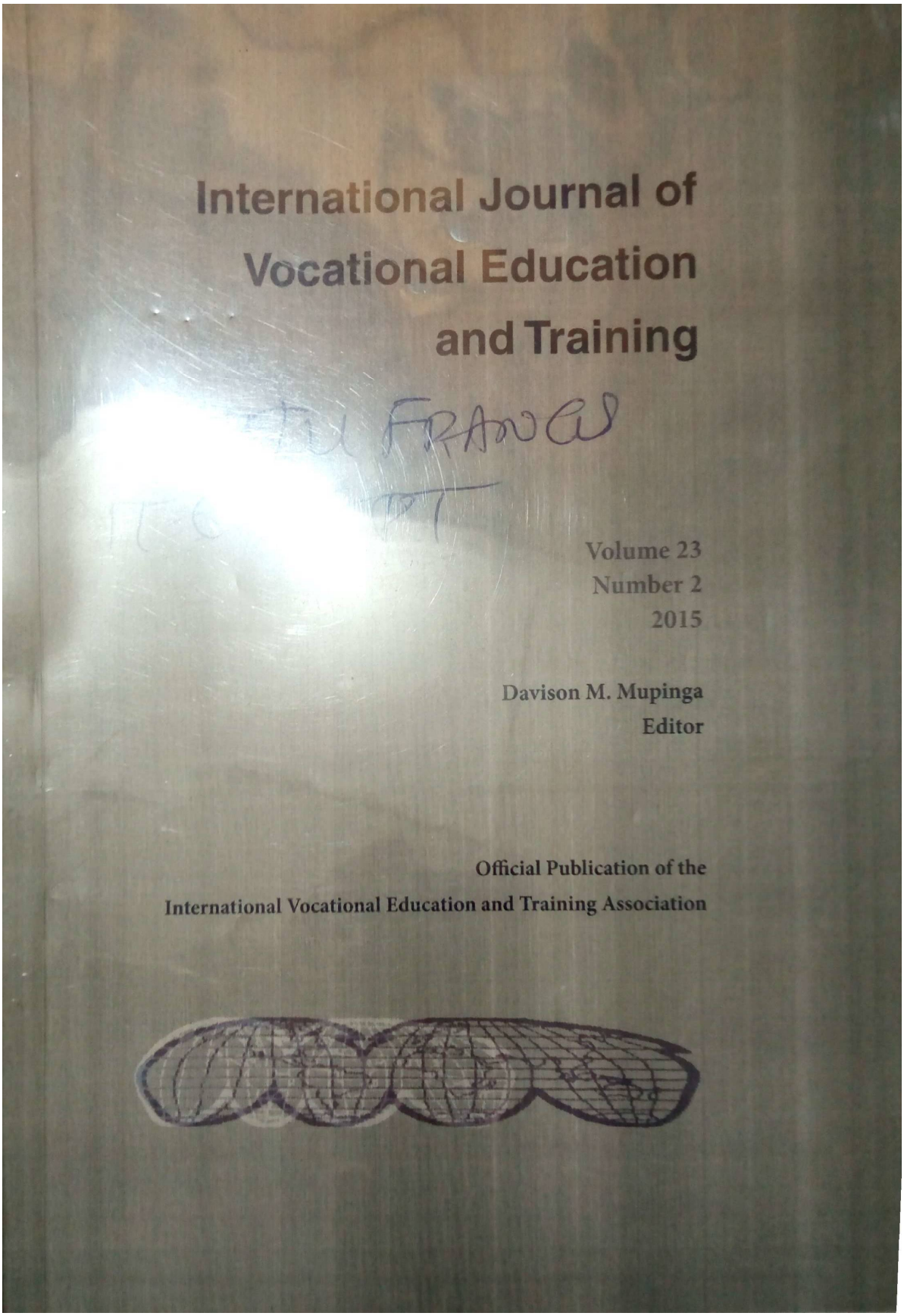
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CURRICULUM INTEGRATION IN VOCATIONAL AND TECHNOLOGY EDUCATION: IMPLICATION FOR TEACHING AND LEARNING

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Abstract

Employers are requiring that schools give graduates of vocational and technology education the 21st century skills. Hence fresh employees are required to learn new skills quickly and be able to communicate, solve problems, and work with technology. Current technological, communication, managerial, and entrepreneurial skills required by the students are to be imparted by the schools, but the present narrow focus on academic and psychomotor skills is affecting the curriculum. This shallow and straight jacket curriculum which separates knowledge into discrete portions has negative implications on effective teaching and skill development. This paper deals with how curriculum integration could facilitate effective teaching and skill development. Specifically it focuses on concept of vocational and technology education, curriculum integration, types of integration, principles of integration, key requirements for successful integration, benefits of integration, approaches to effective teaching and learning, implications of implementing an integrated curriculum and problems associated with curriculum integration.

Keywords: *Curriculum, Curriculum integration, Vocational & Technology Education, Teaching & Learning.*

Introduction

Vocational and technology education is an aspect of learning which leads to acquisition of practical and applied skill as well basic scientific knowledge. It is a form of education designed to prepare individuals for industry, agriculture and commerce, among others. This type of education is usually provided at senior secondary or lower tertiary and the university level. Vocational and technology education can also be seen as a planned program of course and learning that begins with the exploration of career options, supports basic academic and live skills and enables advancement of high academic standards, leadership, preparation for industry, chosen occupation, and advanced and continuing education.

As the global world develops rapidly, it is creating jobs that require a solid education and technical skills. Infact Quinn (2013) observed that as the needs of our global world are changing vocational educators must prepare students to meet these needs. This according to her is because new technologies and management skills require employees to have better communication skills, critical thinking skills and problem solving skills. Lamenting the incompetency of technology

education graduates, Wagner (2008) noted that there seems to be a skill gap in which many students are lacking, the skill to compete for the 21st century jobs. Governments all over the world are lurching ambitious reforms of basic education with strong emphasis in vocational and technology education. All these reforms are geared towards increasing the quality of training given to graduates of vocational and technology education program.

Despite these reforms and explosion in every sphere, VTE graduates still lack required skills and knowledge. Therefore many of such graduates cannot or do not want to pursue higher education and cannot compete in the evolving labour market and contribute to the economy. Graduates often have difficulty finding employment because their training has not given them the skills required by employers. At the same time, employers particularly industrialists complain that graduates from the vocational and technology education programmes in Nigeria do not possess the skills they need and are said to be luring foreign labour instead. .

The existing technical skill gap between the VTE graduates and industries has become a major concern to parents, business leaders and educators in Nigeria. Employers of labour have continued to express their concern and worry over the quality of current VTE graduates. According to Partnership for 21st century Skills, (2011) Technical Vocational Education and Training (TVET) students are actually short on or lack relevant skill required for employment in the public and private sectors. Idris and Rajuddi, (2012) observed that most industries and employers of labour in Nigeria complains, include inadequate skill requirement of VTE graduates for most cutting edge technology in addition to very poor theoretical background. The second international conference of VTE held in Korea 1999 set the mission for all nations under UNESCO to use VTE to address the employment or other socio-economic challenges of the 21th century. These challenges include globalization, trade liberalization, an ever-changing technological scenario, ICT revolution and the consequent rapid pace of social change (UNESCO 2000). The constant and pertinent questions that vocational academics have continually asked are: How relevant, appropriate, and current is the VTE curricula in all tiers of training institutions? Do they meet the needs of employers, industry and society in the age of convergence of information and communication technology? It is regrettable that most of the curricula are those that have been in use for the past fifteen years.

For example various production task which were manually performed before this time, have become mechanized, digital and in some cases automated. In the face of all these changes, review and updating of the present curricula is inevitable. Even though many vocational educationist and even general educationist have blamed the non performance of vocational and technology education graduate on several factors such as poor facilities, tools and equipment, acute shortage of trained teachers, poor administration, under funding among others, curriculum theorist talk about mis-match between the content of what is taught in schools and the demands of the industries. Several technology education expert, will normally and generally call for curriculum review without talking about the technicalities involved. Hence, the focus of this paper is to look at how to tackle these challenges through curriculum integration.

Concept of Curriculum

Curriculum can be described as the totality of all the learning experiences which learners are exposed to under the guidance of the school. Curriculum according to Atsumbe (2010) is a set of courses or content that is planned and taught in or outside the school for the purpose developing of the learner physically, morally, socially and intellectually. In the present dynamic society where change is inevitable, curriculum also encompasses all the planned and unplanned experiences which learners acquire at school or in a training center or any training environment. Curriculum gives a definite focus to the educational process and encourages co-operative endeavor in the school system. Curriculum also emphasizes that school life is a continuation of the life in the society it serves, what the school designs and teaches does not end within the school programmes. The common types of curriculum among others includes subject centered curriculum, activity/experience-centered curriculum, child-centered curriculum, hidden curriculum and core-curriculum.

Educators are constantly searching for new ways to help students, make sense out of the multitude of life's experiences and the bits and pieces of knowledge they gain from traditionally departmentalized curriculum. Students today continue to move from one discipline to the next forcing the information to be disconnected to anything that resembles real life situation. To lighten some of the fragmentation among our students and teachers experience, holistic and integrated curriculum are being proposed and adopted by many educational institutions. A major

driving force behind integrated teaching and learning is the belief that when themes, subjects or projects are combined students begin to see meaningful connections between the subject matter. Materials then serve as a vehicle for learning rather than simple pieces of information. In addition to this, repetition of material from one subject to the next is essentially eliminated.

What then is Curriculum Integration?

Curriculum integration can be described as an approach to teaching and learning that is based on both philosophy and practice. It can generally be defined as curriculum approach that purposely draws together knowledge, skill, attitude and value from within or across subject areas to develop a more powerful understanding of key ideas. Curriculum integration occurs when components of the curriculum are connected and related in meaningful ways by both the student and the teacher. An integrated curriculum is all about making connections, whether to real life or across disciplines, about skills or about knowledge (Drake & Burns, 2004). An integrated curriculum fuses subject areas, experiences and real life knowledge are fused together to make a more fulfilling and tangible learning environment for students. Integrated curriculum according to Vars, (1991) seems to be the best vehicle for empowering VTE students and teachers. In situation where students move from one subject area to the next, information is disconnected and the ability to make material relevant to the life of the student is lost.

Supporters of an integrated curriculum believe that interdisciplinary education offers heightened for mastery of the content and real-world applications, which inevitably increases the opportunity for deeper level of learning. According to Olaitan and Ali (1997), curriculum integration refers to the horizontal relationship between experiences. These relationships should be such that it can help students to have a unified view of the element being dealt with. For instance, in learning to solve problem in metalwork, it is also essential to consider ways in which these skills can be employed in other fields such as woodwork, automobile technology and electrical electronics. This will give learners a great perception of what they are learning and present them with an integrative image of various situation of daily life. Integration takes place when teachers present learning experiences in such a way that they enable the learners to develop more consistent pattern of thinking in various subject matter Atsumbe (2010) further stressed that the major trust of our current educational system stipulates functionalism. And functionalism in education can best be achieved through the effective adoption of integrated curriculum in to

the educational system. Curriculum integration enhances a unified perception of knowledge. Curriculum integration actually implies summation of wholeness.

To integrate curriculum is to sum up all learning experiences and engender functional interplay among various subject towards a unitary perspective. This implies the synthesis of different aspect of knowledge into a quasi-transformed whole. In effect, it brings into conscious reality the interrelatedness of different part of knowledge and this shows how some concepts compliment and reinforce each other. In Vocational and Technology Education, curriculum integration reflects the philosophy that education must forge connections between knowledge development and its application in the workplace. In its most basic form, curriculum integration involves the infusion of academic content into vocational programs, often referred to as "enhanced academics." Most Vocational and Technology Education schools in Nigeria adopt departmentalized curriculum integration system. Here students are exposed to learning experiences in all the trade areas of VTE at the early stage of the programme and later restricted or narrowed to their departmental content. In this system, the students graduate to earn certificate in a single area of trade or specialization such as automobile, building, electrical, metal and woodwork technology among others.

Technological advanced countries like South korea, USSR, China and Japan however practice full curriculum integration from the beginning of the VTE programme to the end. The students are exposed to learning experiences in at least two trade areas of specialization. In this practice the VTE students end up graduating to be expert in at least two trade areas. Here students graduate with fused VTE degrees such as: Electro-mechanical technology, building/wood work technology, automobile /metal work technology, welding and machining technology among others. Vars, (1991) also revealed that in VTE schools in Ukraine there is also a case of VTE students obtaining degrees in Industrial technology (electrical, mechanical and building/civil combined). In line with this, according to Pisapia and Riggins 1997; and Stasz 1997, the new vocationalism calls for "enhanced relevance," which is achieved when students engage in learning experiences that are situated in real-life contexts and that afford in-depth understanding and the development of higher-order thinking skills achievable through curriculum integration.

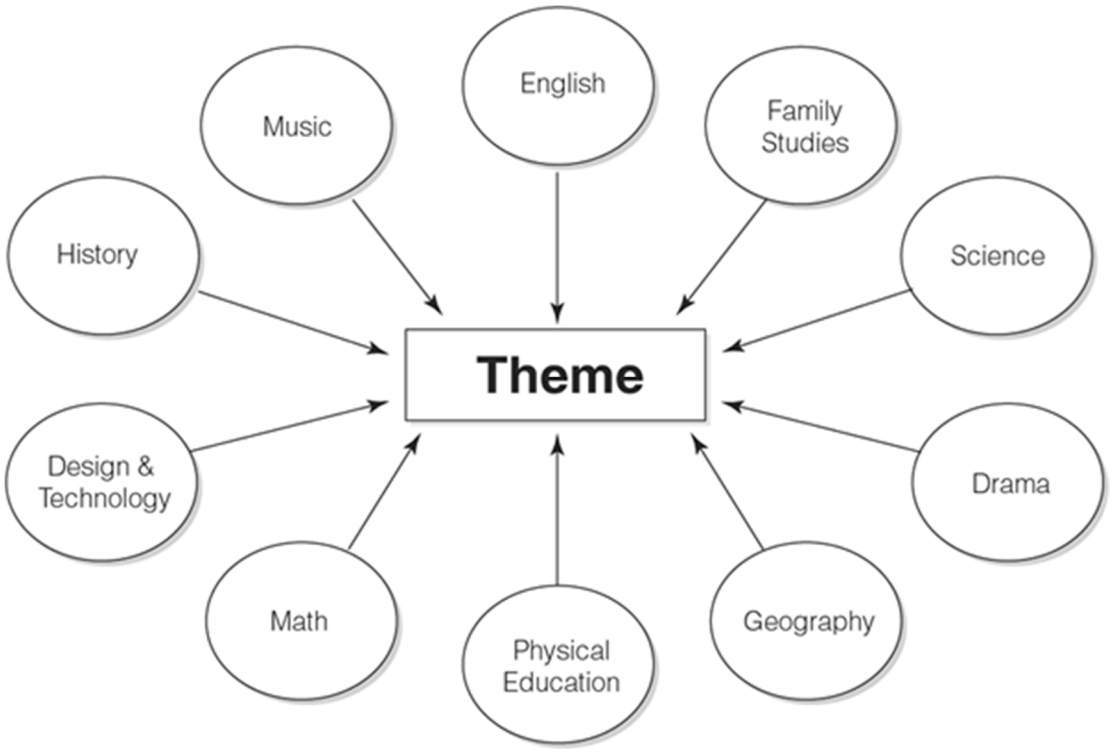
Curriculum Integration Approaches

The integrated curriculum model is an organizational structure and approach that weaves together content disciplines through a substantial theme or complex topic. By immersing learners in an integrated thematic unit, we provide learning experiences across numerous disciplines that encourages students to transfer and retain knowledge conceptually understand topics. For the purpose of this study, we shall discuss the following curriculum approach.

- **Multidisciplinary Integration**.

Multidisciplinary approaches focus primarily on the disciplines. Teachers who use this approach organize from disciplines around a theme. Figure 1 shows relationships of different subject to each other and to a common theme. English, mathematics, science, social studies and career technical teachers all collaborate to plan and present lessons that center around a central, career themed issue or problem.

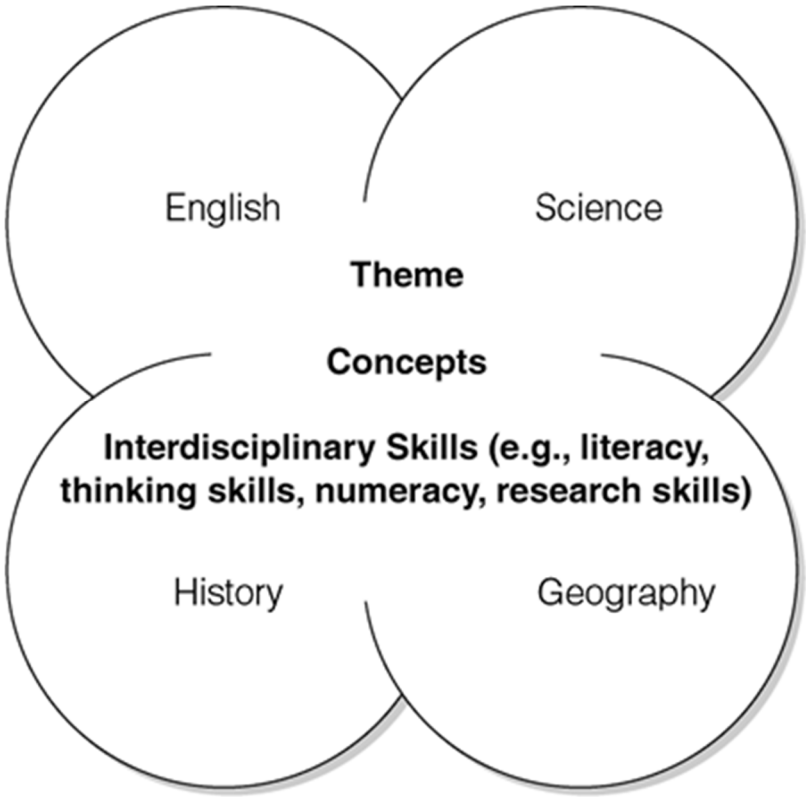
Figure 1: Multidisciplinary approach diagram



- **Interdisciplinary Approach.**

In this approach to integration, teachers organize the curriculum across disciplines. They chunk together the common learning embedded in the disciplines to emphasize interdisciplinary skills and concepts. These disciplines are identifiable, but they assume less importance than the multidisciplinary approach. Figure 2 showed the diagram for interdisciplinary approach.

Figure 2: The interdisciplinary approach diagram



While multidisciplinary implies looking at a common topic or theme in different disciplines; interdisciplinary means exploration of ideas, skills, processes common to different disciplines. Through an interdisciplinary approach, students can make connections, between disciplines and see the correlations, which improves overall learning. As a result, students receive a more relevant timely, less fragment and enriching learning experience. With interdisciplinary integrated curriculum, true learning occurs; there are no distinct boundaries between areas of

study. As much as a student is learning a subject, they are also learning how to learn. Teachers should always encourage learning across the curriculum. The result will always be comprehensive, well-rounded education, where critical thinking, inventive ideas and enthusiasm for learning naturally occur.

An interdisciplinary approach (also called horizontal integration) connects the independent knowledge and skills from more than one subject area to examine a central theme, issues, problem, topic or experience. It is a holistic approach that stresses linkages.

Intradisciplinary Approach

Intradisciplinary approach involves an arrangement of knowledge and skills within one subject area. This approach respects the subject's ways of knowing distinct conceptual structures and methods of inquiry. It aims at integrating the subject knowledge and skills into a coherent whole. Another part of this approach is vertical integration where knowledge and skills within one subject area are connected from grade to grade. Teachers need to be aware of the scope and sequence of their subject areas, from first year through fifth year in the degree programme.

When teachers integrate the sub disciplines with a subject area, they are using an intradisciplinary approach. For example, integrating every sub disciplines from technology to form introductory technology or integrated science integrates perspective of sub disciplines such as Biology, Chemistry, Physics and earth space science. Through this integration, teacher expect student to understand the connections between the different sub disciplines and their relationship to the real world.

- **Transdisciplinary approach.**

Transdisciplinary approach places the characteristics, need, interests and personal learning processes of students at the forefront of the learning experience. Students engage in independent projects which aim at developing initiative, imagination and creativity. Research skills, Analysis and Synthesis skills, and Autonomy are also developed. As students work on projects, they acquire knowledge and skills that are based on the subject areas. However, the subject areas are subordinates to the project goal. In the transdisciplinary approach to integration, teachers organize the curriculum around students'

questions and concerns. Students develop life skills as they apply intradisciplinary and disciplinary skills in the real-life context. Two routes heads to intradisciplinary integration; project-base and negotiating the curriculum. Figure 3, 4, 5, and 6 below showed diagrammatic representation of transdisciliplinary approach, vertical relationship of experiences, horizontal relationship of experiences as well as vertical and horizontal relationship of experiences respectively.

Figure 3 Transdisciplinary Approach diagram

Figure 4: Vertical Relationship of Experiences

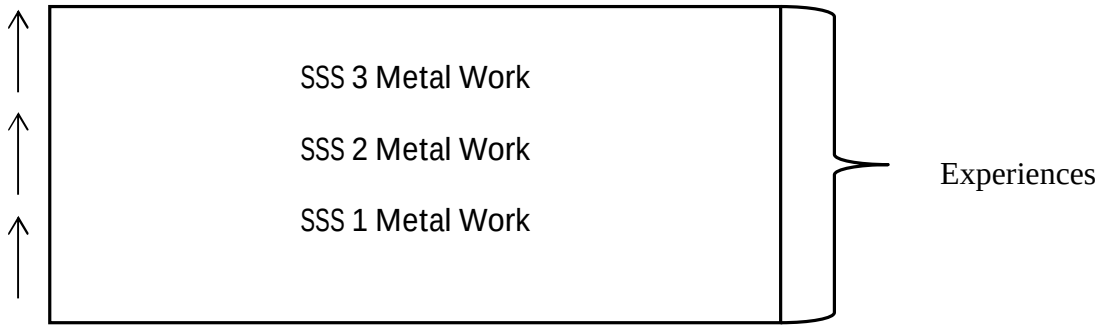
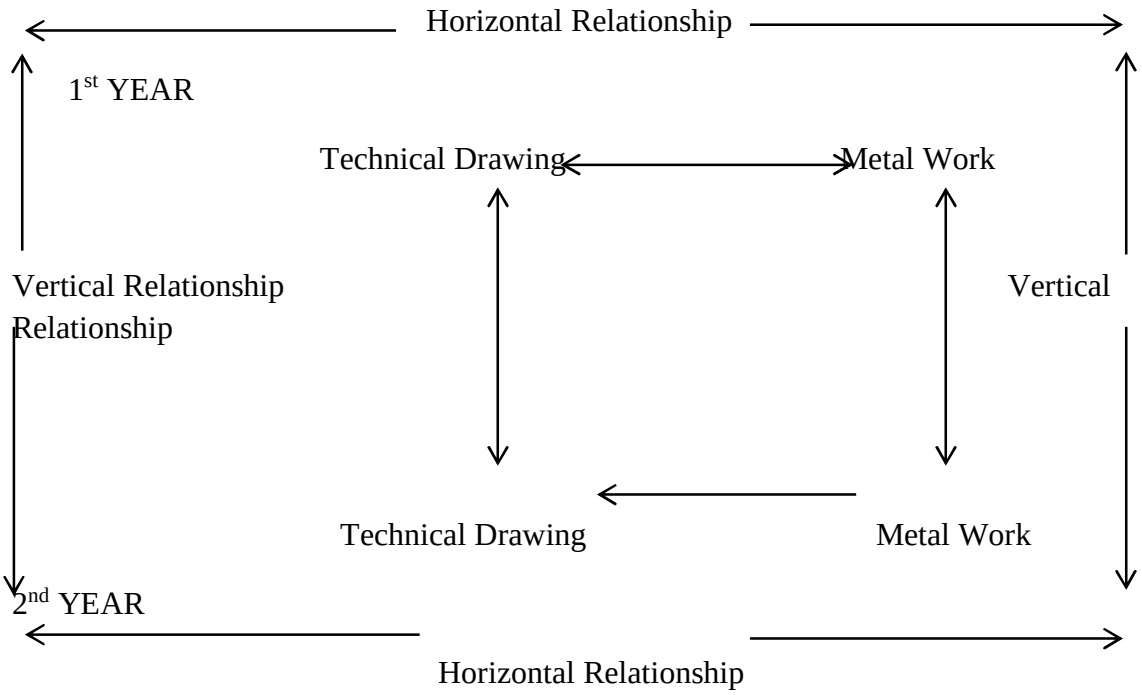


Figure 5: Horizontal Relationship of Experiences

SSS III Wood Work	SSS III Metal Work
SSS III Wood Work	SSS III Building Technology
SSS III Home Economics	SSS III Food and Nutrition

Figure 6: Vertical and Horizontal Relationship of Experiences



Key Requirements of Curriculum Integration

Curriculum integration is more than a clustering of related learning outcomes. The selection of learning experiences should be based on the extent to which they promote progress or broaden and confirm understanding. There is no one best way to integrate the curriculum; however, the

key requirements to be met for successful integration includes : content integrity, authenticity, criterion of validity, significance, interest and learnability.

Benefits of Curriculum Integration

The benefits of integrated curriculum include not only looking at the concepts for an in depth understanding, but of also providing a meaningful learning experience for students through using real life examples. By uniting knowledge, teachers can help students to make connections among disciplines through solving real life problems together. By making education not only relevant but also engaging, it keeps students interested in the learning process.

According to Drake and Burns, (2004) an integrated curriculum is all about making connections, whether to real life or across the disciplines, about skills or about knowledge. An integrated curriculum fuses subject areas, experiences, and real life knowledge together to make a more fulfilling and tangible environment for students. Therefore the interaction of what is taught and what they already know, play a large role in understanding concepts and retention of learning. Perkins,(1996), Omrod,(1999) and Guthrie,(2000) specifically outlined the following as specific benefits of integrated curriculum.

1. In an integrative curriculum with an interdisciplinary approach, students are often given a choice, making the subject inherently more meaningful. This in turn, increases the learners' intrinsic motivation and self-efficacy.
2. Student's motivation and achievements are significantly enhanced by measures that counter fragmentation and attempt to make learning a more connect experience.
3. In an interdisciplinary classroom, students work together in collaborative manner to solve problems, construct knowledge, and make connections between existing curriculums. This in turn brings about cooperative learning. In addition, model effective learning and problem solving strategies for one another.
4. Inter disciplinary approach to learning brings about higher level of comprehension, recognition of inadequacies or misconceptions when students help one another learn, they create scaffolding for one another's' effect and they may collectively construct more sophisticated ideas and strategies than any single group member might be able to construct.

5. Cooperative learning is a valuable instructional method. Our experience, culture and society have shaped our minds, and this cannot be disconnected from learning environment. The cross-circular instruction of integrated curriculum encourages students to continue to make these relevant connections.

   Integrated curriculum allows for

- **Allowing for flexibility:** through curriculum integration, teachers can plan for the development of key skills and understanding that transcend individual strands and subjects.
- **Building on prior knowledge and experience:** choosing meaningful connections among subject areas helps students build on their diverse prior knowledge and experiences, supports their holistic view of the world and ensures more learning that is meaningful.
- **Unifying the students learning:** Curriculum integration enables students to develop a unified view of the curriculum to broaden the context of their learning beyond single subject areas.
- **Reflecting the real world:** When curriculum is organized in a holistic way it better reflects the real world and the way children learn at home and in the community.
- **Matching the way students think:** Brain research supports the theory that younger students take in many things and process and organize them at one time. Teaching ideas holistically, rather than in fragmented pieces better reflects how young students brain process information.

Major Possible Implementation Pitfalls

A major barrier to developing an integrated school-to-work curriculum is territorial conflict between vocational and academic teachers (Bridges,1993). In many schools, vocational and academic educations exist in two separate worlds. Vocational and academic teachers are "separated physically, socially, organizationally, and educationally," and may be reluctant to collaborate. Some vocational teachers wish to maintain the integrity of the vocational curriculum; they may assert the importance of one-sided vocational skills and may be reluctant to add other vocations and academic content. Similarly, academic teachers may resent the integration of vocational issues. Administrators should emphasize the importance of all teachers

working together and sharing information within departments, disciplines, and schools to keep open lines of communication and pave the way for integration. Schrenko (2010) note that territorial conflicts often are resolved when teachers see the benefits of an integrated school-to-work curriculum.

Compared to urban communities, rural communities may have fewer financial supports to develop and sustain integrated vocational and academic programs. Rural communities also may have less business and industry available for making curriculum-design suggestions. Okon (2011) suggests the use of educational cooperatives to develop consolidated programs between school districts. He also notes that rural businesses and industry, though fewer in number and variety than their urban counterparts, may have more incentive to become involved in curriculum reform because "vocational education has been shown to play a pivotal role in arresting economic decline in some rural areas." If not developed with an understanding of the goals for authenticity and increased learning, an integrated curriculum can result in decreased expectations for students.

Implication of Curriculum Integration for Teaching and Learning

No matter which curriculum integration approach or model is selected for use, several common implications tend to emerge:

1. Integrating curriculum requires teacher flexibility and negotiation of content and method. Teachers must shift their belief system from one that is primarily didactic in nature to one that has foundation in constructivism. Rather than asking students to follow the steps of procedure, memorize facts, or verify given principles or laws, students work together to discover knowledge, applying their knowledge as they solve real world problems. At one level this means working with one's peers to improve education. At another level, teachers work with their students in solving problems that have multiple answers.
2. To be able to implement curriculum integration in the classroom, teachers and other school personnel require continuing education and skill development. An extensive amount of professional development is needed for teachers, this includes a significant intervention of two or three weeks of knowledge development in curriculum areas other

than the one they are certified to teach. In addition, this professional development must include extensive practice in the use of constructivist-oriented pedagogy.

3. To effectively practice curriculum integration, teachers need to manage experiential-oriented instruction. This includes inventorying and storing materials. The safe operation of instrumentation, machines, and equipment; and leading students towards efficient progress.
4. In implementing an integrated curriculum, teachers must be conscious of the fact that positioning children as competent and capable entity fosters their ownership of their learning. It also influences the nature of their interactions with adults and peers. This is because a crucial aspect of children's learning is persistence and ownership gained from grappling with problems. Teachers need to recognize fertile moments for provocation and extension.
5. An integrated curriculum may not address a logical sequence within a discipline such as mathematics. Further research into the effect of this will be needed if teachers are to look at the role of sequence in curriculum selection decisions.
6. In using an integrated curriculum, teachers need to learn to use authentic assessment strategies, performance in examinations and rubrics to document student's progress. This is because when the curriculum is based on broad concepts linked in thematic units, students may acquire knowledge in very different ways, making the traditional sequence less meaningful. This is an area that has not been fully explored in the research on integrated curriculum.
7. Best practices for initial and ongoing in-service training need to be explored more fully. A related issue is the extent to which pre-service teachers are prepared to teach in settings that are committed to curriculum integration.
8. Administrators and school board need to be oriented so that the necessary resources and ongoing support can be provided to the teachers to successfully practice curriculum integration.
9. Public information strategies need to be implemented in order to inform the community and parents that a new paradigm of education is being used because the expectation is for education to be provided as it has always been and unless the public is informed of changes to be made, there is likely to be resistance.

10. A final word of caution is for the teacher who feels that this must be an all-or-nothing scenario. There may well be instances in which curriculum integration is not the most appropriate way to go. A careful examination of successfully integrated programs may suggest the extent to which integration can or should be implemented.

Conclusion

Going by this research work, one would acknowledge that full curriculum integration is necessary for effective empowerment of Nigeria Vocational and technology education students with the requisite multiple trade skills for securing employment and for self reliance in the 21st century world of work. Also at national and international platforms, it has been maintained that full curriculum integration in TVET provides the needed employable skills and attitude necessary for effective performance in the workplace. Further more students taught with integrated curriculum are more likely to develop high academic and technical proficiency. Above all, it is an undisputable fact that technologically advanced nations of the world that have become economically and socially balanced are nations that have fully incorporated curriculum integration in their TVET practices both in their technical and technological institutions at secondary and tertiary levels.

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