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Davison M. Mupinga
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If you have a record of publications, research experience, and an interest in gaining additional practice in the use of the Publication Manual of the American Psychological Association, please submit your vita to Dr. Davison M. Mupinga, Editor, International Journal of Vocational Education and Training, School of Teaching, Learning, and Curriculum Studies, College of Education, Health and Human Services, Kent State University, P.O. Box 5190, 316 White Hall, Kent, OH 44242-0001, USA, Email: dmupinga@kent.edu.

Message From the Editor

As the world is reduced to a global village or as Tom Friedman calls it, 'a flat world', the relevance of Technical and Vocational Education and Training (TVET) programs has taken center stage. Lately, there has been so much debate and discussion among TVET professionals, policymakers, employers, and parents on the provision of quality TVET programs meeting the demand of global economies. No doubt, this situation has put enormous pressure on TVET practitioners to come up with programs that can adequately prepare the future workforce. With much of what the future needs unknown, it has not been an easy task for vocational education. At least, there is evidence of some progress in the right direction. For instance, creation of completely new TVET programs now on offer, revisions to old and existing TVET programs, changes to the implementation of TVET programs, and increased involvement of employers in vocational education. There is a lot that is happening in TVET all over the world, and it is through publications such as this journal that all stakeholders can learn from one another. Thanks to researchers and practitioners all over the world who continue to share their work and experiences through a number of avenues such as journals, newsletters, blogs, and conference presentations. These publications help us stay current on global practices, technological trends, manufacturing practices, and above all, best practices to implement vocational education.

Researchers on TVET are focusing their attention and efforts on a number of issues, namely, instructional methods, the role of technology in enhancing teaching and learning, global competencies, disadvantaged students and students with disabilities, literacy, and quality frameworks, just to name a few. Articles in this journal, attempt to provide insights into some of the above issues. There is also an article from a practitioner perspective on literacy. Literacy is considered a big challenge for TVET. Based on experiences in other parts of the world, the author shares some suggestions on tackling the problem.

The first article examines the impact of quality assurance on TVET while the second article looks at how intentionally taught interactive and interpersonal 21st Century skills have transformed their lives. With so much emphasis these days on global competencies, this study provides some useful and current information on training TVET students for the global workplace. The third article touches on the impact of visualization on student outcomes. The fourth article

outlines some accommodations and modifications in TVET for students with disabilities. Since there has been an increase in the number of students with disabilities in TVET, any help to TVET practitioners is appreciated. The fifth article analyzes quality assurance activities in Botswana; the analyzed system is presented as a model for others to learn from.

Once again, readers are reminded that articles published in *IJVET* come from all over the world and as such some authors do not speak English as their first language. While great care has been taken to correct the verbiage, there may be some errors that went unnoticed. Like other past *IJVET* issues, the journal continues to touch on timely and relevant TVET issues. My sincere thanks to all the reviewers, authors, and the editorial staff who worked tirelessly to produce this *IJVET* issue. Please note that the articles in this journal do not reflect the position of the journal's editorial staff, reviewers, or policy of IVETA.

Davison M. Mupinga
IJVET Editor

Quality Assurance and Technical Vocational Education and Training in Nigeria: An Impact Assessment Survey

Innocent A. Akhuemonkhan and Lukman Raimi
Yaba College of Technology, Lagos, Nigeria

Abstract

Quality Assurance (QA) and Technical Vocational Education and Training (TVET) are widely discussed educational concepts. Ineffective QA stands as an inhibiting factor to the success of TVET. This quantitative research examines the impact of QA on TVET in Nigeria. The sample locations were majorly Yaba College of Technology, Federal College of Education (Technical), Lagos State Polytechnic and Federal Science & Technical College, from which a sample of 150 respondents was selected by purposive sampling technique. The data were analysed and presented using descriptive and inferential statistics. The survey found that the impact of TVET has not been impressive due to poor QA at all levels. The paper concludes recommending focus on critical areas like finance, access, quality assurance and relevance of TVET.

Keywords: *Nigeria, Technical Vocational Education and Training, Quality Assurance, Educational Objectives*

Introduction

Formal education from different perspectives is an instrument for attaining economic growth and technological progress (Onyesom & Ashibogwu, 2013); a medium for transmitting social norms and values to learners in a formal school system (Filloux, 1993); and a human investment for fast-tracking economic growth, technological progress and boosting citizens' capacities (World Bank; 2008). Drawing from the experience of the industrialised nations, Nigeria established TVET-oriented institutions to launch the country steadily on the path of technological progress and national development (Besmart-Digbori, 2011). TVET is designed to empower learners with technical skills, human abilities, cognitive understanding, attitudes and work habits in readiness for the world of work and/or self-employment (National Policy on Education,

2004; Oni, 2007; Winer, 2000). However, Badawi (2013) noted that TVET integrates basic education with acquisition of practical skills. Considering the importance of TVET to national development, Nigeria articulated its commitment to TVET in the National Policy on Education (NPE) because of the need for poverty eradication, job creation, sustainable development and actualisation of the Transformation Agenda (Oweh, 2013; Ladipo, Akhuemonkhan & Raimi, 2013).

Pursuance of TVET's objective, the Ministry through the National Board for Technical Education (NBTE) approved the establishment of 99 Vocational Enterprise Institutes (VEIs) and Innovation Enterprise Institutions (IEIs) to complement the conventional TVET institutions in Nigeria (NBTE, 2011). Despite the efforts of government on TVET, the pace of technological progress, employment and industrialisation is still slow, hence the rising rates of unemployment and poverty (Ladipo et al., 2013).

From expert viewpoints, the laudable goals of TVE can only be realised with a sound quality assurance (QA). QA represents a critical examination of educational objectives, attitudes, procedures and institutional control systems with a view to ensuring that set standards are maintained (Fadokun, 2005). The essence of QA in education is to enhance the effectiveness of learning and teaching (Onyesom & Ashibogwu, 2013). With specific application to TVET, a quality assurance (QA) provides policy-makers with deeper understanding of vocational education, its functions, set goals and key characteristics (ETF, 2012). From another viewpoint, it refers to procedures, processes and standard systems that support and ensure effective delivery of educational services (Kontio, 2012), as well as a tool for determining, assessing and evaluating the effectiveness of educational policies and strategies (Asian Development Bank, 1996).

To ensure that standards are maintained, QA mechanisms that suite institution's socio-economic and educational aspirations of often developed. For instance, the United States employed the accreditation systems as QA mechanism at all levels for assessment of educational services. Whereas, Australia created a full-fledged QA unit called Australian Universities Quality Agency (AUQA) for quality control of its educational services (Mohsin and Kamal, 2012). In Nigeria there are supervisory agencies which maintain oversight functions over the universities; the polytechnics; and the Colleges of Education. These agencies developed the Minimum Academic Standards (MAS) as benchmark for QA (Onyesom & Ashibogwu, 2013). The MAS covers among others: teaching quality/effectiveness, floor space for lectures, minimum laboratory facilities per students, minimum library space, minimum staff/student ratio, minimum teaching facilities/equipment and office accommodation (Uvah, 2005). From the foregoing discourse, the purpose of Accreditation Exercise globally is to ensure that standard and quality of higher education are strictly regulated and

maintained in line with changing needs of the society and the industry (Mohsin & Kamal, 2012; Onyesom & Ashibogwu, 2013).

Measuring functionality of TVET: Quality Assurance Indicators

To avoid measuring TVET performance haphazardly, educationists developed quality assurance indicators as metric for assessing educational effectiveness, efficiency and performance (Chalmers, 2008). UNESCO (2002) identified five key components of quality assurance indicators as: (a) What learners gain; (b) Quality Learning Environments; (c) Quality Content; (d) Processes that support Quality; and (e) Outcomes from the learning environment. Other QA indicators include: (i) learners' behavioural characteristics, attributes and demographic factors, (ii) teacher's professional competencies/pedagogic skills, (iii) teaching processes, curriculum and learning environment, (iv) outcomes of education (Cheung 2001; Ehindero, 2004). Furthermore, QA could be carried out using six quality indicators, viz: learning resource inputs, instructional process, teachers' capacities development, effective management, monitoring and evaluation, and quality learning outcome (Ayeni, 2012). By-and large, the thrust of QA is general improvement of all aspect of educational services (Cheung, 2001).

Theoretical Framework

Most research works in the field of education adopt HCT of Schultz (1975) as their theoretical foundation. This paper contributes to the literature on TVET adding the Critical Conflict Theory (CCT). HCT presumes that education or training stimulates economic growth, technological progress and productivity by transferring useful knowledge and skills to learners (Becker, 1964; Ladipo et al., 2013; Robert, 1991; Schultz, 1975). From another viewpoint, Klein and Cook (2006) states that investment in people is a form of human capital, which propels socio-economic change. The economic growth attainment of East Asian nations like Hong Kong, Korea, Singapore, Shanghai and Taiwan is linked to quality of their workforce (Ladipo et al., 2013; Xiao, 2001). In line with the presumptions on HCT, three (3) hypotheses are formulated for empirical testing.

a) H_0: There is no significant relationship between Technical Vocational Education and Training (TVET) and technological progress for national development.
b) H_0: There is no significant relationship between Technical Vocational Education and Training (TVET) and skills acquisition for self-employment.
c) H_0: There is no significant relationship between Technical Vocational Education and Training (TVET) and preparation of students for the world of work.

Critical Conflict Theory (CCT) on the other hand provides explanation for poor quality of TVET and its inability to stimulate economic growth, employment and national development. It strengthens the functionalist's perspective and identifies the sources of conflict in education. The need for using two contrasting theories is premised on the statement of Ball (1994) that:

> "…no one interpretational mode or set of theoretical tools or interpretational stance is adequate or exhaustive of the analytical possibilities of policy analysis. The same data can be subjected to very different types and levels of interpretation"(p.109).

According to the functionalist viewpoints, education is a socialisation mechanism which facilitates learning of skills, norms and positive attitudes for the good of the society thereby reducing social inequalities (Kendall, 2010). The CCT underscores the fact rather than education performing the noble functions enunciated by the functionalists, it used by the privileged segment of the society to engender social inequalities (Kendall, 2010; Liasidou, 2009). The conflict of social inequalities engendered by education is historical and persists in every society (Durant & Durant, 1968). In the contemporary times, every society is still stratified between "a small group of rich men and a great mass of poor engaged in a constant class struggle" (Walsh, 2012 p.94).

CCT also argues that educational institutions have failed to actualise the set objectives because political elites starved education of funds. The disbursement of funds is a critical component for perpetuation of social inequalities. Despite increasing awareness on the importance of TVET, funding has been a big issue (King, 2011). To resolve the problem, the education sector must be restructured, funded and fortified with a view to creating equal opportunities for all irrespective of social status (Kendall, 2010). Besides, the theory identfied hidden curriculum phenomenon as another source of conflict in education. The hidden curriculum is a set of implicit messages, cultural values, norms and attitudes transmitted to learners through the mechanism of education (Giroux, 1983; Kendall, 2010; Skelton, 1997).

The implications of too much emphasis on hidden curriculum on educational outcomes are far-reaching. Bowles and Gintin (1976) remarked that the hidden curriculum leads to nurturing of passive, obedient learners and conformists. Consequently, the education sector turns out stereotyped professionals in excess of the demand of the industry, a situation that keeps wages abysmally low. In the same line of thought, Hargreaves (1978) argued that hidden curriculum stifles creativity and innovation because it rewards the conformists (students without independent thought) and reprimands creative students (students who think outside the box). Therefore, hidden curriculum

produces unimaginative work force that would be exploited and manipulated by the employers of labour in the industry. To ensure proper balance between the basic and hidden curriculum, there is need for QA. Based on the following the fourth research hypothesis could be stated as follows:

a) H_0: There is no significant relationship between Technical Vocational Education and Training (TVET) and Quality Assurance in institutions.

Environmental Factors Affecting the Quality of TVET

Nigeria's low quality TVET is linked to a number of environmental factors. Onyesom and Ashibogwu (2013) identified ineffective implementation of TVET curriculum as a key factor. They noted that the outcome of Monitoring of Learning Achievement (MLA) in Nigeria revealed that "there is a wide gap between the intended curriculum (theory) and the achieved curriculum (practice)." The constraint of translating educational curriculum into reality in the domains of colleges, polytechnics and universities had been a recurring implementation issue in Nigeria for a very long time (Gabadeen & Raimi, 2012; Garba, 2004; Okebukola, 2004).

The second factor that inhibits the quality of TVET in Nigeria is negative perception by the end-users especially parents, wards, students and policymakers; a phenomenon linked to poor understanding and low awareness (Eze & Okorafor, 2012). Amodu (2011) noted that even the policy makers in the Education sector are not insulated from the negative mind-set about TVET. The problem of negative attitude towards TVET featured in a survey carried out in Pakistan, where 57% of the respondents preferred Science Education, 35% favoured Technical Education, while 8% voted in favour of Humanities/Arts. TVET was rated low by these respondents because of the impression that TVET attracts lower financial benefits in the society (Reliance Services, 2012). The third inhibiting factor against quality TVET is the inability of the programme to meet the need of the industry. The Nigerian educational system at present cannot meet the needs of the industry and the society (Omede, 2012). Nigerians import most of their personal and industrial needs from abroad.

Furthermore, TVET experienced fall in quality due to poor funding from government and other stakeholders in Nigeria. King (2011) reported that in several countries of the world, funding of TVET has been very low; the case is worse in developing nations despite increasing awareness about the importance of TVET. Empirical finding on funding for TVET from Pakistan indicated that 75% of the respondents were of the opinion that TVET is grossly underfunded, 20% replied that TVET is well funded and 5% of the respondents maintained a neutral viewpoint. The result above is a common feature

in developing nations. In Nigeria, TVET is challenged by paucity of funding from government and donor agencies (Ladipo e al., 2013). Whereas, huge budgetary allocation is appropriated to security, defence and administration by the government to the detriment of education sector (Adebakin & Raimi, 2012). It was this realisation that informed the deliberate inclusion of funding as a key quality assurance indicator in several working papers (ETF, 2012; UNESCO, 2002; Reliance Services, 2012).

The fifth factor affecting quality of TVET is its inability to stimulate employability contrary to the widely held notion that TVET empowers the citizens to be creative, innovative and productive thereby improving their employability (Ladipo et al., 2013; Reliance Services, 2012).

The last environmental factor affecting TVET is absence of enabling environment and infrastructural facilities to strengthen skills acquisition programmes (King, 2011; Lockheed, Jamison & Lau, 1980). Absence of an enabling environment is worsened by condition of the economy, weak internal capacity of institutions, poor organisational governance, poor institutional research engagements, the phenomenon of brain drain leading to paucity of experts, unhealthy industrial actions, political tampering with policies, unsuitable policy environment and inconsistent educational policy (Oladipo, Adeosun & Oni, 2007).

Methods

This research adopts the quantitative research method. The sample locations were Yaba College of Technology, Federal College of Education (Technical), Lagos State Polytechnic, Federal Science & Technical College and few other TVET schools, from which a sample size of 150 members of staff and students was selected using purposive sampling technique. The responses were analysed, and the findings presented using descriptive and inferential statistics.

4.1. Data Analysis/Discussion

From a total of 150 questionnaires administered in selected TVE institutions, a total of 143 (95.3%) questionnaires were returned after a period of two weeks. The reliability test was conducted on the 54 items in the questionnaire instrument. The Cronbach Alpha indicated a magnitude of 0.892; an indication of reliability of instrument. The findings and results of hypotheses are presented and discussed in Tables (1-9).

Table 1 clearly reflects balanced representation of genders, age groups, TVET stakeholders, TVET institutions as well as different education statuses of respondents.

Table 1: Personal Data of respondents

Variable		Frequency	Percentage (%)
Sex			
	Male	83	58%
	Female	60	42%
	Total	143	100%
Age of respondent			
	15-24 years	43	30.1%
	25-34 years	40	28.0%
	35-44 years	37	25.9%
	45-54 years	19	13.3%
	55 years and above	4	2.8%
	Total	143	100%
Marital status of respondent			
	Single	68	47.6%
	Married	74	51.7%
	Widow	1	.7%
	Total	143	100%
Educational qualification of respondent			
	GCE O/Level	12	8.4%
	ND/NCE	15	10.5%
	HND	17	11.9%
	Bachelor	36	25.2%
	Master and Doctoral degree	26	18.2%
	Others	37	25.9%
	Total	143	100%
TVET institutions of Respondents			
	Yaba College of Technology	37	25.9%
	Federal Science & Technical College	30	21.0%
	Federal College of Technology (Technical)	39	27.3%
	Lagos State Polytechnic	16	11.2%
	Others	21	14.7%
	Total	143	100%

Table 2 indicates a varied perception of TVET among the stakeholders in Nigeria. Majority of Nigerians are of the opinion that TVET is an inferior education option designed for students who are weak in conventional education. The survey established that TVET has the potential of enhancing skills acquisition; promote self-employment, technological progress as well as preparing students for the industry.

Table 2: Perception of TVET by the Nigerian Public

SN	Strongly Agree (SA), Agree (A), Neither Agree nor Disagree (N) Disagree (D) and Strongly Disagree (SD)	SA	A	N	D	SD
1.	TVET is believed was designed for students who cannot effectively cope with the rigour of conventional education system.	16.8%	36.4%	11.2%	14.7%	21.0%
2.	Prevalent belief is that brilliant students should not take-up TVET programmes.	14.7%	28.7%	16.1%	21.7%	18.9%
3.	TVET is perceived as an inferior education designed for students from poor families.	12.6%	28.%	11.9%	23.1%	24.5%
4.	The essence of TVET as contained in the national policy on education is to enhance skills acquisition and promote self-employment.	50.3%	38.5%	7.7%	3.5%	0%
5.	TVET unlike the conventional education has the prospect of stimulating technological progress for national development.	46.9%	34.2%	13.3%	3.5%	2.1%
6.	TVET if well-positioned could become a mechanism for curbing unemployment of graduates in the Nigerian competitive industry.	58.7%	28%	7.0%	4.9%	1.4%
7.	Formal or informal TVET is helpful in preparing students adequately for the world of work and better performance in the industry.	41.3%	44.8%	12.6%	1.4%	0%

Table 3 indicated that majority of the respondents agreed that quality assurance is carried-out in their respective TVET institutions despite a number of socio-economic challenges. The core finding is that the role of QA is appreciated, but there are some areas that require improvement to make QA more impactful.

Table 3: Quality Assurance Exercise in TVET Institutions

SN	Strongly Agree (SA), Agree (A), Neither Agree nor Disagree (N) Disagree (D) and Strongly Disagree (SD)	SA	A	N	D	SD

1.	Your affiliated TVET institution undergoes routine and periodic quality assurance exercise.	16.8%	50.3%	20.3%	10.5%	2.1%
2.	Importance of Quality assurance in your affiliated institution necessitated the establishment of Quality Assurance Committee or Unit	21.7%	47.6%	17.5%	10.5%	2.8%
3.	The essence of TVET Quality Assurance in most institution is to strengthen the training outcomes and deliverables.	40.6%	45.5%	10.5%	1.4%	2.1%
4.	Quality assurance in your affiliated institution covers competencies of instructor and instructional resources.	18.9%	49.7%	20.3%	7.0%	4.2%
5.	Quality assurance in your affiliated institution explores funding of TVET by government.	16.8%	37.8%	32.2%	9.8%	3.5%
6.	Quality Assurance exercises are disliked by authorities and instructors in your affiliated institution because of socio-economic challenges.	7.7%	32.9%	32.9%	16.1%	10.5%
7.	Philosophies of Quality Assurance are sacrificed by personal interests and institutional corruption.	10.5%	39.2%	32.9%	11.9%	5.6%
8.	Outcomes of Quality Assurance are at times positive despite infrastructural deficiencies.	23.1%	46.2%	17.5%	9.8%	3.5%

Table 4 indicated that majority of the respondents rated the quality of TVET instructional facilities, instructors and contents of curriculum fairly adequate. The core finding is that TVET facilities in Nigeria need to be upgraded.

Table 4: Quality of TVET Facilities in Your Institution

	TVET Items	Adequate	Fairly Adequate	Inadequate
1.	Workshop Rooms built for TVET	25.2%	60.1%	14.7%
2	Books and reference materials on TVET available in the Library	20.3%	62.9%	16.8%
3.	Learning Environment for TVET	30.8%	57.3%	11.9%
4.	Machines, Equipment and Tools provided for TVET	27.3%	54.5%	18.2%

5.	Computer rooms set up for TVET	27.3%	44.8%	28.0%
6.	TV & Audiovisual used for TVET	16.1%	49.0%	35.0%
7.	TVET Instructors/Trainers	28.7%	50.3%	21.0%
8.	Contents of TVET curriculum to needs of the society	28.7%	54.5%	16.8%

Table 5 indicated that the rating of relevance of the TVET instructional facilities, instructors and curriculum was mixed. Overall, a little above 40% of the respondents felt the TVET facilities are relevant, the same number noted that TVET facilities are fairly relevant and the remaining 10% noted that TVET facilities are irrelevant. Like the core finding in Table 4 earlier, there is urgent need for the relevance of TVET facilities in Nigeria to be enhanced.

Table 5: Relevance of TVET Facilities in Your Institution

	TVET Items	Adequate	Fairly Adequate	Inadequate
1.	Workshop Rooms built for TVET	49.7%	43.3%	7.0%
2	Books and reference materials on TVET available in the Library	41.3%	53.1%	5.6%
3.	Learning Environment for TVET	50.3%	40.6%	9.1%
4.	Machines, Equipment and Tools provided for TVET	44.1%	47.6%	8.4%
5.	Computer rooms set up for TVET	42%	43.4%	14.7%
6.	TV & Audiovisual used for TVET	30.1%	44.8%	25.2%
7.	TVET Instructors/Trainers	39.9%	40.6%	19.6%
8.	Contents of TVET curriculum to needs of the society	42.0%	41.3%	16.8%

Table 6 shows that the level of funding for TVET in the areas of research, capacity-building, internal quality assurance, general administration and external intervention support is very low.

Table 6: Level of Funding for TVET in Your Institution

SN	Strongly Agree (SA), Agree (A), Neither Agree nor Disagree (N) Disagree (D) and Strongly Disagree (SD)	SA	A	N	D	SD
1.	TVET receives adequate funding from the governments and supervisory authorities.	13.3%	28.0%	23.1%	29.4%	6.3%

2.	TVET is treated as a special education hence there is massive funding for its programmes in most institutions.	9.1%	32.9%	20.3%	27.3%	10.5%
3.	TVET receives intervention funding from private sector organisations and external donor agencies.	10.5%	34.3%	30.8%	16.1%	8.4%
4.	Spending on capacity-building for TVET instructors is a priority of government and the supervisory authorities.	20.3%	36.3%	21.0%	17.5%	4.9%
5.	Funds are set aside for conducting Internal Quality Assurance in your affiliated TVET institution.	6.2%	41.3%	27.3%	19.6%	5.6%
6.	Research & Development on TVET has attracted funding in recent times.	10.4%	34.3%	26.6%	23.1%	5.6%

Table 7 indicates that a little above 50% of the respondents agreed that the level of access/participation by the people in TVET is representative of social classes, ethnic nationalities, geographical spread and religious affiliations. Also, the same percentage of respondents agreed that enrolment in TVET is comparable with enrolment in conventional education.

Table 7: TVET and the Level of Access/Participation

SN	Strongly Agree (SA), Agree (A), Neither Agree nor Disagree (N) Disagree (D) and Strongly Disagree (SD)	SA	A	N	D	SD
1.	Access/enrolment on TVET programmes by students is almost the same with enrolment in the conventional education.	11.2%	43.4%	11.2%	28.7%	5.6%
2.	Nigerian students across social classes (rich and poor) have fair access to TVET in your institution.	18.2%	46.9%	16.8%	14.0%	4.2%
3.	Nigerian students across ethnic nationalities have fair access to TVET in your institution.	20.3%	35.7%	21.7%	14.7%	7.7%
4.	Nigerian students across geographical zones have fair access to TVET in your institution.	21.0%	35.0%	19.6%	18.2%	6.3%

5.	TVET is made accessible to Nigerian students across religious affiliations in your institution.	15.4%	35.7%	23.8%	14.7%	10.5%

Table 8 shows that between 60%-80% of the respondent identified inadequate instructional resources, inadequacy of TVET experts/instructors, poor conditions of service for instructors, irregular capacity-building/training and endemic corruption as critical challenges affecting the quality of TVET in Nigeria.

Table 8: Challenges facing TVET

SN	Strongly Agree (SA), Agree (A), Neither Agree nor Disagree (N) Disagree (D) and Strongly Disagree (SD)	SA	A	N	D	SD
1.	Inadequate instructional resources affect the effectiveness of TVET programmes in your affiliated institution.	35.0%	49.7%	9.1%	2.1%	4.2%
2.	Poor conditions of service and motivation for instructors hinder effectiveness TVET in your institutions.	31.5%	51.0%	10.5%	2.8%	4.2%
3.	Irregular capacity-building and training for those handling TVET programmes affect training outcomes.	32.2%	50.3%	11.9%	1.4%	4.2%
4.	Inadequacy of experts and well trained TVET instructors affect students' performances in vocational education.	37.1%	43.4%	11.2%	4.2%	4.2%
5.	Poor funding of TVET instructional resources hinder technological progress in Nigeria.	41.3%	42.7%	8.4%	3.5%	4.2%
	Endemic corruption in the management of TVET programmes perpetuates unemployment and underdevelopment.	36.4%	37.1%	18.9%	2.8%	4.9%

From table 9 above, two null hypotheses were rejected, while the other two were accepted all at 5% level of significance, but with different degree of freedoms.

For the first hypothesis, since p-value = 0.032 < 0.05, we reject the null hypothesis and accept the alternative hypothesis that there is significant relationship between Technical Vocational Education and Training (TVET) and technological progress for national development. This finding aligns with the prevalent views that investment education stimulates technological progress and national development (Besmart-Digbori, 2011; World Bank; 2008).

In the second hypothesis, the p-value = 0.291 > 0.05, we therefore accept the null hypothesis that there is no significant relationship between Technical Vocational Education and Training (TVET) and skills acquisition for self-employment. This finding goes contrary to the widely held view in the literature that TVET empowers and prepares learners practically for self-employment and self-reliance after graduation (Okolocha, 2012; Oni, 2007; Winer, 2000).

However, since hypothesis 3 has a p-value = 0.420 > 0.05, we accept the null hypothesis that there is no significant relationship between Technical Vocational Education and Training (TVET) and preparation of students for the world of work. This third finding runs contrary with the popular views that TVET prepares students to meet the needs of the industry (Okolocha, 2012; Omede, 2012; Reliance Services, 2012).

The fourth hypothesis has p-value =0.000 < 0.05; we therefore reject the null hypothesis and accept the alternative hypothesis that there is significant relationship between Technical Vocational Education and Training (TVET) and Quality Assurance in institutions. This finding supports quality assurance for effective educational services and maintenance of Minimum Academic Standards (MAS) (Mohsin & Kamal, 2012; Onyesom & Ashibogwu, 2013).

Table 9: Results of the Hypotheses

SN	Hypothesis Statements	Df and Level of Sig.	Chi square and P-Values	Decision
1.	There is no significant relationship between Technical Vocational Education and Training (TVET) and technological progress for national development.	12(5%)	22.496 (0.032)	Reject
2.	There is no significant relationship between Technical Vocational Education and Training (TVET) and skills acquisition for self-employment.	9(5%)	10.782 (0.291)	Accept
3.	There is no significant relationship between Technical Vocational Education and Training (TVET) and preparation of students for the world of work.	9(5%)	9.189 (0.420)	Accept
4.	There is no significant relationship between Technical Vocational Education and Training (TVET) and Quality Assurance in institutions.	16(5%)	48.579 (0.000)	Reject

Conclusion and Recommendations

Flowing from the key findings above, the following recommendations are critical for developing an enduring QA that would impact positively on TVET in Nigeria.

a) For TVET to stimulate employability and national development there is need for proper sensitisation and education of the general public including the policymakers on the real essence of TVET. This measure would fast-track attitudinal change.
b) Federal Government and stakeholders should provide adequate funding for TVET institutions to meet national aspirations. At the governmental level, the Ministry should lobby the Tertiary Education Trust Fund (TETFUND) to earmark adequate funding for tertiary institutions running TVET programmes. In the same vein, the organised private sector should be sensitised to support TVET with their corporate social responsibility investment as done in developed nations.
c) Exchange programme between Industry and TVET institutions is inevitable for effective TVET outcomes that meet industry's needs. This is otherwise called Town-Gown relationship.
d) TVET institutions should invest massively in routine and periodic capacity-building training programmes for teachers/lecturers/instructors.
e) The Ministry of Education in collaboration with the supervisory agencies should embark on sensitisation campaign though the mass media to enrich public understanding and perception on the socio-economic benefits of TVET.
f) In order to ensure effective curriculum implementation, the supervisory agencies should ensure all TVET institutions implement uniform standards, training, evaluation and certification.
g) Federal Government of Nigeria should muster the political will to promote TVET as a springboard for the nation's technological and industrial development.

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Communication, Collaboration, and Credibility: Empowering Marginalized Youth with 21st Century Skills

Vera Jacobson-Lundeberg, USA

Abstract

This study examined students' perceptions of how intentionally taught 21st century skills have transformed their lives. Personal Development Education (PDE) encompasses interpersonal and interaction skills that are required for students to function and succeed in global-oriented 21st century colleges and careers. This qualitative study focused on students' perceptions of how PDE influenced their ability to communicate more effectively and work collaboratively with a range of peers and others. The main findings from the study are that communication is the gateway skill to the rest of the 21st century skills, and participants perceive code-switching (the ability to change language depending on the audience) as an added-value skill for effective communication; participants appreciate the art of collaboration, recognize the challenges and successes inherent in people-management and interpersonal relationships, and believe their credibility is increased as an outcome of learning effective communication techniques.

Keywords: *employability skills, personal development education, soft skills, 21st century skills, globalization.*

Introduction

Inequitable student outcomes and a growing population of under- or mis-educated adults are predictable as long as our PK-12 education retains its current structure. One way to mitigate patterns of mis-education is through personal development education (PDE), an essential dimension of 21st century education designed to prepare lower income and immigrant students to succeed in college and careers. This paper is a result of a study that examined the effects of personal developmental education on students' perceptions of growth with particular focus on and attention to potential benefits for socio-economically disadvantaged subgroups (SED). The study offers a more pragmatic approach to teaching and learning framework that embeds career education in the

school system, and it identifies factors that strengthen student career development (California Department of Education CDE, 2006). This study sought to document the role of Personal Development Education (PDE) through students' perceptions in strengthening 21st century behavioral skill development, and to report on whether such an education gives students multi-directional skills to navigate appropriately and successfully both in school and in their careers. 21st century skills, particularly collaboration and communication, could provide students with code-switching strategies less common in first-generation college attending families. Students could use these strategies to negotiate and navigate power relationships. The context of this study is a career and technical education program that specifically includes PDE as a framework within which educational transformation for first-generation college attending students can take place.

Providing PDE to students in lower socio-economic subgroups is a critical dimension of equitable education. According to Johnson (2008), "those born into economically advantaged families receive through rearing the instruments needed to appropriate the knowledge transmitted in schools and those lacking capital and the cultivation of the requisite cultural tools unfortunately depend on schools to cultivate these dispositions" (p. 231). Educators can disrupt past practices of educational and workplace exclusion by recognizing the role of cultural capital in allowing access to the middle class. "Proponents of neoclassical human capital perspectives hold that individuals who possess a higher level of achieved status receive better paying jobs because their achievements—signal—to employers that they are more able and therefore potentially more productive" (Sakura-Lemessy, Carter-Tellison, & Sakura-Lemessy, 2009, p. 408).

Statement of the Problem

This study focused on the role of Personal Development Education (PDE) for disenfranchised students' success in both college and careers. While 21st century skills or soft-skills are under-rated and under-valued in our education system, workforce development literature shows that they are necessary for students' success, both in college and careers, in a globalized, high-tech, knowledge-based world (Friedman, 2005; Schuman et al., 2005; Trilling 2009). The literature supports the case for PDE, yet mainstream schooling has historically ignored these recommendations. Additionally, the newly adopted Common Core State Standards (CCSS) address PDE by adding six Speaking and Listening criteria to their literacy standards, making this study timely. As the literature omitted students' perception this study sought to bring awareness to the education community regarding curriculum that meets to the 21st Century needs of students.

Within CTE, this study focused on "21st century skills" for achieving success both in school and career. PDE is very broad, and the "skills" that fall into this education vary. The buzzword is "soft skills," meaning the skills that do not fall into the technical domain. They are called "SCAN skills" (SCANS 1991, p. 5) by the U.S. Department of Labor (so named from the late 20th-century Secretary's Commission on Achieving Necessary Skills (United States Department of Labor, Secretary's Commission on Achieving Necessary Skills—SCANS 1991 p. 5), "professional skills" by the American Board of Engineering and Technology (ABET Schuman, Besterfield-Sacre, & McGourty, 2005), "Equipped for the Future – EFF Skills," (Equipped for the Future 2009 p. 3), and "21st century skills" (overview page) by the organization called Partnership for 21st Century Learning (2003).

Soft skills are defined as a cluster of personality traits, social graces, and facility with language, friendliness and optimism (Bancino & Zevalkink, 2007). According to Partnership for 21st Century Learning (2003), these soft skills were defined as critical thinking, communication, collaboration, and creativity. Other definitions include communication skills, people skills, teamwork skills, demeanor, motivation, flexibility, initiative, work attitudes, and effort (Moss & Tilly, 1995) However these interpersonal skills are defined or named, the current workforce development literature states they are now recognized as necessary because of increasing demand for a broader skills set—especially among technical professionals—due to increasing global competition, and the search for new ways to increase productivity and profit (Bancino & Zevalkink, 2007). Research shows that when employees have had personal development education, companies gain a marketable edge in competition. Given that researchers have identified the critical role of personal development education, educators must explicitly teach these skills and evaluate whether and to what degree students have attained them. This study examined students' perceptions of the influence of personal development education, particularly 21st century skills, with attention to those from socio-economically disadvantaged subgroups (Moss & Tilly, 1996).

According to Thomas Friedman (2005), we are currently in an era called "Globalization 3.0." (p.10). Due to rapid advances in technology, this era is unique because of the newfound power of individuals to collaborate and compete globally. Friedman has claimed that the power of the individual to work and survive by competing globally is enormous, and now the individual is required to work both alone and on a team performing complex tasks as knowledge workers (p. 10). Americans will do well if we produce knowledge workers who create idea-based goods and can connect "knowledge pools" (p.10) all around the world. This work, then, demands high-tech skills (hard skills) as well as teaming, collaboration, and communication (soft skills).

A team of researchers studying engineering education suggested that globalization has been driving changes in our economy and therefore our educational practices (Schuman, Besterfield-Sacre, & McGourty, 2005, p. 43). They identified four reasons for these changes: fast-paced information technology changes, corporate downsizing, outsourcing, and the new global work environment. Because of the new world economy and a growing group of overseas trained professionals willing to work for much less than the American workforce, the American educational system must not only provide hard skills but also value-added 21st century skills to justify a higher wage. To stay globally competitive, our work force must be excellent in both.

This study sought to reveal the feasibility of educating students by empowering them with 21st century skills education. These skills are considered essential in today's workforce. Empowering students with a new language and fluency in appropriate behavior for their own personal success and achievement is timely due to all the global changes and forces at work. Twenty-first century skills education is relevant for all students to succeed both in a college setting and in the workplace. According to Mitchell, Skinner and White (2010), "employers rate soft skills highest in importance for entry-level success in the workplace" (p.44). As one employer pointed out, "We hire them for their hard skills and fire them for their soft skills" (Workshop Lecture, November 2005).

Methodology

This qualitative inquiry pursued understanding intentionally taught communication and collaboration skills and how this education modified any and all aspects of the students' lives In Personal Development Education (PDE) —a collection of highly subjective and hard to define 21st century behavioral competencies—the students' voices and perspectives were missing in the literature and, therefore, the hope of this study was to shed light on the significance of PDE as a relevant educational reform.

The context of the study is a program that was designed to provide both academic and personal skills for this population, called Business United in Investing, Lending, and Developing, or BUILD. This is an intervention program targeting SED subgroups, beginning in the 9th grade teaching entrepreneurialism. In grades 10th through 12th it then becomes an after-school program teaching entrepreneurial and 21st century skills as well as academic tutorial instruction with a strong college focus.

The participants shared their stories of personal transformation through 24 informal interviews and 4 focus study groups, which resulted in new knowledge. These new findings add to the existing knowledge surrounding 21st century skills. The inquiry revolved around the students' perspectives of their own

learning, what it means to them, and how this new learning impacted their lives. The data revealed innovative thinking regarding the value, effect, outcomes, and issues surrounding PDE.

The Research Questions

1. What changes have students experienced with 21st century competencies, namely communication, collaboration, critical thinking, creativity, or courage?
2. How have these changes influenced the students' personal, family, school, and/or community life?
3. How have the students comprehended, used realistically, and incorporated these skills into actual work habits?

Data Collection Tools. The type of data needed for the study included the following:

- Student interviews from 3 grade levels—sophomore, junior, senior
- Student Data Demographics
- Student Observations
- Student Written Response Journals
- Four Student Focus Groups: Thirteen Students, Three Grade Levels

The researcher was granted an opportunity to observe this type of personal development education, gather students' voices and perceptions around this type of education, record them, and analyze the findings with the possibility of having students voice their need for personal development educational reform. With these findings, it is believed the validity of PDE will be taken seriously. There is real potential for adopting such curriculum into instructor-training programs in universities, empowering new teachers and, thus, empowering the students, by allowing them access to and the abilities to navigate power relationships. This theoretical framework is not intended to negate the students' culture, behavior, or language but to add navigational skills for their success

Findings: Communication, Collaboration, and Credibility

This study is about the role of communication and collaboration in self-empowerment and students' sense of their own credibility. Before this study, the researcher had a general idea that PDE was a way to empower youth, particularly socio-economically disadvantaged populations (SED). The researcher originally thought soft skills empowered students for their future career success. But the students' portrayal of their experiences illuminated the contribution of soft skills to increase of confidence, self-efficacy, and credibility.

The overarching theme that permeates the findings from this study is self-

empowerment through PDE, specifically through learning communication and collaboration skills. While the literature recommending soft skills development was consistent about the need for lower SED students to obtain these skills, the researcher had not anticipated the depth and breadth of the personal transformations that the participants shared. The emergent findings are that: (a) communication and collaboration are the gateway skills to the rest of the 21st century skills and participants perceive code-switching as an added-value skill for effective communication; (b) participants appreciate the art of collaboration, recognizing the challenges and successes inherent in people management and interpersonal relationships; and (c) participants believe their credibility is increased as an outcome of learning effective communication techniques.

Communication

One key finding was that communication is a gateway skill to other soft skills. Communication skills lead into the more sophisticated, complicated soft skills of critical thinking, problem-solving, stress management, and risk-taking. Communication is powerful: language holds immense power in the development of successful human relations. In fact, effective communication's real purpose is to relay information successfully from one person to another. Freire (1993) stated that the oppressed must fight for their own liberation; through effective communication, this liberation can be a reality. According to Stewart (1990),"the quality of your life is directly linked to the quality of your communication" (p. 6). All 13 participants knew the value of effective communication and that language and communication are keys to their success in life. The participants recognize the value of effective communication by expressing their ability to discern the type of communication skill set needed for a given situation in a sophisticated way. Their awareness of the "other"—the audience—is essential to their ability to communicate. Likewise, participants voiced their concerns about wanting to hear and *be heard,* to know and *be known,* and to understand—and *be understood.*

The way the participants are understood is through their ability to code switch, which was defined by O'Neal and Ringler (2010) as "a strategy that helps us communicate in socially and culturally appropriate ways" (p. 50). Therefore, it is safe to say that code-switching is a skill where one can change words and/or behaviors in order to effectively communicate and obtain a desired goal. They believe that without these skills, newly hired employees have only a small chance of success in their field of employment. The data showed a strong awareness of informal or formal language and the need to discern when to code-switch; most participants valued code-switching as part of their communication successes and demonstrated belief in their ability to use it appropriately.

Simply stated, the execution of effective communication requires the sender to access formal communication skills so that the receiver can fully comprehend the message. When the receiver fully understands the message and believes it, the communication is deemed successful—which establishes the credibility of the sender.

The Art of Collaboration—The Need to Communicate in Order to Collaborate

The second finding relates to the art of collaboration. Some participants demonstrated strong views on the subject of motivation and collaboration. Collaboration is also a gateway skill because producing work with others is a most challenging skill to acquire. Attending a conference the researcher learned that 70 percent of terminated employees are fired from their jobs because they could not get along with others (ACTE Convention, 2012). If communication and collaboration skills can empower marginalized populations and strengthen the sense of self, they too can be open and therefore vulnerable, ultimately achieving successful human relations.

A more detailed look at the challenges of problem-solving within collaborative efforts was mentioned. They divulged about the constant tension between producing the work and—at the same time—remaining friendly and caring with your co-workers. Personal sacrifice was a strategy spoken of many times, in terms of a complex tension between what they individually sacrificed for the team and what they could hold on to. "I know how to ignore little annoyances," noted Bambi.

Interestingly, the participants shared stories of their experiences that were not successful, but in their frustration, they revealed keen insight about interpersonal conflicts. Some ignored the other; some set boundaries and held firm to them, while still others threatened their teammates. The participants concluded that sometimes people have sad lives, and their responses revealed a heightened sense of empathy, allowing them to give personal space and extra time for their teammates to accomplish the work.

Credibility

The unanticipated finding was centered on credibility as an outcome of effective communication. Communicating successfully results in credibility, which in turn empowers the individual. Bobby showed the importance of credibility by saying, "I've been able to present my ideas in a way to make them easily understood and to get to my point faster." Communicating clearly and concisely is key to building trust; sending a message needs to be done correctly in order to have

the receiver believe that the sender is credible. Participants described the value of credibility throughout our interviews; however, the literature reviewed did not directly address the importance of credibility as vital in building self-efficacy.

Soft skills of communication and collaboration lead to empowerment through the attainment of credibility. Freire (1993) has taught us that to liberate oppressed populations permanently, education must actively engage the participants in dialogue to create action to enable them to access their own power. Participants needed their ideas, thoughts, and opinions valued; therefore, they are valued. The participants want to feel worthy, not worthless. According to Freire (1993), the term marginalized itself has often been used in relation to lack of access to power. Therefore, effective communication is a tool to access power, and the participants valued this tool as they learned to use it. For example, Bobby spoke about his growth as he used to just say what he thought, hoping everybody else would agree—but he would not argue or defend his point if they did not. Since receiving this education, he has gained communication skills, so he can stand his ground, insisting on his argument or his idea.

The theme of credibility surfaced again with a wider scope of influence as Ronesha spoke of her community members as dispirited and not believing in themselves. This statement supports the value of credibility with the participants and how vitally important it is to be believed in. When students learn to communicate effectively, they have a better chance of being believed, leading to believe in themselves. As Ronesha said, "It's just like they're closed to different opportunities that they actually have

Synthesis of Communication, Collaboration, and Credibility

Twenty-first century skills build social intelligence, which is defined as intelligence with human relationships (Goleman, 2006). Freire (1993) explained that when people are oppressed or not given adequate education, they become stifled. These 21st century behavioral competencies are a key to unlocking the power all people have; this is especially important in marginalized populations who have been oppressed and silenced. These skills can help all populations, however, access their own power, in a dignified manner, and use it to their advantage.

As Maria pointed out, these are "survival" skills within a 21st century context. Ronesha spoke of the defeated spirit within her own community, believing that if they only knew these skills, people in her community could transform their thinking. Raj told us of the new reality of cyberspace, where people communicate and connect digitally, forming relationships and working together. They spoke of self-empowerment and how soft skills are a tool enabling them to access their own power. Participants described how they used these skills in all areas of their lives including church, school, family, friend relationships, as well as in navigating

power relationships. They have a keen sense of using these skills to speak to power, so they too can access such power for their own personal use.

After conducting this study, the author realized that PDE plays an essential role in students' lives beyond employability skills. PDE contributes to human empowerment by teaching students how to access the power that lies within them. It is a higher-level, transformative education. Ronesha clearly articulated the immense need for this kind of education in lower socio-economic neighborhoods where people have given in to the spirit of poverty: "Our town is low income and a lot of people don't believe—a lot of people don't have that motivation to succeed. . . .They don't believe in themselves. . . .'School is whack; I'm just going go hang out with my homies.'" PDE can transform people and, through those people, their communities—by empowering them with their own creativity, critical thinking, and ability to achieve dignified interpersonal conflict resolutions. The reach of PDE is wider than I thought it was when I began this study.

Implications for Educational Reform

Providing PDE to students, particularly in lower socio-economic subgroups is a critical dimension of equitable education The report *Pathways to Prosperity—Meeting the Challenges of Preparing Young Americans for the 21st Century* (Symonds et al., 2011) specifically speaks of the necessity for soft-skills education by saying,

> [H]ard and soft skills are essential for success in this economy. . . .These findings strongly suggest that a more holistic approach to education—one that aims to equip young adults with a broader range of skills—is more likely to produce youth who will succeed in the 21st century. (p. 4)

California recently adopted CCSS for both English and Math. CCSS are designed to prepare every student for success in college and the workforce. These new standards are designed to ensure that students can compete globally in the new world order. The Language Standards include not only elements of reading and writing but also speaking and listening. This is the beginning of a shift in thinking, bringing an increased awareness to the value of 21st century skills which makes this study timely. Through California's adoption of the CCSS, students learn to express ideas, work together, and listen carefully to integrate and evaluate information (California Department of Education, 2010).
Education needs to be separated into three equal domains. Connect Ed (2011); for example, has built a conceptual framework identifying the domains as Academic, Career, and 21st century domains. The author contends that education

needs restructuring into three equal domains for educating the student as an individual and not as an object. The current education system is not broken but rather out of balance so the author envisions the following graphic to restructure the system:

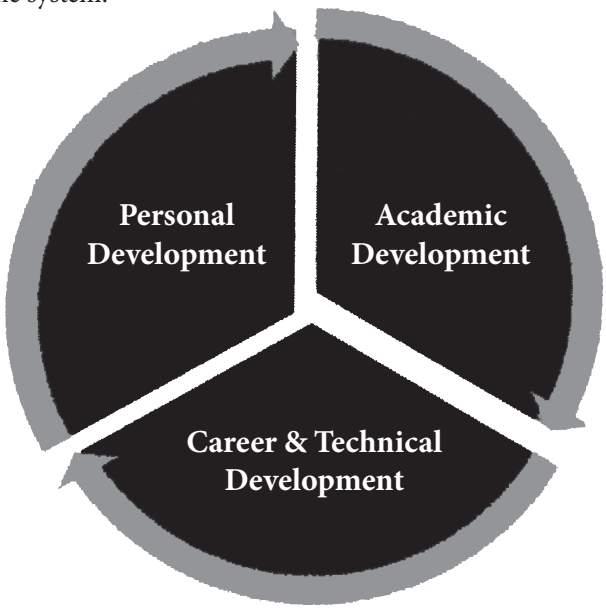

Figure 3. Three Domains of Education in the 21st Century.

Such a three-part educational structure would support greater educational equity, policy changes, and program development. The author envisions that these three domains of education can be embedded into the existing K-12 curriculum rather than separating them into individual components. This integrated approach would be articulated as instructional modalities throughout the current academic system. This chart clearly shows a more totally balanced system for equitable education inclusive of all students.

Recommendations

Recognition of the value of PDE is just beginning to take hold in the United States, along with placing a higher value on a holistic education for its youth. The current study is only a beginning in understanding the role of PDE in bringing this authentic reform to education. Here are my recommendations.
Implement Project Based Learning (PBL): This learning structure supports students working together in small groups to solve real-world problems. The

students actively engage in investigative work, drawing from what they already know to what they need to know. PBL encourages students to improve their problem-solving skills, research skills, and their social skills.

Conduct Longitudinal Studies: 21st century skills are hard to define and quantify, rendering them difficult to assess. In education, teachers quantify learning from written formative and summative assessments; assessing human behavior is a real challenge. Therefore, it is recommend creating longitudinal studies where educators can view the bigger picture on the participants' success in life. Using the national organization of ACTE, quantitative surveys could be developed nationwide with participating CTE programs as to the validity of PDE education. Prioritize teaching other 21st century skills:

Strengthen teacher training programs. The author envisions a course called, "21st Century Behavior Studies for the Classroom" as an additional course for new teachers. New teachers would be instructed in practical implementation of behavioral 21st century competencies in their classroom. Or PDE could be embedded into teacher training curriculum and not as a stand-alone course or curriculum. Not only would this help new teachers with classroom management, it would also prepare students for achievement in all areas of their life including college and career.

Final Thoughts

This work is about power—who has it, who does not, who wants it, and how to access it. PDE is sophisticated education centering on human empowerment that teaches students how to access the power that lies within them. While this study is about power, it is also about basic human dignity. Dignity is the quality or state of deserving respect. All people deserve dignity, but without effective communication skills, without a voice or being heard or understood, dignified treatment rarely occurs. Simply stated, teaching effective communication and collaboration skills leads to student self-empowerment which produces an expectation of dignified treatment. Self-empowered people expect to be treated with dignity— they demand it. Therefore, it is in this expectation that they receive it. Conversely, when people are oppressed or disempowered, they do not expect or demand being treated with dignity and thereby never receive it.

Empowering socio-economically disadvantaged (SED) populations to unlock their own potential for greatness was one motivation for this study. The participants eagerly shared their stories of growth, challenges, and changes while experiencing PDE. The skills taught in PDE have many names already, such as professional skills, 21st century behavioral competencies, SCAN skills, people skills, and soft skills. The education system can empower SED students

by embedding the core curriculum of K-12 institutions with three types of education—academic, career and technical and personal development.

In conclusion, Personal Development Education teaches students how to access their own power and experience human dignity. PDE permanently transforms and liberates students who now speak with confidence and credibility. In turn, they can influence their families, friends, and communities working to create a more inclusive, diverse middle class in the 21st century. The links between education, individual students, and their communities is best shown in the voice of Ronesha, speaking her truth:

> For me it's necessary to be teaching it in school because where I come from, it's, like, its different because—well, not different—but most people aren't exposed to these types of good skills that they should be having.

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Visualization Ability and Student Outcomes in Engineering Design Graphics

Joe R. Busby, Ed.D., Teaching Associate Professor
North Carolina State University
Jeremy V. Ernst, Ed.D., Assistant Professor
Virginia Tech
Aaron C. Clark, Ed.D., Professor
North Carolina State University

Abstract

This spatial visualization study, rooted in the body of research that has been performed on an international platform, pairs engineering design graphics students, at the post-secondary level of education, with documented high visual skill and with documented low visual skill. The examination of proficiency in outcome measure as it pertains to these student visual skill abilities was the focus of the study. It was determined that cumulative engineering design graphics course outcome was higher for those students with higher documented visual skill. However, end of course examination outcome provided no significant difference between groups. Rationale for the expansion of further integration of engineering design graphics coursework and implementation of visual skill practices within STEM education globally are among the implications of the study's findings.

Keywords: *visualization, engineering design, outcome measures, STEM, graphics*

Introduction

Spatial visualization is of the utmost importance for individuals with existing or prospective careers in science, technology, engineering and mathematics (STEM) disciplines and can serve as a predictor of interest and success for students in STEM areas (Branoff & Dobelis, 2012; Newcombe, 2013) throughout the world. High school students with identified high spatial ability, after accounting for their mathematical and verbal ability, will more often work in STEM disciplines as adults. Additionally, individuals who are not exceptional in verbal and mathematical ability but are high in spatial ability create an untapped talent pool for STEM domains (Wai, Lubinski, & Benbow, 2009).

Spatial visualization ability, spatial ability, visualization ability, and spatial intelligence are used within the subject area texts and appear to have like meaning. Hinze et al. (2013) state, "Spatial visualization involves the ability to mentally represent (i.e., to imagine) and dynamically manipulate objects (p. 130)." "Spatial ability or intelligence involves the process of thinking about images, as well as the capacity to perceive, to transform and to recreate different aspects of the visual and spatial world (Ekstrom & French, 1979, as cited in Seabra & Santos, 2008, pp. 99-100), and is required by innumerable artistic, scientific and technical professions (Sorby, 2001, as cited in Seabra & Santos, 2008, p. 100)."

Individual's spatial visualization ability can be improved (Ceci, 1991) by practicing tasks similar to those found on measured intellectual ability tests (Newcombe, 2013). Seabra & Santos (2008) indicate entering university engineering students do not possess developed spatial visualization ability regardless of the essential nature of the skill for the engineering profession. Hoffler (2010) reported that students with high spatial ability learn with visualizations better than students with low spatial ability. Wai, Lubinski, & Benbow (2009) indicate that teachers can help students increase their ability to learn spatially by using visualizations as strategies of instruction. A common metric in the initial determination of spatial visualization ability is the Purdue Spatial Visualization Test (PSVT) (Clark & Ernst, 2012).

Sorby and Baartmans (2000) provided evidence that engineering students weak in 3-D spatial visualization skills can significantly improve their skills through the completion of a course designed for visualization skill enhancement. Clark and Ernst (2012) reported from a meta-analysis that learning attributes in engineering design graphic students are kinesthetic learning preference, existing mental rotation ability, and moderate to high motivation and suggest these factors be considered when developing curricula related to engineering and technical graphics education. Ultimately, students with improved spatial visualization skills will be able to solve real work engineering design problems (Connolly, Harris, & Sadowski, 2009).

Research Questions

There is a single principal research question in efforts to examine academic outcomes of engineering design graphics students. This question couples students with high mental rotation abilities, as measured by the PSVT, and students with lower mental rotation abilities into two paired subgroups to consider the question: Do engineering design graphics students with above average mental rotation abilities experience higher academic outcomes in engineering design graphics coursework?

Paired variable outcome measures provide for focused examination in regards to contributing factors of overall student attainment. Paired outcomes, guided by the principal research question, afforded testing and analysis of two specific investigational hypotheses: *Hypothesis A* – There are no cumulative examination outcome differences for students with above average visualization abilities and students with below average visualization abilities. *Hypothesis B* - There are no overall course outcome differences for students with above average visualization abilities and students with below average visualization abilities. These hypotheses were investigated through matched pairs analysis of difference.

Participants

Research subjects for this study were students in an introductory engineering/technical graphics course offered at a major research university. This course was designed to give students fundamental skills in visualizing in both two and three dimensions, modeling techniques, and understanding basic standards for the creation of technical drawings. Students learn proper techniques to create solid models using a parametric modeling software package. Although this course was developed for students majoring in areas related to engineering and technology (i.e., technology, engineering and design education), the course has been considered a general education course for the university since its primary goal centers on teaching visual communications to students at the undergraduate level (http://www2.acs.ncsu.edu/reg_records/crs_cat/GC.html). The majority of students who take this course major in areas related to engineering and technology, engineering, and design education. The course was developed to be taken at the sophomore level and serves as a requirement by several programs in engineering and education. Students taking this course have a diverse background and understanding of engineering/technical graphics, with the majority having little to no experience in technical graphics. This course was offered as multiple sections throughout the academic year and summer sessions.

Instrumentation

The instrument used in this study was the Purdue Spatial Visualization Test (PSVT) - Visualization of Rotations that measures spatial visualization ability in students through the use of mental rotations (Branoff, 1998). It is just one of a set of developed assessments of this type associated with the PSVT. The test consists of thirty questions that requires student to study a given object and how it is rotated, then compare to a second object and how it would look when rotated in exactly the same measure and then select the answer that shows

exactly how the second object was rotated and positioned from a choice of five different answers (Bodner & Guay, 1997). This test has been used extensively by engineering and technology schools internationally to test spatial abilities in students since the 1980s. The isometric pictorial views using orthogonal projection techniques are commonly taught in most engineering/technical graphics courses and is considered one of the reasons this test is so popular to measure spatial abilities (Yue, 2008).

Methodology

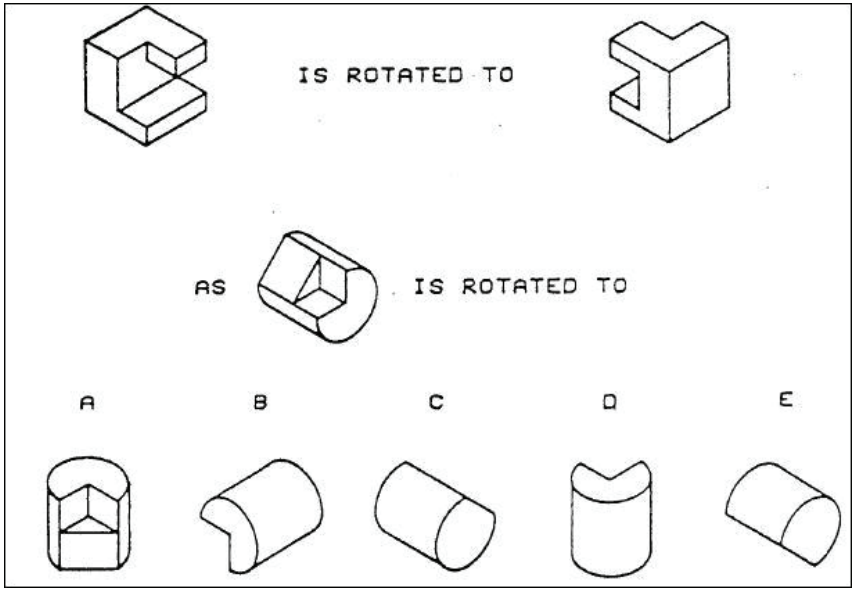

Figure 1. Example of the Purdue Spatial Visualization Test (PSVT)- Visualization of Rotations

the purposes of this academic outcome study. Two sections of engineering design graphics students were asked to participate, where 106 individually consented. University undergraduate engineering design graphics students participating in an "Introductory to Engineering Design Graphics" course were administered the PSVT at the mid-semester point in a six week summer session. "High visualization ability" has been established as equaling or exceeding the historical mean of 23 out of 30. Branoff (2000) identifies the approximated visualization ability mean of engineering design graphics students, measured by the PSVT, as 23. Inversely, "low visualization ability" has been established as failing to equal or exceed a 23 on the PSVT. There was also a standard cumulative course examination offered at the conclusion of the sixth week of instruction. Also, overall assignment and quiz totals were tracked for the purposes of

the generation of overall Introductory to Engineering Design Graphics course outcome. The coded cumulative examination, overall outcome, and PSVT data from the "high visualization ability" group and the "low visualization ability" group was paired for analysis.

Data and Findings

Summary statistics and matched pairs analyses were conducted for the engineering design graphics students with high visualization ability and low visualization ability. The group mean, standard deviation, and upper and lower means provided a descriptive account of visualization outcome. Variation from the average, as represented by the calculated subgroup standard deviations and reinforced by the upper and lower means, was smaller for the high visualization group demonstrating closer concentration of visualization outcomes (see Table 1).

Table 1. Summary Statistics High PSVT and Low PSVT

Group	n	Mean	Std Dev	Upper 95%	Lower 95%
High PSVT	68	26.54	2.14	27.06	26.03
Low PSVT	38	18.03	3.45	19.12	16.91

Summary statistics were also tabulated for high PSVT students and low PSVT students in relation to overall course outcome mean as well as final examination outcome mean. It is of specific note that the high PSVT student group demonstrated higher collective mean achievement on the overall course outcome ($\bar{x}$ = 87.24) and the cumulative end-of-course examination ($\bar{x}$ = 85.00). Expanded results appear in Table 2.

Table 2. Summary Statistics High PSVT and Low PSVT Course Outcome and Cumulative Examination

Group	N	Outcome Mean	Outcome Std Dev	Examination Mean	Examination Std Dev
High PSVT	68	87.24	7.66	85.00	8.34
Low PSVT	38	82.46	10.38	79.42	11.3

In investigating *Hypothesis A*: "There are no cumulative examination outcome differences for students with above average visualization abilities and

students with below average visualization abilities", engineering design graphics competency was measured through a cumulative course examination. Upon analyzing matched pair data of high visualization ability and low visualization ability at the set alpha value level of 0.05, it was determined that no statistically identifiable outcome difference was discernible based on cumulative competency measure. Hypothesis A failed to be rejected (see Table 3).

Table 3. Cumulative Competency High PSVT and Low PSVT

Difference	n1 High PSVT	n2 Low PSVT	Mean Diff	Std Err	DF	P-Value
High PSVT – Low PSVT	68	38	3.16	2.49	37	0.21

Overall outcome measure of the two subgroups within the "Introduction to Engineering Design Graphics" was evaluated. This matched pair analysis of outcome assisted in the appraisal of Hypothesis B: "There are no overall course outcome differences for students with above average visualization abilities and students with below average visualization abilities." Considering the set alpha level of 0.05, a statistically identifiable difference was determined based on overall outcome measure. Hypothesis B was rejected (see Table 4).

Table 4. Overall Outcome High PSVT and Low PSVT

Difference	n1 High PSVT	n2 Low PSVT	Mean Diff	Std Err	DF	P-Value
High PSVT – Low PSVT	68	38	3.68	1.79	37	0.05

Discussion and Conclusions

One overarching research question was asked for this investigational study involving engineering design graphics students' mental rotation abilities and course outcomes. The first hypothesis explored the prospective difference between a group of students with high visualization ability as measured by the PVST and a group with low visualization ability after six weeks of instruction on a cumulative examination. No significant difference was found between the two groups in examination scores. The post-only nature of the cumulative assessment provides visual skill development opportunity over the course of the semester, as previously suggested by the work of Sorby and Baartmans (2000).

The second hypothesis investigated the difference between the group of students with high visualization ability and students with low visualization ability when the groups averages of graded works (i.e., assignments, quizzes) were compared. A significant difference was found to exist between the two groups. This remains consistent with the work of Connolly, Harris, and Sadowski (2009) as well as Sorby and Baartmans (2000) considering that progress over time is factored in coursework measure, therefore, building collective assessment outcome that has progressional features in place of a single post measure.

This study provides evidence that further supports the finding that engineering design graphics coursework possesses direct/indirect influential characteristics in the promotion of visual skill development. This suggests that maintaining persistence in curricula intervention has potential impact on spatial ability development of future engineering design graphics educators or professionals. The authors recommend that visual skill considerations be built into degree scope and sequence development, specific to STEM majors at the post-secondary level as well as students with STEM major aspirations at the secondary level of education. The importance of visual skill and visualization ability is well-documented and apparent within STEM-based professions. The extension of this ability through engineering design graphics coursework is promising in regards to the development and enhancement of the future workforce.

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Modifications and Accommodations for Students with Disabilitiesin Vocational Education Programs

Rae Lynn Daviso
Lakeview Intermediate School, Stow, Ohio
Angela Textor
Theodore Roosevelt High School, Kent, Ohio

Abstract

Students with disabilities benefit from differentiated instruction, hands-on learning as well as learning in least restrictive environments alongside regular education students. Lately, there has been an increase of students with disabilities in vocational education (career technical education) programs (Casale-Giannola, 2012). While many vocational education teachers lack pedagogical skills, teaching students with disabilities further creates anxiety for them. These teachers, therefore, need skills to assist this growing population of students with disabilities in their programs. This article describes modifications and accommodations that can be made to a vocational education program in order to level the playing field for students with disabilities. For each of the four vocational education areas: classroom, laboratory, work-based learning, and student organizations, examples of accommodations and modifications for students with disabilities in Health Careers Technologies programs are suggested.

Keywords: *students with disabilities, accommodations, modifications, student organizations*

Introduction

Historically, career and technical education (CTE) programs have been a good fit for students with disabilities (Casale-Giannola, 2012). Students with disabilities benefit from hands-on learning, differentiated instruction, repetition, work-based learning, applying academics to concrete situations, focusing on employability skills, as well as real world experiences, which are all a part of CTE programs (Burgstahler & Bellman, 2009; Casale-Giannola, 2012; Stair & Moore,

2010). In recent years, there has been an increase of the number of students with disabilities in CTE programs (Casale-Giannola, 2012; Stair & Moore, 2010).

According to the Ohio Department of Education (ODE), CTE is associated with Workforce Development (WFD) which contains both specialized training and "strong" academics. ODE reported that 126,347 (or 23%) of students in high school in Ohio are in WFD programs. Of those students, 22, 742 (or 18%) have one or more disability (ODE, 2012). For instance, in a local Health and Career Tech program, there are 15 students on an individualized education program (IEP) out of the 65 junior and seniors in the program.

With the passage of legislation such as No Child Left Behind and the Individuals with Disabilities Education Act (IDEA) in 1997, additional requirements have been placed on all students including those with disabilities such as stronger academic requirements and high stakes testing (Casale-Giannola, 2012). As a result, additional challenges on top of those already being tackled in the general education setting are faced by instructors in general education and CTE programs (Casale-Giannola, 2012; Stair & Moore, 2010). The most common challenges faced by teachers serving students with disabilities in CTE programs include students struggling to learn course content due to a difficulty with basic skills, a lack of understanding and training of instructors in special education, lack of knowledge of accommodation and modification strategies, and effective use of differentiated instruction.

Challenges

One of the most common difficulties faced by CTE instructors is students struggling to learn the course content. The students struggle with basic skills such as reading, math, and study skills (Casale-Giannola, 2012). One vocational education instructor observed that students struggle in reading, spelling, and with vocabulary words, which are integral parts of the program.

A lack of understanding and training in special education and working with students with disabilities is another challenge encountered by instructors (Casale-Giannola, 2012; Hall, 2007; Stair & Moore, 2010). Furthermore, there is minimal to no training at the college level as well as in the specific local school on supporting students with disabilities. In one study, teachers reported that they were unprepared to work with students with disabilities and were not sure how to react to them (Stair & Moore, 2010).

Another area where CTE teachers struggle when working with students with disabilities is a lack of knowledge of accommodation and modification strategies (Casale-Giannola; Stair & Moore, 2010). An integral part of services for students with disabilities is the individualization of their instruction. The

instruction and activities should be customized to meet the needs of the student. Modifications and accommodations are part of that customizing.

Modifications involve a change in the content being covered or what the student is to produce. For instance, a student may be required to answer ten questions as opposed to the other students in the class that answer twenty. An accommodation, on the other hand, allows a student to complete the identical assignment as other students in the class, but with an alteration made in the presentation or response such as formatting, timing, response mode, and/or setting. An example of an accommodation is using text-to-speech computer programs for textbook readings and/or notes (NICHY, 2010).

One final area of challenge for CTE instructors trying to meet the needs of students with disabilities is differentiating instruction (Casale-Giannola, 2012). Differentiated instruction results in the teacher providing various options for the same content material to best fit all the varying (high, middle, and low) levels in the classroom. The teacher is able to have a learning environment that meets all learning styles, interests, and abilities of the students in the class (Heinle, 2008). According to one local CTE teacher, it is difficult to meet all the different levels in the classroom while maintaining attention and motivation of all the students.

Unless assistance is provided to CTE instructors, frustrations will run high, students will not get the help they need, there will be a reduced effectiveness of instruction, and teachers may be in violation of the law. This paper provides tools and techniques including specific accommodations and modifications for CTE instructors to use when working with students with disabilities.

Common Types of Disabilities Found in CTE

The following paragraphs will give a brief overview of characteristics of three types of disabilities, specific learning disability (SLD), Asperger Syndrome (AS), and Attention Deficit Hyperactivity Disorder (ADHD) encountered by instructors in CTE programs:

Specific Learning Disability

Specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. The term does not include learning problems that are

primarily the result of visual, hearing or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural or economic disadvantage. (ADE, n.d., para 1)

According to the *do2learn* website (2012), students with a SLD may exhibit a number of the characteristics listed below, but they may be more severe in their presentation. Specific learning disabilities can be diagnosed as long as the student displays problems with one or more of the primary learning areas (reading, writing and mathematics). They may also display secondary characteristics which may be hyperactivity, poor social skills and possible behavior problems. Below is a list of possible characteristics a student may display in the areas of reading, writing, mathematics, socialization, and behavior.

Reading

- Difficulty with similar words or confusion of similar letters
- Skips or jumps over words
- Starts reading at an older than average age
- Difficulty with pronunciation
- May substitute the wrong word
- Difficulty with reading comprehension
- Difficulty with terms and their meaning

Writing

- Difficulty with vocabulary, grammar, punctuation, spelling and letter formation
- Difficulty with neatness (staying between the lines and spatial relationships)
- Difficulty copying correctly and with eye hand coordination
- May write words or letters in the wrong order
- Poor organization to the writing

Mathematics

- Difficulty with mathematical concepts
- Difficulty making number associations (3x5 or 5x3)
- Difficulty following steps in mathematical equations
- Difficulty with concepts of space and time
- Has difficulty comparing or sorting items

Socialization

- Poor communication skills
- Difficulty making friends
- May not understand jokes or sarcasm

- May not display appropriate non-verbal communication and may not recognize non-verbal communication

Behavior

- Usually requires one on one attention
- They may be slow to respond to questions or cues
- Difficulty following or remembering instructions
- May be hyperactive or move around frequently
- May have mood changes or show frustration
- May be easily distracted

Asperger Syndrome

According to the National Institute of Neurological Disorders and Stroke (2012), "Asperger syndrome (AS) is an autism spectrum disorder (ASD), one of a distinct group of complex neurodevelopment disorders characterized by social impairment, communication difficulties, and restrictive, repetitive, and stereotyped patterns of behavior" (para 1). Although children with autism can have varying levels of disabilities AS is considered the mildest form of ASD and these children tend to be highest functioning individuals with ASD.

Children with AS may be difficult to diagnose and starts with a well-child checkup. The National Institute of Neurological disorders and Stroke (2012), states that the second step is usually completed by a team of physicians that may include a neurologist, psychologist, speech therapist and a psychiatrist. This team will work together along with other expert health professionals to make a diagnosis of AS. Some signs teachers can look for are: uncontrolled volume of voice, poor social skills and a narrowed focus of interest. These children may not reach milestones as quickly as other children due to a lack of coordination.

Attention Deficit Hyperactivity Disorder

The National Institute of Mental Health (NIMH) (2008), states that Attention Deficit Hyperactivity Disorder (ADHD) "is one of the most common childhood disorders and can continue through adolescence and adulthood. Symptoms include difficulty staying focused and paying attention, difficulty controlling behavior, and hyperactivity (over-activity)" (para 1). ADHD can be difficult to diagnose as all children can misbehave, be inattentive or wild. Some parents may notice that their child loses interest in an activity before other children. NIMH (2008) reports that teachers are often the first ones to notice the symptoms of ADHD. They notice "when a child has trouble following rules, or frequently

"spaces out" in the classroom or on the playground" (para 18). NIMH also states that there are three behaviors most often associated with ADHD. These are listed below with some common symptoms:

Inattentive
- Easily distracted and miss details
- Difficulty completing homework assignments
- Slower to digest information
- Confused easily
- Difficulty staying on task or following instructions

Hyperactivity
- Difficulty sitting still
- Talk frequently
- Difficulty with quiet tasks

Impulsivity
- Impatient
- Difficulty waiting their turn
- Show emotions easily
- Act out regardless of consequences

Modifications and Adaptations

As mentioned previously, CTE programs offer students with disabilities hands-on learning, differentiated instruction, repetition, work-based learning, academics applied to concrete situations, employability skills, as well as real world experiences, which is extremely beneficial to their individualized learning styles (Burgstahler & Bellman, 2009; Casale-Giannola, 2012; Stair & Moore, 2010). One of the challenges faced by CTE instructors in attempting to best meet the needs of students with disabilities in their programs is a lack of knowledge of accommodation and modification strategies (Casale-Giannola, 2012; Stair & Moore, 2010). This section gives suggestions of specific accommodations and modifications that can be used with students with SLD, AS, and ADHD that are in a CTE program, assistive technologies that are helpful to students, and web resources where one can find additional information about the disabilities.

CTE is unique because it offers learning experiences in four different settings: CTE classroom (related and anatomy), CTE lab, Work-based Learning, and Career and Technical Student Organizations (CTSO). Table 1, presents specific accommodations and modifications for each of the three disabilities (SLD, AS, and ADHD) in each of the four settings:

Table 1. Accommodations and Modifications for Students with Disabilities

Disability	CTE Classroom	CTE LAB	CTSO	Work-Based Learning
SLD	• Use of a net book to complete essay questions • Seating in the front • Peer tutoring • Task analysis (break task into smaller parts) • Audio books/notes • Pre-teaching vocab • Guided notes • Spell check and word prediction program • Shorten assignment or test • Differentiated instruction • Repetition of material • Extended time • Open note tests in a small group setting • Multiple choice on test • Tests read aloud	• Extended time for lab abbreviations • Lab directions repeated/ clarified • Task analysis of skills • Use of visuals for directions • Partner with another student	• Frequent checks to make sure the student is on-task • HOSA projects are classified under The Individuals with Disabilities Act (IDEA) Amendments of 1997 • Visual examples are provided when working on club activities	• Use of technology is provided for written work • Directions need to be clarified and repeated • Visual demonstration when possible • Use of task analysis when possible

AS	• Small group testing • Reinforced directions and present with visuals • Extended time for homework • Differentiated instruction • Consistent routine • Clear posting of daily schedule • Room provided for sensory breaks • Task analysis • Graphic organizers	• Individualized instruction • Room provided for sensory breaks • Allow choices for competencies	• HOSA projects are classified under IDEA Amendments of 1997 • Individual projects as needed • Carefully chosen club partners for group work • Use of social stories to discuss appropriate social interactions	• Provide sensory breaks by providing a quick task to complete • Provide written instructions and pictorial cues • Allow additional training time for new skills • Use of social stories with a job coach to discuss appropriate social interactions
ADHD	• Provide guided note packet and have students record lectures • Seating in front • Tests read aloud • Use of dividers to encourage on-task • Audio books • Task analysis • Allow breaks with movement if possible after structured time • Use differentiated instruction	• Clarify and repeat lab skills, use visuals • Task analysis of lab skills • Mix hands-on skills and written tasks daily • Reinforce skills on the computer	• HOSA projects are classified under IDEA Amendments of 1997 • Assign a club buddy when working on group projects to keep student on-task • Keep parents informed of club work	• Use task analysis • Provide a private work space so student does not interrupt other employees • Provide a job coach to instruct and explain certain social cues • Use dividers when possible to reduce distractions

Assistive Technologies

Specific Learning Disability:

- Computers- Use of computers with programs with spell check, word prediction, and read aloud capabilities to use for notes, write essays, and assist with punctuation, grammar and word choices.
- Quizlet- Use Quizlet to make flashcards of vocabulary and abbreviations. Students can practice at home and in class. They can also hear the term stated correctly. They can create games and tests to check comprehension.
- Audio Books/Lectures
- Visual – Use visual cues as a second way of presenting information for differentiated instruction, to clarify directions, to keep the student as independent as possible and offer more success, and to keep students with disabilities engaged in the activity.

Asperger Syndrome:

- Tape recorders- record lectures and listen to them again later to reinforce the material.
- Computers- Use of computers with programs with read aloud capabilities to use for notes and write essays.
- Visual – Use visual cues as a second way of presenting information for differentiated instruction, to clarify directions, to keep the student as independent as possible and offer more success, and to keep students with disabilities engaged in the activity. Students with AS are often more successful as a visual learner and when given information in multiple ways. A visual schedule will offer comfort to the student and clear expectations of the day.

ADHD:

- Computers- allow students to use computers with read aloud capabilities when possible. They like the interaction and it keeps them on-task.
- Flip videos- video tape lab procedures and allow students to watch whenever needed. They can also video tape and critique themselves. Also, using audio books is a great way to repeat and reinforce information.
- Phone prompts- send the student text messages to remind them of important assignments or tests to study for.
- Quizlet- students can place terms and abbreviations on Quizlet. They can play games that assist comprehension of the material. They can also create tests to see how they are doing.
- Visual – Use visual cues as a second way of presenting information for differentiated instruction, to clarify directions, to keep the student as independent as possible and offer more success, and to keep students with disabilities engaged in the activity

Web Resources

The National Institute of Neurological Disorders and Stroke (August 2012) has provided the following websites where you can gain more information and resources for students with SLD, AS, and ADHD. These websites provide information on the causes, signs, symptoms, treatments and current research being done for the above disabilities as well as many others.

National Institute of Mental Health (NIMH)
National Institutes of Health, DHHS
6001 Executive Blvd. Rm. 8184, MSC 9663
Bethesda, MD 20892-9663
nimhinfo@nih.gov
http://www.nimh.nih.gov

Autism Science Foundation
419 Lafayette Street
2nd floor
New York, NY 10003
contactus@autismsciencefoundation.org
http://www.autismsciencefoundation.org/

Autism Speaks, Inc.
1 East 33rd Street
4th Floor
New York, NY 10016
contactus@autismspeaks.org
http://www.autismspeaks.org

MAAP Services for Autism, Asperger Syndrome, and PDD
P.O. Box 524
Crown Point, IN 46308
info@aspergersyndrome.org
http://www.aspergersyndrome.org

Autism Society of America
4340 East-West Highway
Suite 350
Bethesda, MD 20814
http://www.autism-society.org

National Institute of Child Health and Human Information Resource Center
P.O. Box 3006
Rockville, MD 20847
NICHDInformationResourceCenter@mail.nih.gov
http://www.nichd.nih.gov

National Dissemination Center for Children with Disabilities
U.S. Dept. of Education, Office of Special Education Programs
1825 Connecticut Avenue NW, Sutie 700
Washington, DC 20009
nichcy@aed.org
http://www.nichcy.org

http://www.add.org or **CHADD** (Children and Adults with Attention Deficit/Hyperactivity Disorder), is a national non-profit prganization working to improve the lives of affected people through education, advocacy and support. From lobbying to local support groups, CHADD is a leader inthe field of ADHD. CHADD is also the soonsor of the **National Resource Center on AD/HD.** The center is funded by the CDC and has tons of science-based information about attetnion-deficit/hyperactivity disorder
National Information center for Children and Youth With Disabilities (NICHCY)

Do2Learn: Educational Resources for Special Needs
www.do2learn.com/ provides pictures, learning activities and links to other recourses for disabilities

Attention Deficit Disorder association (ADDA)
http://www.add.org/ provides links to other sites along with personal stories and interviews with professionals about ADD

Summary & Recommendations

CTE programs have been a good match for students with disabilities, and while the face of CTE has changed and now serves students from all walks of life, there continues to be a growing presence of students with disabilities. As mentioned throughout this paper, three common disabilities found in career programs are students with SLD, AS, ADHD. Instructors are faced with daily challenges in meeting the needs of these students. Areas of difficulty can include techniques to support students struggling with basic skills, accommodations

and modifications, and differentiating instruction (Casale-Giannola, 2012). The following section summarizes recommendations in three areas to assist CTE instructors in best meeting the needs of students with disabilities.

1. Supporting basic skills
- Pre-teaching, re-teaching and reciprocal teaching
- Peer tutors
- Specific literacy remediation programs
- Graphic organizers (outlines, templates, Venn diagrams)
- Reading strategies (preview, predicting and identifying key words, using context clues)

2. Accommodations and modifications
- Use of computers
- Audio books and notes
- Use of visuals for skills
- Extended time
- Guided note packets
- Small group setting for tests and read allowed
- See Table 1 for additional accommodations and modifications.

3. Differentiating instruction (Willoughby, n.d.)
- Provide access to a variety of materials
- Develop activities that target auditory, visual and kinesthetic learners
- Use a variety of assessment strategies
- Offer students a choice of projects that reflect a variety of learning styles and interests
- Use flexible grouping

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A Situational Analysis of Approaches Used to Bridge Content Gaps and Labor Market Demand: A Case for Botswana Vocational Training System

Gillian K. Mmolotsa
Botswana Training Authority

Abstract

This paper analyzed quality assurance activities used by Botswana Training Authority (BOTA), a vocational training regulatory body in Botswana, to ensure that the content of accredited programs meet the needs of the labor market. BOTA has put in place quality assurance activities which extend beyond Botswana National Vocational Quality Framework (BNVQF) programs. In addition, the level of industry involvement in the generation of content of training programs was explored. Both qualitative and quantitative methodologies were used to gather and analyze data. The study revealed that Botswana has a robust vocational training system and that industry is involved in the development of national programs such as MTTC apprenticeship, BTEP and BNVQF. However, to improve the credibility and quality of the Technical, Vocational Education and Training system from the current status, the study recommends increasing the level of involvement of industry in the whole training cycle and for the country to run one national vocational training system.

Keywords: *apprenticeship, NVQF, quality assurance, curriculum, standards*

Introduction

Overview

There are many factors that cause the organizations environment to become turbulent. One of these factors is the economic recession that hit the world around the year 2008. In Botswana the impact of recession was greatly felt because the country relied completely on diamond extraction. Just like other countries, Botswana is still at recovery stage of that economic meltdown. The President of Botswana in his 2013 State of the Nation Address reported that

Botswana's economy has been recovering and the country has enjoyed positive growth rates since 2010/2011. This growth could be attributed to strategies which the countries uses to diversify the economy, one of such strategies being a move from natural resources to human resource development, which of course encompasses Technical, Vocational Education and Training (TVET) initiatives (Ministry of Education and Skills Development, 2009).

Studies have revealed that TVET is becoming a political priority in boosting the countries' economies. Gondo and Dalefuya (2010) support that in both developed and developing countries, TVET programmes have continued to receive increased attention for stimulating the economic growth. In Botswana even before the economic recession, TVET was a priority in increasing youth employability and boosting the country's economy. This is reflected in the country's current and previous National Development Plans (NDPs) and pieces of legislation dealing with education and training matters.

Besides economic recession, other factors such as globalization and rapid technological advancements make some knowledge and skills which employees acquired a long time ago obsolete. To address this, organizations have to device strategies that will enhance their employees' adaptation to changes. The strategies or Human Resource Development (HRD) interventions should be those that are aimed at re-tooling or up-skilling employees. According to McGuire and Cseh (2006), HRD interventions are measures that could be put in place in order to help organizations cope with this inevitable change. They argued that HRD, particularly training and skills development initiatives are strategic interventions which facilitate competitive advantage by helping organizations cope with change process, competitive markets and turbulent business environment.

The main philosophy behind TVET is to prepare people for the world of work. An education system that bears fruits is one that is quality assured so that it meets the needs or exceeds the expectations of the customers, which in this case are the learners and the industry. UNESCO (2005) asserts that quality assurance is essential at all levels of TVET because of the strong link between what is leant and the needs of the labour market.

The concept of quality assurance may be defined in various ways, especially in education and training circles. Bartram and Wolfendale (1999) stated that it involves setting and monitoring operational standards. Quality assurance ensures that TVET is industry driven so as to enhance youth employability. Whatever quality assurance system a country puts in place, it should ensure that all training initiatives or interventions are work-based. This will allow the graduates from either conventional training institutions or workplaces to readily perform their duties upon completion of their training. Employers would not have any need to send new employees for immediate further training to

up-skill or retool them. Evidence has shown that involvement of the industry in planning, delivery and evaluation of training, facilitates and enhances the training system to meet the demand of the labour market.

The concept of quality assurance in TVET is very important in that it:

(a) ensures ease of articulation should a learner wish to change areas of specialization or move from one strand to the other,
(b) training standards are developed for setting minimum quality requirements which training providers should meet,
(c) curriculum is aligned to the industry requirements specified in the training standards as this allows for ease of transferability of what has been leant to real work situations; and also
(d) allows learners to acquire knowledge skills and attitudes, through exposure to both theoretical and practical components of the training programme.

All these specified quality indicators can only be measured when there is a robust quality assurance system put in place so that nothing is left to chance. The European Union has also developed a set of ten (10) quality indicators and four of those are directly related to labour market demands. These are placement rate in vet programmes which discusses the percentage of TVET programme completers who are employed after the end of training, utilization of acquired skills at the workplace, unemployment rate, and mechanisms to identify training needs in the labour market.

National Qualifications Frameworks and National Quality Assurance Frameworks

Many countries have National Qualification Frameworks (NQFs) and/or National Vocational Qualification Frameworks (NVQFs) which provide a basis for all quality assurance activities. Colombo Plan Staff College for Technician Education (2011) defines an NQF as "a quality assured national system for the development, recognition and award of qualifications based on standards of knowledge, skills and attitudes acquired by learners or workers of a certain country." Winch and Foreman- Peck (2004) stated that National Vocational Qualifications (NVQs) were introduced with the intension of accrediting and developing a flexible and skilled workforce responsive to global economic changes. Hart and Rogojinuru (2007) stated that NQF functions include accreditation of occupation and training standards, validation of programmes and assessment and certification of learners' achievement.

Some developed countries such as those in Europe have gone further than developing NQFs by developing Common Quality Assurance Frameworks (CQAF) in TVET in an effort to promote transparency and consistence among

the member states that have signed the Copenhagen Declaration of 2002 (UNESCO-UNEVOC 2013). This framework has four main components which include the model, a method for assessment, and monitoring tool and a measurement tool.

Since the inception of Botswana Training Authority (BOTA), the country has had a Botswana National Vocational Qualifications Framework (BNVQF) only. The BNVQF is an integrated system of nationally recognized qualifications and nationally endorsed standards for the recognition of vocational skills, knowledge and competencies. The Vocational Training Act of 1998 set out broad plans for a three-tier vocational qualifications framework, which will eventually link to a National Credit and Qualifications Framework (NCQF) which the country is in the process of developing its architecture.

The BNVQF also facilitates the coordination of Technical, Vocational Education and Training (VET) provision in Botswana, assessment of learning, and the award of credits and certificates. It sets quality standards in the provision of VET in Botswana, as well as moderation across fields of learning and levels of qualifications. Following assessment based on unit standards, learners will be awarded certificates of achievement. Botswana has never had a National Quality Assurance Framework. However, the regulatory body for vocational training, BOTA, has a documented Quality Management System and is certified against ISO 9001: 2008. This ISO standard is a generic optional standard that assists organizations to continually improve their processes in order to satisfy or exceed its customer expectations.

Background on Botswana's Current Vocational Training System

Prior to 1993, a National Commission on Education was set up assess the status of the quality of Botswana's education system. The Commission's enquiry revealed that there were no clear, standardised qualifications with appropriate equivalencies; and the curriculum did not meet the demands of the economy because some programmes were developed outside the country for different needs altogether. It was then that the Botswana Revised National Policy on Education (RNPE) of 1994 was formulated in order to address these challenges.

Botswana's vocational training system is characterised by five (5) different types of programmes being offered in the country's training institutions. These are Madirelo Training and Testisting Apprenticeship programmes, BNVQF, Botswana Technical Education Programmes (BTEP), Franchised and self - developed ones. All these programmes are accredited by BOTA provided they are for Foundation, Intermediate or Certificate Levels. It is the discretion of an institution to decide on the type of programme they want to accredit with BOTA.

Botswana National Vocational Qualifications Framework Programmes

The RNPE noted the need to establish a regulatory body for coordinating all vocational training initiatives in the country. Responding to the recommendations of that policy, Botswana Training Authority (BOTA) was established under The Vocational Training Act of 1998. According to this Act, BOTA has a responsibility of establishing and implementing a Botswana National Vocational Qualification Framework (BNVQF) national unit standards and qualifications below technician level.

1. The components of BNVQF are the unit standards and the standard based qualifications which are developed by industry based committees, herein and later referred to as Standards Setting Task Forces (SSTFs). According to BOTA Terms of Reference for Standard Setting Task Forces, the desired composition of an SSTF is as follows:
   i. Not more than 12 persons belonging to or having interest in a specific sector;
   ii. Inclusive of an employer perspective;
   iii. Inclusive of an employee perspective;
   iv. Inclusive of professional or regulatory associations;
   v. Inclusive of training deliverers;
   vi. Inclusive of an NGO or Community perspective; and
   vii. Inclusive of the appropriate Government perspective.

It is the responsibility of SSTFs to generate content of the unit standards, specifying minimum requirement which providers have to base their curricula or programmes on. It is allowed for the provider to offer more than what is specified on these unit standards.

BNVQF qualifications are made up of sector specific, entrepreneurship, information and technology and generic/key unit standards. The awarding and certification body for these programmes is Botswana Training Authority.

Botswana Technical Education Programmes (BTEP)

Rocke-Collymore (2010), stated that BTEP Programmes are outcomes based TVET qualifications made up of modules. These modules are made up of mandatory and elective units, key skills, integrated project and work experience. These programmes are developed through participation of industry through Curriculum Development Groups and Programme Advisory Committees coordinated by a government department under Ministry of Education and Skills Development, called Department of Technical, Vocational Education and Training (DTVET). Assessment, moderation and verification for these programmes is undertaken by Quality Assurance and Assessment Unit under the same Ministry. The awarding and certification body for these

programmes is the Ministry of Education and Skills Development. These type of programmes are only offered in government training institutions, which are Brigades and Technical Colleges.

Franchised programmes

Training institutions also have a choice of purchasing Training Franchise Packs which include training programmes, assessment material, leaner guides and training guides. In some instances, the Franchisors are the awarding or certification body. There is no participation of the local industry in the development of training material for the franchised programmes. Although these type of programmes are mostly used by private training institutions, one technical college owned by the government offers a franchised hospitality programme.

Self – Development Programmes

With these programmes, a training institution develops a programme on what it would like to train on. There is no involvement of the local industry on the curriculum development for this type of programme. BOTA offers templates and support on how to develop these programmes.

Madirelo Training and Testing Centre (MTTC) Programmes

A government department under Ministry of Labour and Home Affairs called, Madirelo Training and Testing Centre is mandated to coordinate apprenticeship and industrial training programmes. This institution offers theoretical and practical contact sessions and later trainees go for apprenticeship attachment at workplaces. According to Mupimpila and Narayana (2009), the programmes offered by MTTC are employer based, which mean they are offered at the trainees' workplaces.

Statement of the Problem

Many countries continue to experience rising statistics of one of the macroeconomics a problem which is unemployment. This is common especially among the youth. Brigades, Colleges and University graduates are not immune from unemployment. Factors that contribute to unemployment are many, and research has pointed lack of relevant knowledge, skills and attitudes among the graduates as some of the factors. The 2011 Population and Housing Census revealed that the population of Botswana was 2,024,787. Out of this figure, 63.4% are between 15 and 64 years (CSO, 2011). In the State of the Nation Address by His Excellency, the President of Botswana, he reported that the 2012 population statistics reported 17.5% rate of unemployment.

Several studies that have been done in Botswana revealed that graduates

of the country's local vocational training institutions do not have current industry requisite skills. These are young people who trained in self -developed, franchised, BNVQF or Botswana Technical Education Programme (BTEP) training programmes. Mbayi (2013) stated that a large number the unemployed have not received formal education. Central Statistics Office cited by Mabyi revealed that 2% are Degree holders, 2% are Diploma holders and 10% of the unemployed are Certificate holders. The statistics above indicate that unemployment is high among certificate holders who are graduates of the vocational training system.

Justification of the Study

A study such as this one is relevant because there is a reformation and rationalization in Botswana's education system with the aim of raising the standard and quality of the system. Findings of the analysis will be of great help in guiding the development of quality assurance activities, systems and processes for use by Botswana Qualifications Authority (BQA) which was established in September 2013 by an Act of Parliament. This new regulatory body will be responsible for coordinating all quality assurance activities in Botswana's education system.

Research Scope

The study is based only on analysis of vocational training system, particularly quality assurance activities for programmes up to certificate level or equivalences of BNVQF Level 3. It covers both BNVQF and Non BNVQF programmes.

Research Aim and Objectives

This study aimed at exploring and analyzing the approaches used to ensure that there is no gap between the content of training programmes and what the labour market demands.

The study:

- Analyzed the quality assurance activities used by BOTA on the programmes it accredits, focusing specifically on the level of industry involvement and participation in the development of training curricula or training programme content.
- Made recommendations on how Botswana's vocational training system can be improved to ensure that all training initiatives are work based.

Literature Review

This section discusses the quality of the TVET system, and youth employability. Quality here is gauged by the level of participation in the development of content of training programmes. The section also discusses briefly, the theory which the research is premised on.

Education and Training for Employment

There has been extensive research done in education systems and employment settings that confirm that the output of quality TVET makes employees employable, competitive and flexible in changing occupations even beyond the country borders. These studies have established a positive relationship between youth employability and education and training. UNESCO-UNEVOC (2013) asserts that there is a strong link between what is leant in TVET and the needs of the labour market because graduates of high quality TVET are more likely to find employment either within or outside their country' borders. This is because quality assured qualifications makes the graduates portable.

According to Beach (1999), training is defined as an organised procedure by which employees learn knowledge and or skills for a definite purpose. From this definition, it is clear that the ultimate goal of training should be positive transfer of what is learnt to the workplace. In reviewing the training transfer literature, trainee characteristics, training design, work climate variables were seen to influence training transfer. It is also important to note that literature revealed positive relationship between these variables (Lim & Morris 2006). Even though the goal of training is clear, Lim and Morris (2006) stated that unfortunately, estimates suggest that only 10% of learning actually transfers to job performance.

Bridgwood (1987) argued that vocational education and training is seen as preparing people for the world of work and contended that it can be defined broadly or even narrowly. According to her, in its broad sense, all education is vocational in so far as it encourages qualities, attitudes, knowledge, understanding and competencies which are the necessary foundations for employment. HMSO (1985, as cited in Bridgwood, 1987) stated that narrowly, it refers to training for a specific vocation area.

Use of Industry Experts in Curriculum Development

Many company's use industry experts for developing the curricula or training programmes. This ensures that there is no content gap between what training offers and what the workplaces expect of employees. Hiring competent employees increases the company profits because employees would productively undertake

their duties (Mupimpila & Narayana, 2009). A case for Honda revealed that after economic downturn, the company sales went down and then Honda partnered with CETE/OSU to undertake the curriculum development process. That process involved analyzing the tasks and jobs for different occupations. The analysis revealed that Honda's training programme required additional content (Business & Management Practices, 2013). This shows how a systematic and structured approach of doing job analysis is important in determining the programme content.

Halasz (1997) stated that DACUM, used in workplaces and education settings, is a fast, effective, cost effective way of doing job analysis to inform training curricula. Halasz asserts that DACUM uses experts from the industry and that the validity of DACUM is based on the fact that expert workers understand and can explain their work environment more than anybody else. The DACUM process involves identification of the competencies required by employees for to better perform their tasks. These competencies are then classified into knowledge, skills and attitudes which are then translated into learning outcomes.

Romania has been working with a competence based VET system since 1995. In ensuring that the training standards based qualifications meet the sectoral labour market needs, and are delivered to an appropriate quality, the country developed both an NQF and NQAF. The regulatory body for TVET in Romania, National Centre for Technical, Vocational Education and Training Development (NCTVETD), has the responsibility of curriculum development, development of training standards and lastly development and validation of qualifications. It is only programme development which is the responsibility of providers (Hart & Rogojinaru, 2007). This approach has enabled Romania's TVET to improve to a certain degree.

This section has shown that training facilitates individual and organizational effectiveness. High quality TVET is determined by the level of involvement of industry throughout the system.

Findings from Vocational Education and Training Studies Conducted in Botswana

As revealed by tracer studies conducted by Department of Vocational Education and Training under Ministry of Education and Skills Development (DVET, 2005), Construction Industry Trust Fund (CITF, 2006) and Botswana Training Authority (BOTA, 2005; 2010) competencies of graduates of the local vocational education and training system do not match the industry demands.

The 2010 Tracer study that was conducted by BOTA revealed that employers reported that the graduates were not skilled enough to competently perform work roles. It also outlined that the graduates of the local vocational education

and training system pointed out that there is need for minimal improvements on the BNVQF awards in order to enhance the graduates' employability.

Mbayi (2013) stated that despite reforms in Botswana education system, particularly vocational training, it appears like the system is still underperforming. According to her study, the public vocational training system either produces graduates with low level technical skills for diamond cutting and polishing industry or does not produce relevant skills at all.

Mupimpila and Narayana (2009) supported that there is a significant relationship between economic growth and vocational education and technical training. On the other hand, contrary to what other analysts have pointed out as the cause of unemployment among the TVET system graduates, that the graduates are underachievers and are not skilled enough to undertake duties at workplaces, they argued that the high rate of unemployment among the TVET graduates is attributable to the fact that in Botswana, job creation in the formal sector is limited, hence disadvantages graduates with low level qualifications.

Theoretical Framework

The theoretical construct which influenced the study is the systems theory which assumes that organizations operate on an external environment and that this external environment impacts on the organizations internal environment (Cummings & Woley, 2008; Ott, Shafriz & Jang, 2010). Some of the characteristics of this theory that guided this study is that the theory states that organizations import energy from the environment, this means that the inputs or resources of production for products are obtained from outside the organization. This implies that involvement of the industry in curriculum development is critical. Secondly, the theory states that quality of through put depends on the quality of inputs and it has to be maintained if the output is to be of desired quality. This means that the Curriculum Development facilitators need to be qualified and skilled to undertake this duty. Thirdly, the theory asserts that information input, negative feedback and the coding process is important to the organization. This suggests that customer feedback is important is assisting the organization improve its processes. This aspect implies that it is very important to have independent evaluation of the TVET system in addition to the monitoring and evaluation activities undertaken by BOTA. Lastly, one of the characteristics is that of equifinality, which suggests that the desired end may be reached through various means. This implies that if the process which BOTA has been using does not yield desired results, the new regulatory body for TVET quality assurance activities will have to find another way that may bear fruits.

METHODOLOGY

Research Strategy

The study adopted a case study approach. It focused only on Botswana's vocational training system. There was triangulation of research strategies since both qualitative and quantitative methods were used for data collection and analysis. Qualitative strategy in the form of key informant structured interviews was used to enable the researcher to have in-depth insight about the key parameters of the investigation. The qualitative research approach seeks to understand a given research problem or topic from the perspective of the local population it involves (Cohen & Crabtree, 2009). Quantitative approach was used for gathering numeric data.

Desktop evaluation of documents was used for collecting secondary information on BNVQF unit standards and qualifications that are already registered on the database, number of training institution supported on curriculum development, number of accredited training institutions and programmes.

Research Design

The study was analytic in nature because the quality assurance activities which BOTA uses to ensure that the content of the training programmes used by the local training institutions address the current and future needs of the industry were investigated.

Findings/Results

Registration of Industry Based Committees (Standard Setting Task Forces-SSTFS) Responsible for BNVQF Unit Standards and Qualifications Development

It is the responsibility of BOTA to organize a team of subject matter experts for any sector for which national qualifications are to be developed. Each Standard Setting Task Force (SSTF) has an elected Chairperson, Deputy Chair, Secretary and Vice Secretary who work with a BOTA officer, Standards Specialist to manage the activities of the SSTF. These people are drawn from the industry.

By end of quarter 2 for the year 2012/13, there were 48 registered Standard Setting Task Forces.

Industry Involvement in Development of BNVQF Training Standards and Qualifications

Training standards and qualifications are developed by a subject matter experts and practitioners employed in a particular sector of the economy. The SSTF works under the guidance of a trained and skilful facilitator who serves as a process expert while the team members serve as content experts. These industry representatives explain precisely the job requirements for people working in that sector as well as how the job is done. This type of analysis provides the content of industry-recognized unit standards. The analysis of identified duties and tasks forms a solid research base upon which relevant competencies can be identified to inform design and packaging of qualifications as well as associated curricula materials. This system elicits the support of industry leaders in guiding training providers on what content to teach and strategies to use to meet industry needs.

It was observed that the content of unit standards specify the assessment mode for learning outcomes. The mode depends on the evidence to be collected by the assessor in order to determine the leaner's competence. Some learning outcomes are to be assessed theoretically while others are to be assessed in practical activities. For some unit standards, learners have to demonstrate their competence and collect evidence in a real working environment. Evidence of some of the Performance Criteria is to be gathered and assessed while the learner is on workplace attachment.

The development of qualifications involves packaging of industry specific, soft skills, entrepreneurship, and information and communication technology unit standards.

After developing unit standards and qualifications, they are quality audited, edited and then sent out to the whole industry for national endorsement, confirming that the contents address the needs of the labour market.

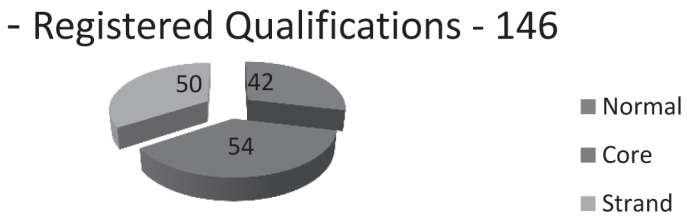
Registration of BNVQF Unit Standards

When the whole development process is complete, the unit standards are registered on the BNVQF. By 28 October 2013, it was reported that BOTA had registered 1452 unit standards on the BNVQF. These unit standards are from various Fields and Subfields of Learning. Out of these some have expired and are due for review.

Registration of BNVQF Qualifications

Just like unit standards, when the process of designing and developing Figure 1 illustrates all the different types of qualifications which BOTA had registered on the BNVQF by the 28 October 2013. These are also from various Fields and Subfields of Learning.

Figure 1: National Qualifications registered on the BNVQF



In a normal qualification, all the packaged unit standards are compulsory, which means that if a learner wants to be awarded a full qualification, they need to master all of these standards. A core qualification has a compulsory section and an electives section. An elective section provides a menu of unit standards from which the leaner is expected to choose learning outcomes that they would like to study in order to meet the minimum requirement of the full qualification. Lastly, a strand qualification has compulsory, elective and optional sections. The optional section provides a menu of different specializations or concentration areas which a learner has to choose from, in addition to the compulsory and election sections explained above.

Financial Costs for Development of Unit Standards and Qualifications

Development of unit standards and qualifications for one subfield would cost approximately:
Workshop packages for 6 meetings = BWP 252, 000.00
Sitting allowance at a rate of BWP300.00/day = BWP 108,000.00
Total = BWP360, 000.00 ~ $ 41, 472.00

Industry Involvement in Curriculum Development for Botswana TVET Programmes

BOTA provides support to training institutions on curriculum/programme development after which the curriculum/programme is submitted for accredi-

tation with BOTA. This support is offered at no cost for both BNVQF and Non-BNVQF programmes. Training providers are given the curriculum templates and assisted on what to write under each section.

Table 1 illustrates the different types of programmes that BOTA accredits and whether there is industry involvement in curriculum or programme development.

Table 1 Quality Assurance activities per type of qualifications

Type of programme	Quality Assurance activities coordinated by BOTA	
	Local industry involvement in programme development	Support in programme development
BNVQF	Yes	Yes
NON-BNVQF		
(a) BTEP	Yes	No
(b) Franchise	No	No
(c) Self-developed	No	Yes
(d) MTTC apprenticeship programmes	Yes	Yes

BOTA's Strategic Plan trend report indicated that by end of quarter 2 for the year 2012/13 only one (1) training institutions sought support on development of two (2) BNVQF programmes. On the other hand, support for fifty three (53) Non- BVQF programmes was provided to training institutions that had approached BOTA for assistance.

Industry Involvement in Development of Assessment Material for BNVQF Programmes

For quality assurance purpose, when unit standards and qualification development process is complete and they are registered on the BNVQF, another group of industry experts, called Assessment Material Development Panel (AMDP), is assembled to design and develop assessment materials. Only 25% of the members who would have been part of the SSTF are included in AMDP membership. Table 2 indicates Fields/ Subfields that have assessment materials. For a very long time until 2013, BOTA used to offer Standard Based Assessment Training to members of the AMDPs to build their capacity and provide them with knowledge and skills required when developing standard

based assessment materials. BOTA has since outsourced this function to one accredited training provider.

Table 2 Fields and subfields that have assessment material

Field	Subfield	
Agriculture and Nature Conservation	Beef Cattle Farming	
	Dairy Cattle farming	
	Small Tock farming	
	Poultry and Ostrich farming	
	Sub Total	4
Culture, Arts and Crafts	Choral Music	
	Traditional Song and Dance	
	Basketry	
	Pottery and Ceramics	
	Sub Total	4
Engineering and manufacturing	Machining and Fitting	
	Welding and Fabrication	
	Process Plant	
	Sub Total	3
Health and Social Services	Occupational Health and Safety	
	Sub Total	1
Services	Tourism	
	Travel	
	Wholesale and Retail	
	Hair Dressing	

	Beauty Therapy	
	Contact Centre	
	Sub Total	5
Education	Early Childhood Development	
	Trainer	
	Sub Total	2
	Total	19

Financial Costs for Development and Sale of Assessment Materials

Development of assessment materials for 1 qualification = P12, 000.00
Moderation of assessment tools for 1 qualification = P8, 000.00.
Total BWP = 20,000.00 ~ $ 2,304.00
BOTA sells assessment materials at a highly subsidised price of P5000.00 per qualification (~ $ 576). Regardless of this subsidy, only one training institution has bought assessment material for one (1) subfield of learning which is Skin and Body Therapy.

Accreditations of Training Institutions and Programmes

Programme evaluation prior to accreditation

BOTA has a structured system put in place where subject matter experts are drawn from the industry to evaluate training programmes before being accredited. Some of the items evaluated on the programme are evidence of alignment of the programme to national unit standards, information on benchmarking and articulation, assessment modes and moderation systems for the programme.

Accredited Programmes and Training Institutions

By the 25th August 2013 reporting period there were 392 accredited training institutions and 3617 accredited programmes. Out of the 3617 accredited programmes, 18/ 3617 (0.5%) are BNVQF programmes while 3599/ 3617 (99.5%) are non-BNVQF programmes.

Apart from programme evaluation, BOTA uses industry experts for undertaking a resource verification visit to the institutions. Basically these visits are done to confirm that the training institution has enough resources that will facilitate training.

Discussion

Development and Administration of BNVQF

It is commendable that BOTA uses industry experts to generate content of the training standards and standard based qualifications. However, the organization seems not to be doing so well as far as standards development and conducting review of expired unit standards and qualifications is concerned. There are few qualifications from varying Field of Learning that have been registered on the BNVQF. Non availability of qualifications in some subfields of learning leaves training institutions with no choice but to use non-BNVQF programmes, some of which were developed with no consultation or involvement of the local industry. Training providers end up using whatever they can easily access. The non BNVQF programmes (save for BTEP programmes) which are used by institutions are developed without local industry consultation and lack national endorsement.

Besides the non-availability of standards and qualifications in some fields of learning, there are some that were developed more than five years back which should have been reviewed by 2013 and BOTA has not undertaken reviews in some subfields. It is possible that the competencies specified in those standards which were relevant five years back are now obsolete. Some of these expired unit standards are still being used to package qualifications even in this year 2013.

Lack of BOTA availing BNVQF unit standards and qualifications on time for whatever reason, is not only an organization internal problem but leads to a disintegrated vocational education and training system that does not meet the needs of learners and the industry as the organization's mission states that it exits for all these. The consequence of this is that by the time the learners graduate, they would still have certain skill deficit and may find it difficult to find employment.

Lastly, the usage of non BNVQF programmes by vocational training institutions poses a great challenge for learners as both horizontal and vertical articulation, transitions into further training, credit transfer, and getting exemptions for learning outcomes already covered in lower levels, becomes difficult. Any certificate awarded after learners undergo training for non BNVQF programmes, particularly the self-developed ones, do not have international or even national recognition since such programmes did not gain national endorsement by the concerned sector of the industry. This is of great disad-

vantage to the learner of such a vocational training system because portability of their qualification is reduced.

Development and Sale of Assessment Material

The assessment materials for BNVQF programmes are unit standard based and their usage provides a standardized system of obtaining competence evidence expected of learners by the industry. The beauty of this type of assessment system is that it even allows leaners to compile portfolio of evidence whilst at work. The portfolio of evidence can later be submitted to BOTA for assessment and determining the learner's competence.

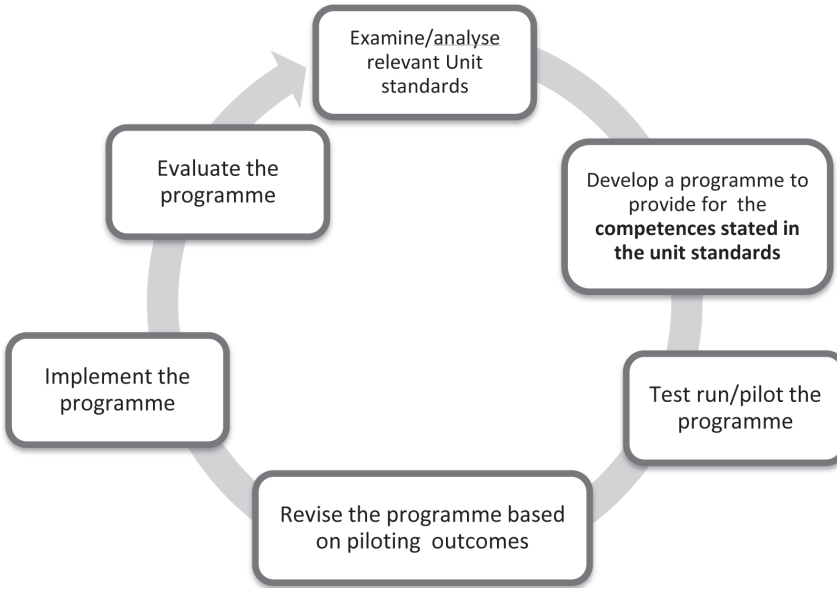
BOTA uses a lot of money to develop the assessment material. It is unfortunate that only one institution that offers a Beauty Therapy programme has purchased the assessment materials. Part of the explanation why training institutions do not buy assessment material could be attributed to the fact that almost all (99.5%) of the programmes are non-BNVQF, so there is no how they could buy assessment tools that are not aligned to the programmes they offer.

Local Industry Participation in Programme/Curriculum Development

There are various models of curriculum development in outcome based education. The approach which BOTA promotes or guides the industry on when developing curricula is the use of Unit Standard Based Curriculum Development model. This model is preferred because the content of the unit standards is generated by the industry based committees. The content is generated on the basis of the job and task analysis that is undertaken as a critical step in curriculum development. Job and task analysis ensures that training programmes are tailored for the current and future job demands.

Figure 2 below illustrates a six step unit standard based curriculum development process.

Figure 2: Unit Standard Based Curriculum Development Process
(Source: BOTA Curriculum Guidelines – BOTA.DSD.CDD.P03.F10)



This cycle indicates that curriculum development is not a ones off activity. It is a process which training institutions are continually engaged with. In Botswana, the responsibility of curriculum development lies with the training provider while, BOTA provides support and templates for both BNVQF and non-BNVQF programmes.

Accreditation of Institutions and Programmes

The results indicate that since the inception of BOTA, the focus of accreditation of programmes has been on non-BNVQF (99.5%) programmes even though BOTA was established to standardize qualifications with appropriate equivalencies; and facilitate development of curriculum that meets the demands of the economy. This situation is unfortunate because BOTA uses lots of monies on development of national standards, qualifications and assessment materials. Accrediting non BNVQF and BNVQF creates fragmentation of the system because the credit system used by training institutions differs on the type of programme they offer. This fragmentation hinders credit transfer and thus disadvantages the learners.

Regarding programme evaluation of non BNVQF by industry experts, it can be concluded that usage of one subject matter expert to evaluate a programme

may not really give an objective opinion on the content of the programme as opposed to what the entire industry would say, should endorsement be sought from them. It therefore cannot be guaranteed that the content of these type of programmes addresses the needs of the local industry.

Conclusion and Recommendations

Conclusion

A very good TVET is one that involves industry in the design, planning, implementation, monitoring and evaluation of the system. The study revealed that in Botswana, there is high level of involvement and participation of industry experts in generation of training standards, curriculum/programme development, programme evaluation, and verification visits at training institutions. All these quality assurance activities ensure that the contents of national programmes offered address the requirements of the labour market. This therefore means that the country has a robust quality assured vocational training system.

It can also be concluded that BNVQF, BTEP and MTTC programmes are demand driven as opposed to supply driven because there is industry influence of the training content for these programmes. The only challenge of running these programmes parallel is that monitoring, reporting and measuring quality of the entire vocational training systems is not well coordinated. The development of these programmes is time consuming and taxing to the industry experts since their involvement and level of participation is required by different bodies for almost the same products.

Although BNVQF programmes are quality assured, developed at a high cost which is borne by the regulatory body, BOTA allows for flexible delivery mode, benchmarked against programmes from other countries and are relevant to industry requirements, they study showed that most training institutions have over the years preferred to offer non- BNVQF programmes. Regardless of the benefits the national qualifications have for learners and the industry, uptake of BNVQF programmes has been slow.

The study was not able to prove whether or not the content of franchised programmes also addresses the needs of the local market. It only revealed that development of such programmes does not involve the local industry. Lastly, the quality of self-developed programmes could not be ascertained because the content of these programmes lies entirely on what the trainer wants to offer.

Recommendations

Based on the findings of the study, it is recommended that for Botswana's TVET system to improve, the country should:

- Develop a National Quality Assurance Framework that will harmonize with the National Credit and Qualifications Framework.
- Develop a system that allows for two pathways for vocational educational and training and general education to both lead to further study in university courses.
- Develop common curricula for use by local training institutions. However institutions should only be allowed to develop their own curriculum if there is evidence that whatever would be taught would meet all the requirements of the training standards since the standards specify the minimum requirements.
- Standardize the credit systems used by training institutions in order to facilitate learners' credit transfer should there be a need to do so.
- Fast-track development of assessment material for all the registered qualifications.
- Strengthen promotion and marketing of national programmes.
- Strengthen partnerships between training institutions and industry so that learners can access workplaces for exposure even before placement or attachment.
- Run one national system that involves the local industry for better coordination.
- Have one organization or government Ministry coordinating the apprenticeship programme for easy monitoring, evaluation and reporting.

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Illiteracy - An International Vocational Dilemma

Keith Wright, Director
International Language Academy (ILA)

Despite the billions of dollars expended by governments, international agencies and philanthropic benefactors in support of aid-related programs annually, hundreds of millions of people across the globe are eking out lives reeked with poverty, disease and despair. The causes are myriad but the overall outcome is the same – sheer misery and hopelessness.

While the individual, human consequences vary in their impact and intensity, there is one common, universal problem that could at least partly alleviate many of the other issues, if addressed nationally and internationally. That common problem is "Illiteracy".

It is estimated that there are more than 900 million illiterate adults in the world. Nearly 700 million of whom are believed to be women. The evidence is irrefutable that in the twenty-first century, illiteracy has reached "epidemic" proportions globally.

Added to this frightening situation is the fact that illiteracy is a major contributor, not just to poverty and unemployment but also to child labor - trafficking in women and children - infant mortality - the spread of diseases such as HIV/AIDS and to the deprivation of basic human rights.

Every nation, regardless of its economic status, has an illiteracy problem - one that ranges from being a major social issue to a plague-like situation that year by year remains neither contained nor abated.

While the task of alleviating global Illiteracy appears insurmountable because of people numbers, there is now a solution that other generations have not had. In this new millennium, English has become the "international" language. It is now the most globally used language medium in commerce, trade, industry, employment, communications, media, politics, tourism, education, law, and international relations.

Today, English is a "passport" to employment nationally and internationally. It is the magnet that attracts foreign investment into developing countries and is often the local "job-creator" in factories, on construction sites, in IT centers, tourist resorts and hotels.

As the "new" global language, English has the capacity to be a major, if not the most crucial weapon the world has ever had to break the poverty chains

that bind millions. The prerequisite however, is that the methodology used to impart these vital English language skills be appropriate to the needs of the new millennium and not the failed methods that have resulted in millions of casualties in education systems globally over the last six decades.

As the Director of the *International Language Academy (ILA)*, I have traveled to many parts of the world, particularly across the South Pacific region - throughout South East Asia and to far off places like Inner Mongolia and to hard-to-reach areas such as the Pacific island Nation of Nauru.

My personal objective has been to train teachers, tutors, trainers - and sometimes, parents – particularly in developing nations - to effectively use the accelerated English learning methodology I created, back in the mid Nineties, called the *4S Approach To Literacy And Language* that is now used in minor and major ways in over twenty countries.

Repeatedly, I have seen the lives of individuals totally changed through the acquisition of English language skills in just a matter of months. I have witnessed what personal proficiency in English can achieve in terms of self-esteem and giving some hope in the future, regardless of one's circumstances.

Those NGO's who work at the coalface of poverty know the truth of my assertion. In places like the squalid, Kibera slum in Kenya - in the Karen refugee camps on the Thailand border - in the no-go areas of Dhaka in Bangladesh – in mountain villages in Laos – in the Sepik River region of PNG – in Australia's Northern Territory - there is one "key" that can open the door to "new life" - that is the ability to speak English well.

While it is important for every nation to retain its "national language identity", political decision makers are realizing that in this modern world, a nation's long-term, economic strength depends, not just on its natural resources or its industrial and political might but on the literacy level of its people. Why? It is because the literacy level of the people rates as a crucial measure of a country's "human capital". Today, that Literacy Level is so often measured in terms of the English language.

Moreover, as more and more occupational opportunities around the globe require at least a basic, practical knowledge of English, raising the standards of English and eradicating Illiteracy are vocational imperatives. Combating illiteracy and enhancing English language skills therefore are not just social and educational necessities; they are also a Twenty-First Century, economic must.

Understandably, many people see English as an arduous and difficult language to master. The reality is that there are proven learner-friendly, techniques and tools that when used appropriately and with purpose, will significantly enhance personal English language skills and knowledge in a reasonably short period of time. The key to such accelerated improvement is to firstly understand the characteristics and attributes of the language.

In keeping with IVETA's objective of supporting all aspects of Vocational Education on an international basis, as the CEO of the International Language Academy (ILA), I welcome the opportunity to make available a free Tool Box of PDF English language files to anyone who makes contact by e-mailing contact @ila-english.com.au.

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The *International Journal of Vocational Education and Training* reflects regional contributions and is international in scope. Its purposes are to provide a forum for the discussion of vocational education and training issues and practices; to assist in the dissemination of information on research and practice; and to strengthen the lines of communication among individual researchers and practitioners, institutions, and organizations. In addition, it provides a platform for individual views on relevant issues.

The Editorial Board passed a resolution requiring membership in IVETA in order to publish in the Journal, with effect from Volume 14.2. The Journal publishes feature articles on research, theory, and practice broadly related to international vocational education and training. The largest section of the Journal is devoted to empirical research articles. General articles and research manuscripts submitted for publication should he between 1,200 and 5,000 words in length and should adhere to rules in the most recent edition of the Publication Manual of the American Psychological Association (APA) with the exception of placing tables in-column in the text where you prefer them to appear. Articles should deal with some relevant aspect of educational opportunity such as educational research, evaluation, instruction, teaching methods, policy making, or theoretical discourses related to education and training.

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Test Reviews. Test reviews should be between 500 and 750 words in length and contain the following information: complete bibliographic entry, including cost; the main purpose(s) of the test; a brief description of the administration and time; shortcomings and strengths; intended audience (whom will the test most benefit in the international education and training community); your opinion of the test (citing similar tests and the pros and cons relative to those tests); and what you think the test contributes to the international vocational education and training community.

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P.O. Box 5190 412 White Hall
Kent, Ohio 44242-0001 USA
(330) 672-2656
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