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The Constriants of Ghanaian Polytechnics in Adopting Competency Based Training (CBT): The Case of a Pilot-Tested Programme

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Abstract
Polytechnics in Ghana view Competency Based Training (CBT) as a major intervention to the perennial constraints confronting its education and training. On the basis of this, and by government policy, a pilot programme of CBT was instituted in all the 10 polytechnics of Ghana, and was pilot tested in, at least, one department. Agricultural Engineering was piloted in the three study Polytechnics namely; Tamale, Bolgatanga and Wa polytechnics. This study was therefore aimed at finding the constraints of the pilot programme. A sample size of 151 was then drawn out of a population of 240, including both students and lecturers. On survey administration, 145 questionnaires were retrieved, giving a response rate of 96.0%. The findings of the study revealed that CBT programme is undoubtedly career focused and career oriented as compared to the traditional education. However, the polytechnics need to further build their capacity to handle the CBT programmme in terms of human resource, adequate infrastructure and modern equipment. Also, in the absence of electronic libraries, the polytechnic libraries still harbour obsolete reference books and materials. Therefore there is the need for an e-library to improve the capacity of the stock reference materials, while the curricula of the polytechnics be made more relevant to industry by involving members of industry and other stakeholders among other things.
Keywords: Competency Based Training, Constraints, Pilot Programme, Polytechnics, Ghana.

1. Introduction

Of late, the polytechnic education system and its curriculum has become a major source of concern to many Ghanaians; following a paradigm shift from its existing curriculum to CBT, there is also a vision to convert polytechnics in the country into technical universities. This innovation is viewed by the polytechnics as a major intervention in dishing out the right educational offering to the students, especially in the Technical and Vocational programmes.

It is hoped that the adoption of CBT in the current converted polytechnics to Technical Universities will still be relevant since Competency Based Training (CBT) is an approach to Technical and Vocational Education and Training (TVET) that focuses primarily on what a person can actually do in the workplace as a result of completing a programme of training (Boahin and Hofman, 2012).

2. Development of Polytechnic Education in Ghana

Governments upon governments before and after independence of Ghana laid emphasis on the importance of formal education, viewing it as an impetus to rapid national development. Both colonial and post-colonial governments placed a premium on education, especially, technical education. Education was thus placed at the centre of Ghana's economic and social development policies following its independence in 1957 and the 1961 Education Act (Akyeampong, 2010).

In order to strengthen technical and vocational education at higher levels the Polytechnic Law (PNDCL 321 of 1992) which was replaced by the Polytechnics Law (Act 745) in 2007 established the polytechnics in Ghana, elaborating its objectives as: To provide tertiary education in the fields of manufacturing, commerce, science, technology, applied social sciences and applied arts, etc; and to provide opportunities for skills development, applied research and publication of research findings.

In March 2003, Ghana was selected to benefit from the NUFFIC programme. In consultation with relevant stake holders, the Ghana government recommended the ten (10) Polytechnics as beneficiaries to the programme. According to Afeti et al., (2003), one of the priority areas of the NUFFIC Programme was the development of the Competency Based Training (CBT) programme in fashion, design and textiles, agricultural engineering, civil engineering, building and construction, automobile and Plant Engineering. The specific objective of the project was, among other things, to offer training opportunities for students and staff for the development of skills and knowledge in the relevant areas. The programme started with the provision of needed equipment and series of workshops for trainers of trainees. The Netherlands Foundation for International Cooperation (NUFFIC) picked some Polytechnic programmes to pilot a project on CBT (NUFFIC, 2005). The ultimate aim of the project was to strengthen the Agricultural Engineering programme for the enhancement of education and training in order to achieve rural development, food security and poverty reduction in Ghana

(NUFFIC, 2005).

CBT Disciplines in Ghanaian Polytechnics are spelt out as follows: Agricultural Engineering (Ho, Wa, Bolgatanga and Tamale), Civil Engineering (Kumasi and Takoradi), Automobile Engineering (Koforidua), Building Technology (Sunyani and Cape Coast), Fashion Design and Textiles (Accra and Takoradi), Plant Engineering (Accra) (Sundong and Oman, 2013). Competency Based Training (CBT) is supposed to be industry or demand driven.

3. Overview of the CBT model

Mrowicki, (1986) defines Competency Based Training as a component of essential skills, knowledge, attitudes, and behaviours required for effective performance of a real-world task or activity. Unlike the traditional Training efforts, learning is centred on subject contents, and the instruction is teacher-centred and time-based. CBT is believed to have close connection between theory and skills; it is industry-focused and student-centred. It is also believed to be an exploratory form of learning among trainees (Cremers et al., 2005). In the traditional approach, the role of the lecturer is restricted to that of the expert, while class size is large and the teaching strategy is the lecture method. On the contrary, CBT training is flexible, not time-based and where learners progress through modules or in small groups at their own pace. The role of the instructor is that of a coach, mentor or facilitator (Eggink and Van Den Werf, 2006). CBT can be viewed as education based on outcomes and pre-determined standards on what students can do (Biemans et al., 2004).

This new phenomenon is gradually gaining grounds in all spheres of educational reforms in Ghana. Council for Technical and Vocational Education and Training (COTVET, 2006) outlines the Ghanaian concept of competence to mean the capacity of an individual to perform a professional task to a specified standard. Similarly in Europe, competence is viewed as the capacity to perform specific tasks and roles to the expected standards in a given context or profession. In the UK, competence is defined in the context of output whereas in the USA, is used to imply potential and cognitive process rather than demonstrated proficiency. (Biemans et al., 2004; Mulder et al., 2006).

Competency Based Training (CBT) is an alternative strategy for Hands-on Training that can be adopted in Ghanaian Polytechnics. McClelland's (1973) is often cited as the proponent of competency where he laid emphasis on "Testing for Competence Rather than for Intelligence," The methods of CBT are regarded as suitable for several reasons. In CBT, training is divided into learnable units or elements of competence targeted towards specific skill development (Eggink and Van Den Werf, 2006). So the CBT study programmes in the country have been organised into modules and each module contains specific competencies required for a job. It is noteworthy that to acquire a national certification (Higher National Diploma) it requires the completion of all modules within the specific skill area, along with the related support subjects (COTVET, 2006).

Modularisation is of paramount importance in the implementation of CBT in the polytechnics since it produces graduates with specific competencies, and ensures success and mastery of each task (Boahin and Hofman 2013). Field visits and interviews will have to be conducted with people who have a stake in the profession. The learning outcomes of CBT are based on standards set by industry, and assessment is designed to ensure that each student has achieved all the outcomes (skills, knowledge and attitudes) required by each module (Boahin and Hofman, 2012). Smith & Nangle (1995) noted that with CBT, the student's achievement is measured against the Training Package or competency standards set by industry, and not against the achievement of other students. The learner is then assessed to find the gap between the skills they need (as described in the Training Package) and the skills they already have. They further explained that skills gap is the difference between the skills needed and the skills already acquired. Evidently, competency Based Training (CBT) is an industry and demand driven education and training programme based on well defined industry generated standards (occupational standards). The emphasis of CBT is on Do It Yourself (DIY). Which is synonymous with acquisition of Knowledge, Skills, Attitudes and Personality Traits.

Some countries, however, are of the view that CBT training is too behaviouristic and narrowly focusing on skills with resources being inadequate, low enthusiasm on the part of students to learn, absence of career guidance system, all these coupled with inadequate professional and staff development (Mulder, 2004; Sullivan, 1995). Notwithstanding the assertion made above, CBT is believed to have transformed the Vocational Education and Training (VET) sectors and economies of many countries by way of increased skills and productivity, efficiency, effectiveness and quality products (Mulcahy & James, 2000).

4. Polytechnic Curriculum Change

CBT calls for pedagogical change in the polytechnic curriculum and instructional approaches, incorporating outcome based learning with little emphasis on theoretical understanding of concept. The Japanese International Cooperation Agency (JICA)'s report on TVET in Ghana revealed that 'the Curricula of Higher National Diploma (HND) were more theory oriented than the craft and technician courses, with theory-based form of assessment (JICA, 2001). The polytechnics of Ghana are anticipated to play a lead role in the provision of employable skills

for graduates; skills that are needed to propel all the economy for national development. On the contrary, the current curricula and the mode of delivery of Ghanaian polytechnics are driven by theoretical knowledge which gives little attention to skills development (Gondwe and Walenkamp, 2011). In view of this, there is the need to transform the polytechnics' curricula and its delivery in order to conform to the TVET sector. Thus Competency Based Training (CBT) is intended to provide the alternative method of delivery for the polytechnics (Salifu *et al.*, 2010).

5. Challenges Associated with the Polytechnic System

Biemans et al (2004) on Malawis educational system revealed that implementation of CBET approach in the TEVET system was overshadowed by a number of factors which include; CBET being viewed as expensive to implement; misunderstandings of CBET objectives; disconnection between student priority and CBET objectives; increased work load and too much paper work for instructors.

Nyarko (2011) clearly indicated that the Polytechnics in Ghana were upgraded to tertiary institutions without the necessary funding and other resources. He further explained that the Government expenditure per Polytechnic student in 1990 was US$ 168 as compared to US$ 2100 per University student. This actually fell to US$ 74 per Polytechnic student by 1998 during which time that of the University student fell to US$ 900. Another window of funding for Polytechnics as at then also came to being, thus, Teaching and Learning Innovation Fund (TALIF).

In terms of practical experience a study has indicated that some employers complained of some polytechnic graduates lacking practical knowhow needed by the local job market (Kanyiri, 2012). The absence of training in practical and entrepreneurial skills remains a recurrent point of criticism in formal employer feedback from Ghana Employers Association (GEA, 2006). Again, the requisite skills required by industries and those assumed to be acquired from the polytechnics appears to be sub-standards when viewed against the competencies required for performance on-the-job (Obeng et al., 2013).

In terms of staffing the Polytechnics faced serious staffing problems when they were upgraded from second cycle institutions to tertiary institutions. Inadequate qualified and professional staffing posed problems for teaching, learning and research. However, by pragmatic staff development programmes, the Polytechnics have been able to upgrade the qualifications of most of the staff. At the moment, there are several staff members on study leave in institutions both home and abroad. The situation is improving but there is still room for further improvement (Nyarko, 2011). With the implementation of this new innovation, most of the teaching staff in the department of agriculture in the Tamale polytechnic have undergone training in CBT either within the Polytechnic, or in the Netherland(Aboko and Obeng, 2015; NUFFIC, 2008).

In terms of resources, Pelga (2008) asserts that insufficient funding, logistics and other resources were making competency based technical training in the nation's polytechnics ineffective, calling on the Government to adequately resource the nation's polytechnics. According to MOESS (2008), Technical, Vocational Education and Training (TVET) institutions lack workshops, tools and equipment and even machines that are currently available are often decades old and bears little resemblance to what is currently used in industry.

6. Purpose of the Study

The purpose of the study was to take a critical look at the CBT model which was pilot-tested in Ghanaian polytechnics. The study assessed the contraints of the CBT programme with respect to the piloted programmes in the country. The study also investigated the adequacy of funding, staffing, workshops and laboratories, books and other reference materials for full implementation of the CBT programme in Ghana.

7. Objectives of the Study

The objective of the study was to examine from both students' and lecturers' perspectives

- Whether there was still a gap or mismatch between the CBT curriculum and the industry
- Whether industry was involved in the conversion of the syllabus to CBT and retraining of staff in the industry
- Industrial Training in the Student's Area of Specialisation
- To find out the challenges faced by the piloted programme

8. Research Methods

The survey was conducted using the quantitative approach to solicit the viewpoints of participants. This was carried out in the three polytechnics of northern Ghana; Tamale polytechnic, Bolgatanga polytechnic and Wa polytechnic respectively. The selection was by way of convenient sampling out of the ten (10) polytechnics. The population for the study was made up of both students and lecturers in the departments in which CBT was pilot-tested. A total population of 240 was involved out of which 200 were students and 40 were lecturers. However, the special nature of the population per department had called for the use of the purposive sampling of the non-probability method

on the part of lecturers; therefore lecturers in the CBT departments of the three polytechnics were sampled using the purposive method, hence 31. The total population of the students on CBT from the three polytechnics, especially the second and third year students, was 200 and a sample of 120 was drawn based on the sample size determination table (see Crejcie & Morgan, 1970). Ideally both students and lecturers were actively involved in order to obtain a representative sample. A sum total of 151 questionnaires were then administered to both students and lecturers, including interviews to collect data regarding the overall behavioral changes about CBT. However 145 were returned, representing a response rate of 96.0%. The data were analysed with the SPSS using descriptive statistics.

9. Summary of Results

Table 1. Characteristics of Respondents (Students)

Gender	Count	Percent
Male	104	91.2%
Female	10	8.8%
Total	**114**	**100%**
Department		
Agric. Eng.	108	94.7%
Civil Eng.	6	5.3%
Total	**114**	**100%**

Table 2. Characteristics of Respondents (Lecturers)

Gender	Count	Percent
Gender		
Male	31	100.0%
Female	0	0.0%
Total	**31**	**100%**
Level of Education		
HND	10	32.3%
Bachelor's Deg	2	6.5%
Master's Deg	19	61.3%
Department		
Agric Eng.	28	90.3%
Civil Eng.	3	9.7%
Total	**31**	**100%**

Table 3. Yes or No scale (students' perspective)

Variable	YES	NO	Total
1. Mismatch between institutions and the industry	70	44	114
	61.4	38.6	100%
2. CBT is more career oriented than the TE	99	14	113
	87.6	12.4	100%
3. Scoring students on CBT is not realistic	39	74	113
	34.5	65.5	100%

Table 4. Yes or No scale (lecturers' perspective)

Variable	YES	NO	Total
1. Mismatch between institutions and the industry	24	7	31
	77.4	22.6	100%
2. .CBT is more career oriented than the TE	28	3	31
	90.3	9.7	100%

Table 5. students' perspective

Variable	SA	A	N	D	SD	Total
1. The polytechnic has enough lecturers to handle CBT	36	34	10	24	10	114
	31.6	29.8	8.8	21.1	8.8	100(%)
2. The polytechnic lacks enough workshops for training	43	28	6	26	10	113
	38.1	24.8	5.3	15.9	8.8	100(%)
3. The polytechnic lacks enough lecture rooms for CBT	45	40	2	18	8	113
	39.8	35.1	1.8	15.9	7.1	100(%)
4. Laboratories are well equipped for CBT Students	41	53	2	11	4	111
	36.9	47.7	1.8	9.9	3.6	100(%)
5. Internship is relevant to my field of study	42	54	8	7	2	113
	37.2	47.8	7.1	6.2	1.8	100%
6. Most competencies are taught in the abstract	34	46	11	18	5	114
	29.8	40.4	9.6	15.8	4.4	100%

Table 6a. 5-point rating scale (lecturers perspective)

Variable	SA	A	N	D	SD	Total
1. The polytechnic has enough lecturers to handle CBT	13	10	5	1	2	31
	41.9	32.3	16.1	3.2	6.5	100(%)
2. The polytechnic lacks enough workshops for training	7	19	2	3	0	31
	22.6	61.3	6.5	9.7	0.0	100(%)
3. The polytechnic lacks enough lecture rooms for CBT	5	13	9	4	0.0	31
	16.1	41.9	29.0	12.9	0.0	100(%)
4. The polytechnic needs adequate funding	26	5	0	0	0	31
	83.9	16.1	6.1	0.0	0.0	100(%)
5. Laboratories are well equipped for CBT Students	0	7	13	10	1	31
	0.0	22.6	41.9	32.3	3.2	100(%)

Table 6b. 5-point rating scale (lecturers perspective)

Variable	SA	A	N	D	SD	Total
6. Industry took part in the redesign of curricula	1	8	1	19	1	30
	3.3	26.7	3.3	63.3	3.3	100(%)
7. Industry took part in my retraining & orientation	1	15	2	12	0	30
	3.3	50.0	6.7	40.0	0.0	100(%)
8. Most competencies are taught in the abstract	1	14	9	7	0	31
	3.2	45.2	29.0	22.6	0.0	100(%)

10. Discussion of Results

The CBT Education was introduced in, at least, one department in all the polytechnics as a pilot programme. For the three study areas; Tamale, Bolgatanga and Wa Polytechnics, the initiative was in the Agricultural Engineering Departments. The study took into consideration both male and female students and the distribution was as follows: The male students were 104 and the female students were 10, giving a total of 114 participants. The students were from two departments; Agricultural and Civil Engineering where the CBT programme was ran (Table 1).

On the part of lecturers only male participants were available with a total of 31, all from either Agricultural or Civil Engineering department. The academic level of qualification of the lecturers were as follows: Those with master's degree were 19 and those with bachelor's degree were 10 while HND holders were 2 as displayed in (Table 2).

10.1 Mismatch of the CBT to Industry

On a "Yes" or "No" scale the CBT programme is undoubtedly career focused; career oriented as compared to the traditional technical education, as 99(87.6%) of the students answered in affirmative (Table 3). Likewise the lecturers (Table 4), 28(90.3%) agreed to this fact (Table, 4). In terms of relevance of CBT curricula to industrial needs, 70 out of 114 students, representing 61.4% expressed the sentiment that there is a bit of mismatch (Table 3). Forty-four (38.6%) of them were of the view that there is no mismatch. Lecturers 24 (77.4%) were also of the view that there was mismatch between the curriculum and industry (Table 4), as against their counterparts (22.6%) who answered in affirmative to the same question.

10.2 Involvement of Industry and Retraining of Staff

In trying to determine the involvement of industry in the redesign of the curricula, 9 (30.0%) of the lecturers expressed the view that industry was involved in the redesign of the curricula, and 20 (66.6%) of them rejected the idea that industry was involved in the redesign process (Table 6b). The study surveyed the retraining and reorientation of lecturers in the process of CBT implementation, and 16 (53.3%) of them gave affirmative responses while 12 (40.0%) answered negatively (Table 6b).

10.3 Industrial Training in the Student's Area of Specialisation

On one hand, Interns were thoroughly investigated to determine whether the practical training given to them in industry was in their area of specialization and 96 (85.0%) of the students asserted that the practical training was in their area of specialisation. On the other hand, there were few students 9(8.0%) who had reservations about the training given to them in industry (Table 5).

10.4 Challenges of the CBT Programme

On a 5-point likert scale, both students and lecturers were asked to rate their opinions as to whether the polytechnics have adequate lecturers to handle the CBT programme. Both lecturers (74.2) and students (61.4) indicated that there were adequate lecturers. However 29.9% disagreed on the part of the students (Table 5), while 9.7% disagreed on the part of lecturers (Table 6a). The investigation also revealed that polytechnics lack adequate workshops for practical training on CBT, as 62.9% of students and 83.9% of lecturers indicated as such (Table 5 and 6a). The polytechnics lack enough lecture rooms for the CBT programme, since 85 (74.9%) of the students and the lecturers 18 (58.8%) attested to this fact (Table 5 and 6a). This is a confirmation of Pelga's (2008) assertion that insufficient funding, logistics and other resources were making CBT in the nation's polytechnics ineffective. Overwhelming majority of students (84.6%) was of the opinion that there were adequate laboratories for CBT (Table 5). About (35.5%) of the lecturers were of the opinion that there were adequate laboratories for CBT as compared to their counterparts who were on the contrary (22.6%) and about 41.9% of the lecturers reserved their comments (Table 6a).

Usually funding is the lifeblood of any successful training programme. All lecturers, 31 (100.0%) were of the opinion that the CBT programme needed sufficient funding (Table 6b). This underscores the assertion that polytechnics in Ghana were upgraded to tertiary institutions without the necessary funding and other resources (Nyarko, 2011).

The essence of CBT is hands on experience. Opinions of respondents were also sought to find out whether some of the competencies were taught in the abstract, and 80 (70.2%) of the students admitted the fact with only 23(20.2%) of the students disagreeing to this fact (Table 5). Lecturers (48.4%) were also of the view that some of the competencies were still taught in the abstract as against (22.6%) that had a contrary view (Table 6b).

11. Conclusion

All in all, CBT programme is undoubtedly career focused and career oriented as compared to the conventional education. As Gasper (2005), puts it, the herald of Competency Based Training into the Polytechnic educational system will provide the necessary skills and competencies in graduates for sustainable development.

The polytechnics lack adequate lecturers to handle the CBT programme, including workshops, and lecture rooms, laboratories, etc,. Polytechnics need more physical resources for competency-based training (pelga, 2008). This is in line with the views of MOESS (2008), Technical, Vocational Education and Training (TVET) institutions lack workshops, tools and equipment and where they are even present, machinery is often decades old and bears little resemblance to what is currently used by industry.

However some of the competencies were taught in the abstract and 70.2% of the students admitted the fact. All lecturers admitted the fact that the CBT programme needed sufficient funding. A large majority of the lecturers however maintained that there was a bit of mismatch in the CBT curricula. In trying to determine the involvement of industry in the redesign of the curricula, 66.6% of the respondents rejected the idea that industry was involved in the redesign process. The study enquired the retraining and reorientation of lecturers with the implementation of the CBT pilot programme, and 53.3% of them gave affirmative responses while 40.0% answered negatively. The study had been eventful and undoubtedly unearthed the constraints of the CBT pilot programme in the three polytechnics; in the northern, upper east and west regions of Ghana.

Recommendations

In order to improve CBT Education in the three polytechnics of Ghana, it would be recommendable to improve infrastructure in terms of workshops, lecture rooms, electronic libraries and laboratories. By this, it would improve the applicability of the great deal of theories learned in the classroom and also encourage reflective learning. Lecturers also need reorientation to CBT as well as further development of their capacities, especially in the industries. The traditional curriculum should always be translated into CBT with the involvement of industry; this is a bid to enhance the relevance of the curriculum and to reduce mismatch or bridge any skill gap. Interactions with a few CBT graduates reveal that some of them were still unemployed, indicating that they needed proper orientation to the objectives of CBT and skills that were relevant to the world of work; they should be given the right skills for both wage and self-employment. In terms of funding, Polytechnics should not rely solely on GETFund or on government as Nyarko (2011) puts it; they should diversify their sources of funding. These should include appeals to industry, philanthropist and the alumni. Polytechnics can also generate funds by running short courses for local entrepreneurs and artisans as well as providing consultancy services and writing proposals for external funding.

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