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# Perceptions of Stakeholders on the Industrial Attachment Programme of Ghanaian Public Polytechnics

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**Abstract**
Industrial attachment based on experiential learning offers the most promising strategy in the development of productive and technically skilled human capital potentials of students in Ghanaian public polytechnics for the world of work. However, inadequate logistics, funding and follow-up visits and supervision of students on attachment seem to hinder the success of the industrial attachment programme of polytechnics in Ghana. This paper seeks to assess the perceptions of stakeholders on how the industrial attachment programme in selected Ghanaian public polytechnics affects the development of human capital. Mixed method and analytical research designs were employed in conducting the study with a sample of 594 respondents. Descriptive and inferential statistics were employed in data analysis. The study found that the industrial attachment programme has been perceived as a catalyst to human capital development in Ghanaian public polytechnics because it serves as a perfect transition from the classroom to the world of work. The disparities in perceptions of the industrial attachment programme for each pair of the four categories of stakeholders was moderate, while disparities in the perceptions of Accra and Kumasi Polytechnics; as well as Kumasi and Takoradi Polytechnics was small. To ensure effective, efficient and holistic practical development of human capital in Ghanaian public polytechnics, experiential learning via industrial attachment should be vigorously pursued by all polytechnics in connection with its stakeholders.
**Keywords:** Perceptions, stakeholders, industrial attachment programme, experiential learning, Ghanaian public polytechnics

## 1. Introduction

Technical and vocational education and training has been recognised and touted as an effective means of facilitating economic growth and national development. The educational reforms of Ghana in 1987 and 2007 underscored the significance of technical and vocational education and training in improving national development. Hence, the Polytechnic Law of 1992, PNDC Law 321 which established the polytechnics was repealed and replaced by the Polytechnic Act, 2007, Act 754 (GoG, 1992). This mandated the polytechnics as technologically oriented institutions to actively contribute to national development by providing career focused education and skill training to the highest level; to provide opportunities for applied research in close collaboration with business and industry and to provide employable skills for graduates in order to help reduce the high rate of unemployment in Ghana (Kwame, 2001; Amankwah, 2011). Indeed, contemporary labour market requires graduates with employable and productive skills, competences and abilities. In response to the need to provide graduates with the required stock of productive, creative and innovative skills, technical knowledge, competences and abilities embodied in labour, competency based training and industrial attachment has been introduced in Ghana's system of polytechnic education (Takoradi Polytechnic, 2011; Kumasi Polytechnic, 2012; Tamale Polytechnic, 2012; Accra Polytechnic, 2013).

One of the efficient learning approaches employed in delivering effective technical and vocational education and training is experiential learning. Experiential learning is learning through sense experiences (Jarvis, 1995) and involves education and training that occurs as a direct participation in the events of life (Houle, 1980). Industrial attachment based on experiential learning and other forms of anticipatory socialisation has become increasingly popular among tertiary institutions with particular reference to polytechnics in Ghana. This is because industrial attachment underpins polytechnic education as a practical mechanism in developing the technical and vocational human capital needs for national development. Industrial attachment is a skill training programme design to bridge the gap between the theoretical world of academic enterprise and the world of work of professional practice (Lauber, Ruth, Theuri & Woodlock, 2004).

It is a vital component of the polytechnic curriculum and is directly related to the major career interests of the students. Empirical evidence shows that internship has improved students' self-confidence, and social skills; increased practical knowledge and skills; enhanced employment opportunities (Sharma, Mannell, & Rowe, 1995); provided students with the opportunity to develop a more accurate self-concept and test for fitness between individual characteristics and demands of work environment (Callanan & Benzing, 2004); exposed students to real work environment and apply theory to practice (Ayarkwa, Adinyira & Osei-Asibey, 2012). On

 

the basis of experiential learning, industrial attachment serves as a conduit in the transition from the classroom to the world of work. For this reason, it has been regarded as a critical academic enterprise in the development of human capital potentials in the polytechnics for the world of work.

Laudable as the industrial attachment programme seem to depict, there are discerning and contrary perceptions among stakeholders about the programme. The perceptions relate to the annual recurrence of challenges in the placement of students on attachment, inadequate logistics and funding for payment of overnight and supervision allowance of staff involved in follow-up visits and supervision (Adjei, 2013). This observation has the tendency of hindering the ultimate significance of the industrial attachment programme. Therefore, it was imperative to study and highlight the perceptions of stakeholders of the industrial attachment programme of Ghanaian public polytechnics.

The objective of this paper, therefore, was to assess the perceptions of stakeholders on the industrial attachment programme in selected Ghanaian public Polytechnics. Furthermore, the paper sought to test the hypotheses that there are no significant differences in the perceptions of the industrial attachment programmes among the four stakeholders (students, senior members, members of professional association and members of industry) and the four selected polytechnics (Accra, Kumasi, Takoradi and Tamale).

The paper is organized in five sections. It begins with an introduction, theoretical perspectives, methodology, and results and discussion based on stakeholders' perceptions of the industrial attachment programme in selected Ghanaian public polytechnics. It also presents conclusions and recommendations on major issues.

## 2. Theoretical Perspectives

The study was guided by the human capital theory and experiential learning theory. The concept of human capital relates to the stock of productive skills and technical knowledge embodied in labour which serves as means of production, into which additional investment yields additional output. According to Organisation for Economic Co-operation and Development (OECD) (1998, p.9), human capital is "the knowledge, skills and competencies, and other attributes embodied in individuals that are relevant to economic activity". Similarly, human capital has been defined as "an intangible asset, best thought of as a stock of embodied and disembodied knowledge, comprising education, information, health, entrepreneurship, and productive and innovative skills, that is formed through investments in schooling, job training, and health, as well as through research and development projects and informal knowledge transfers" (Ehrlich & Murphy, 2007, p.2).

The theory of human capital operates on the assumption that formal education is highly instrumental and necessary in improving the production capacity of a population. It emphasizes on how education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability which is a product of innate abilities and investment in human beings (Sakamota & Powers, 1995; Psacharopoulos & Woodhall, 1997).The human capital theorists argue that an educated and trained population is a productive population. Hence, investment in education, training and health of a country could increase its human capital resource base and potential productivity.

Experiential learning is a "direct encounter with the phenomenon being studied rather than merely thinking about the encounter, or only considering the possibility of doing something about it" (Borzak, 1981, p. 9, cited in Brookfield, 1983; Smith, 2005). Proponents of experiential learning have tended to use the term in two contrasting senses (Brookfield, 1983). On one hand, it is used to describe the sort of learning undertaken by students who are given a chance to acquire and apply knowledge, skills and feelings in an immediate and relevant setting. The second type of experiential learning is "education that occurs as a direct participation in the events of life" (Houle, 1980, p.221). Here, learning is not sponsored by some formal educational institution but by people themselves. It is learning that is achieved through reflection upon everyday experience and is the way that most of us do our learning.

In the opinion of Jarvis (1995), experiential learning is akin to the acquisition of knowledge primarily through sense experience without recourse to the idea of secondary experience. It also involves a number of responses to the potential learning situation through trajectories of non-learning, non-reflective and reflective learning. The trajectory of non-learning consists of presumption, non-consideration and rejection. The trajectory of non-reflective learning consists of pre-conscious, practice and memorisation while the trajectory of reflective learning consists of contemplation, reflective practice and experiential learning (Jarvis, 1987; 1995). The thesis of Jarvis provides an excellent framework for planning, teaching and learning activities and serves as a guide to students in acquiring knowledge and skills through practical observation of expert performance (Tenant, 1997). Critics argue that the theory of Jarvis is too simplistic. It has no capacity to measure the degree of integration of learning style and needs to recognise differences in cognitive, communication styles and cultural experience (Tenant, 1997).

## 3. Methodology

Mixed method research approach and analytical research design involving both quantitative and qualitative

 

methods were employed for the purposes of triangulation and complementarity. The essence of triangulation is to collect, analyse and seek corroboration between quantitative and qualitative data while complementarity is to use quantitative and qualitative methods to measure overlapping but distinct facets of the relationship and difference between perceptions of stakeholders on the industrial attachment programme in a single study (Caracelli & Greene, 1993; Creswell, 2003). The application of multiple sources of evidence in a study helps to have a clearer understanding of the research problem by converging numeric trends from quantitative data and specific details from qualitative data (Martens, 2003).

The study population consisted of third year students and senior members (lecturers and administrator) from four selected public polytechnics including Accra Polytechnic, Kumasi Polytechnic, Takoradi Polytechnic and Tamale Polytechnic. Members of industries and professional associations who were beneficiaries of the industrial attachment programme were included. Purposive, simple random and systematic sampling techniques were adopted in selecting 594 respondents for the study. Purposive sampling was employed in selecting all beneficiary industries of the industrial attachment programme, from records of the industrial liaison officers of the four polytechnics. Consequently, 85 members of industry who worked directly with students on attachment where purposely selected. Four polytechnics (Accra Polytechnic, Kumasi Polytechnic, Takoradi Polytechnic and Tamale Polytechnic) were purposively selected because they were part of the six polytechnics that were first upgraded to tertiary institutions, placed emphasis on practical training through industrial attachment and were located in the metropolis with concentrations of industries (Takoradi Polytechnic, 2011; Kumasi Polytechnic, 2012; Tamale Polytechnic, 2012; Accra Polytechnic, 2013). Hence, 118 senior members who were directly involved in the planning and implementation of the industrial attachment programme were purposively selected. The systematic sampling technique was adopted in selecting 355 students from a total of 6,718 third year students from the four polytechnics based on the sample size determination method of Krejcie and Morgan (1970). Thirty-six members of profession associations involved in the industrial attachment programme of the polytechnics were also purposively sampled. In all a sample of 594 respondents were selected for the study.

Survey and interviewing were adopted as methods of data collection. Instruments such as questionnaire, interview guide, and focus group discussions were used in collecting primary data (Sarantakos, 1998; McBurney & White, 2007). Questionnaires were used for students, senior members, members of industry and professional associations while interview guide was used for key stakeholders (executive officers of industry and professional associations and senior management of the polytechnics). Focus group discussion (FGD) was also held for key stakeholders in the polytechnics and industry.

Descriptive and inferential statistics were employed in analysing both qualitative and quantitative data. Data was processed using Statistical Product and Service Solutions version 16 and presented in tables. Analysis of Variance (ANOVA) was employed to determine whether stakeholders significantly differed in their perceptions regarding the industrial attachment and human resource development dimensions at 0.05 significant level and the p-value. The Post Hoc Test was also conducted, using Tukey's HSDTest to determine exactly where the differences among the groups occurred (Pallant, 2005). The results and discussion were presented using the Likert scale, means and percentages.

## 4. Results and discussion

### 4.1 Perception of students on the industrial attachment programme

The productive knowledge, skills, competences, and attitudes as perceived by the students related to student's career, communication, problem solving abilities and human relations. The majority of students were of the view that industrial attachment assisted in developing students' job related skills (97.4%), enhancing job placement (90.7%), developing students' problem solving skills (86.5%), developing students' communication skills (85.1%), training students in latest technology (88.7%) and developing students' human relations skills (70.4%) as illustrated in Table 1

**Table 1: Perception of students on the industrial attachment programme**

| Statement | SA % | A % | U % | D % | SD % |
|---|---|---|---|---|---|
| Industrial attachment should develop a students' job-related skills | 56.3 | 41.1 | 2.0 | 0.6 | 0.0 |
| Attachment should enhance job placement opportunities of students | 38.3 | 52.4 | 4.5 | 3.4 | 1.4 |
| Industrial attachment should develop a students' problem-solving skills | 34.1 | 52.4 | 6.8 | 5.1 | 1.7 |
| Internships should develop a students' communication skills | 33.0 | 52.1 | 6.2 | 8.2 | 0.6 |
| Industrial attachment should allow the student to earn academic credit | 6.9 | 48.2 | 7.6 | 6.5 | 0.8 |
| Industrial attachment should allow the student to earn money | 20.6 | 36.9 | 16.1 | 18.8 | 7.6 |
| Attachment should provide training in the latest technology | 44.5 | 44.2 | 5.4 | 4.5 | 1.4 |
| Industrial attachment should develop a students' human relations skills | 40.8 | 29.6 | 6.8 | 12.7 | 10.1 |

Legend: SA=Strongly agree; A=Agree; U=Undecided; D=Disagree; SD=Strongly disagree n=355
Source: Field survey, 2010

With regard to knowledge and skills relating to jobs, problem solving and latest technology, a civil engineering student of Takoradi Polytechnic, in a focused group discussion remarked:

> I gained much experience and skills in the use of dummy levels by being able to set the leveling instrument without flaws, take levels for finishing and checks. I also acquired the skill of reading and interpretation of drawings and could therefore read and interpret the bending schedule, setting out, setting of template, concrete mix ratio, grounding, plinths, tower erection, retaining wall and fencing.

Similarly, an accountancy student of Kumasi Polytechnic, in a focus group discussion indicated:

> Certainly, the industrial attachment programme gave me the opportunity to observe and practice accounting and bookkeeping skills of accounting, using calculators, using adding machines, accounts payable, accounts receivable, payroll, income tax, typing, billing, money handling, keeping records, supervisory experience, spreadsheets and using computers.

As a vital component of Ghana's system of polytechnic education, industrial attachment based on experiential learning provides students with an opportunity to directly participate, observe, practice and assimilate productive knowledge, skills and competencies, and other attributes embodied in individuals that are relevant to economic activity (OECD, 1998).This conforms to the findings that adequate completion of industrial attachment and cooperative education assignments improve individual career decision-making, self-efficacy, strengthen the crystallization of vocational self-concept, and allow for the acquisition of job relevant skills (Garavan & Murphy, 2001). This is significant for the world of work as it provides employable skills for graduates and helps reduce the high rate of unemployment in the country (Amankwah, 2011).

**4.2. Perception of senior members on the industrial attachment programme**

It was also revealing to note that the senior members had the perception that industrial attachment enhances polytechnic-industry relationship, trains students in latest technology, integrates practical knowledge into theory, builds students' professional confidence, bridges the gap between classroom and the world of work and prepares students for absorption into the workforce of related industries. In this regard, the majority of the senior members, out of the 118 respondents held the view that industrial attachment in Ghanaian public polytechnics enhances polytechnic-industry relationship (96.8%), trains students in the latest technology (89%), integrates practical knowledge with theory (96.6%); builds students' professional confidence level in their area of specialisation (95.8%), bridges the gap between classroom and the world of work (96.6%) and prepares students for ready absorption into the workforce of related industries (89.8%)(Table 2). The Rector of Takoradi Polytechnic intimated in an interview that, on a number of occasions, Volta Aluminum Company (VALCO) in Tema, provided opportunity for lecturers of the polytechnic to sharpen their skills and knowledge. Such lecturers, after their internship, came back to campus with discarded equipment donated by VALCO meant for teaching and learning. The views of senior members with regard to industrial attachment are consistent with the observation that internship based on experiential learning creates a platform for improved student self-confidence, self-concept and improved social skills (Gillan, Davie, & Beissel, 1984); increased practical knowledge and skills (Williams, Sternberg, Rashotte, & Wagner, 1993) and enhanced employment opportunities (Clark, 1994; Sharma, Mannell, & Rowe, 1995).

**Table 2: Perception of senior members on the industrial attachment programme**

| Statement | SA % | A % | U % | D % | SD % |
|---|---|---|---|---|---|
| Industrial attachment enhances polytechnic industry relationship | 36.4 | 59.3 | 4.2 | 0.0 | 0.0 |
| Industry influences the structure of the polytechnic curriculum | 18.6 | 56.8 | 11.9 | 11.9 | 0.8 |
| Industrial attachment helps develop industry support for polytechnics | 19.5 | 55.1 | 16.9 | 7.6 | 0.9 |
| Industrial attachment injects new ideas in the latest technology | 28.0 | 55.7 | 11 | 3.4 | 1.7 |
| Attachment gives students chance to integrate practical experience with theory | 46.6 | 50.0 | 2.5 | 0.8 | 0.0 |
| Attachment builds students' professional confidence in their area of specialisation | 44.1 | 51.7 | 3.4 | 0.8 | 0.0 |
| Industrial attachment bridges the gap between classroom and world of work | 42.4 | 54.2 | 2.5 | 0.8 | 0.0 |
| Attachment prepares students to be absorbed into workforce related industries | 35.6 | 54.2 | 5.9 | 4.2 | 0.0 |

n=118

Source: Field survey, 2010

**4.3. Perception of members of professional associations on the industrial attachment programme**

Unlike the senior members and members of industry, majority of the members of professional associations disagreed that industrial attachment aided firms in recruiting and selecting new-full time employees(83.3%);

fostered linkages between the polytechnics and industry(83.4%); injected new ideas into an organisation(83.8%); reduced a firm's cost of recruiting new full-time employees (83.4%); allowed firms the opportunity to influence the structure of polytechnics' curriculum (72.2%); developed industry support for polytechnic programmes (72.2%) and provided companies with a source of part-time employees (83.4%)(Table 3).

With regard to whether industrial attachment aided firms in recruiting and selecting new full-time employees, the Western Regional representative of Ghana Institution of Surveyors affirmed in an interview that:

> There is no way a student after going through just 3-6 months attachment can be recruited as a surveyor without going through the professional training and successfully passing the prescribed examinations. This is a specialized area and we do not just recruit for recruiting sake.

As to whether industrial attachment allowed firms the opportunity to influence the structure of polytechnic's curriculum, a vice regional president of the Chartered Accountants (CA) Ghana, remarked in an interview as follows:

> CA Ghana is prepared to help restructure and review the polytechnic curriculum regularly. However, this is not the case. Polytechnics and CA Ghana have very little interactions in terms of the structure of the curriculum, and they continue to teach the old stuff and what fascinates them.

**Table 3: Perception of members of professional associations on the industrial attachment programme**

| Statement | SA % | A % | U % | D % | SD % |
|---|---|---|---|---|---|
| Industrial attachment should aid firms in recruiting and selecting new full-time employee | 2.8 | 13.9 | 0.0 | 36.1 | 47.2 |
| Industrial attachment should foster linkages between the polytechnics and industry | 8.3 | 8.3 | 0.0 | 52.8 | 30.6 |
| Attachment should provide industry with a source of employees for special projects | 8.3 | 8.3 | 0.0 | 38.9 | 44.5 |
| Industrial attachment should inject new ideas into an organisation | 5.6 | 5.6 | 0.0 | 55.5 | 33.3 |
| Industrial attachment should enhance the sponsoring company's community image | 8.3 | 8.3 | 0.0 | 25.0 | 58.4 |
| Attachment should reduce a firm's cost of recruiting/selecting new full-time employees | 0.0 | 14.0 | 2.8 | 52.8 | 30.6 |
| Attachment allows firms the chance to influence the structure of polytechnics' curriculum | 5.6 | 13.9 | 8.3 | 50.0 | 22.2 |
| Industrial attachment should develop industry support for polytechnic programmes | 5.6 | 13.9 | 8.3 | 50.0 | 22.2 |

n=36

Source: Field survey, 2010

**4.4. Perception of members of industry on the industrial attachment programme**

Like the students and senior members, majority of members of industry had the perception that the industrial attachment programme in Ghanaian public polytechnics provided the opportunity of fostering linkages between the polytechnics and industry (90.5%)(Table 4). In agreeing with the view that industrial attachment provided the opportunity of fostering linkages between the polytechnics and industry, an industry-based supervisor at Ghana Cocoa Board in an interview in Kumasi affirmed that:

> To be able to turn out well trained personnel who would be technically competent to address the needs of industries, trade and commerce, there was the need for a strategic partnership and collaboration between industry and academic institutions to provide opportunities for students' internship or attachment in order that theories learnt could be applied to practical situations in work places.

Furthermore, the study revealed that majority of the members of the industry had the perception that industrial attachment assisted in providing industry with a source of employees for specialised projects (81.1%), injecting new ideas into an organisation (80.0%), and reducing a firm's cost of recruiting new full-time employee (65.8%). Responding to the issue as to whether industrial attachment helped in reducing a firm's cost of recruitment, the human resource manager of Electricity Company of Ghana, in a focus group discussion in Takoradi, remarked that after spending resources to train a good student intern for three months or more, it will not be advisable to let him go away with the skills and knowledge acquired from the company. Again, most of the respondents had the perception that industrial attachment allowed firms the opportunity to influence the structure of the polytechnics' curriculum (76.5%), and develop industry support for polytechnic programmes (81.2%) (Table 4).

 

**Table 4: Perception of members of industry on the industrial attachment programme**

| Statement | SA % | A % | U % | D % | SD % |
|---|---|---|---|---|---|
| Industrial attachment should aid firms in recruiting and selecting new full-time employee | 24.7 | 50.6 | 10.6 | 10.6 | 3.5 |
| Industrial attachment should foster linkages between the polytechnics and industry | 32.9 | 57.6 | 7.1 | 2.4 | 0.0 |
| Industrial attachment should provide industry with a source of employees for special projects | 17.6 | 63.5 | 9.4 | 9.4 | 0.0 |
| Industrial attachment should inject new ideas into an organisation | 21.2 | 58.8 | 11.8 | 8.2 | 0.0 |
| Industrial attachment should enhance the sponsoring company's community image | 12.9 | 64.7 | 21.2 | 1.2 | 0.0 |
| Attachment should reduce a firm's cost of recruiting/selecting new full-time employees | 12.9 | 52.9 | 18.8 | 11.2 | 3.5 |
| Attachment allow firms the opportunity to influence the structure of polytechnics' curriculum | 22.4 | 54.1 | 15.3 | 7.1 | 1.2 |
| Industrial attachment should develop industry support for polytechnic programmes | 16.5 | 64.7 | 17.6 | 1.2 | 0.0 |

n=85

Source: Field survey, 2010

Similarly, as to whether industrial attachment allowed firms the opportunity to influence the structure of the polytechnics' curriculum, in an interview, the public relations officer of Volta River Authority emphasized that:

> The academic curricula of the polytechnics were gradually getting out of tune with expectations of the industries since most of the manufacturing systems and machinery in the industry were of the modern state-of-the-art technology. Hence, the need for collaboration between the polytechnics and industry in fine tuning the programmes currently run by the polytechnics.

The perception of the respondents on industrial attachment was tested by employing the one-way between groups ANOVA with post-hoc analysis to ascertain the differences in the perceptions of industrial attachment programmes across the four stakeholders. The output of the analysis showed the descriptive statistics, ANOVA, and multiple comparison of the mean difference. The descriptive statistics of stakeholders for the perception of industrial attachment in terms of the number in each group, means, standard deviation and standard error as well as the confidence interval for mean, minimum and maximum is presented in Table 5. The overall mean score (M=35.15, SD=6.90) and category of stakeholders' mean score (students [M=35.33, SD=4.13]; senior members [M=41.64, SD=4.64]; industry [M=32.59; SD=3.09] and professional associations [M=18.25, SD=9.37]) represent the numerical average difference of the stakeholders in the perception of industrial attachment at 95% confidence interval.

**Table 5: Descriptive statistics of stakeholders on the perception of industrial attachment**

| Respondents | N | M | SD | 95% confidence interval for mean | | Minimum | Maximum |
|---|---|---|---|---|---|---|---|
| | | | | Lower bound | Upper bound | | |
| Students | 355 | 35.33 | 4.131 | 0.219 | 34.90 | 35.76 | 18 |
| Senior members | 118 | 41.64 | 4.638 | 0.427 | 40.80 | 42.49 | 28 |
| Industry | 85 | 32.59 | 3.087 | 0.335 | 31.92 | 33.25 | 24 |
| Professional association | 36 | 18.25 | 9.370 | 1.562 | 15.08 | 21.42 | 9 |
| Total | 594 | 35.15 | 6.903 | 0.283 | 34.60 | 35.71 | 9 |

Source: Field survey, 2010

However, the mean score does not provide the statistically significant difference on the perception of industrial attachment programme for the four stakeholders. Hence, the need for ANOVA, which gives both between-groups and within-groups sums of squares, degrees of freedom (df), mean squares, F-value and sig. (ρ-value). The results of the ANOVA indicated that there was a statistically significant difference at the $\rho<.05$ level in the perception of industrial attachment programme for the four stakeholders. That is, [$F(3, 590) = 250.41$, $\rho=.000$]. This means that there is a significant difference somewhere among the mean scores on the dependent variable (overall perception of industrial attachment programme) for the four stakeholders (Table 6).

 

**Table 6: Total perception of stakeholders on industrial attachment**

| Source | Sum of squares | Df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| Between groups | 15827.266 | 3 | 5275.755 | 250.408 | 0.000 |
| Within groups | 12430.485 | 590 | 21.069 | | |
| Total | 28257.751 | 593 | | | |

Source: Field survey, 2010

The resulting statistically significant difference in the mean scores on perception of industrial attachment programme across the four stakeholders showed that the hypothesis, which states that there is no significant difference with regard to the perception of the industrial attachment programme across the four stakeholders (senior members, students, industry and professional associations) in Ghanaian public polytechnics, was not upheld. It can, therefore, be concluded that there are disparities in perception of the industrial attachment programme across the four stakeholders. However, this does not clearly spell out the differences in perception of one stakeholder from the other on the perception of industrial attachment. Consequently, the post-hoc multiple comparisons, using Tukey HSD test was employed to ascertain the statistical significance of the differences between each pair of stakeholders (Table 7).

**Table 7: Dependent variable: Total perception of stakeholders on industrial attachment**

Tukey HSD

| (I) Respondents | (J) Respondents | Mean difference (I-J) | Std. error | Sig. | 95% confidence interval Lower bound | Upper bound |
|---|---|---|---|---|---|---|
| Students | Senior members | -6.317* | .488 | .000 | -7.57 | -5.06 |
| | Industry | 2.739* | .554 | .000 | 1.31 | 4.17 |
| | Professional associations | 17.077* | .803 | .000 | 15.01 | 19.15 |
| Senior members | Students | 6.317* | .488 | .000 | 5.06 | 7.57 |
| | Industry | 9.056* | .653 | .000 | 7.37 | 10.74 |
| | Professional associations | 23.394* | .874 | .000 | 21.14 | 25.65 |
| Industry | Students | -2.739* | .554 | .000 | -4.17 | -1.31 |
| | Senior members | -9.056* | .653 | .000 | -10.74 | -7.37 |
| | Professional associations | 14.338* | .913 | .000 | 11.99 | 16.69 |
| Professional Associations | Students | -17.077* | .803 | .000 | -19.15 | -15.01 |
| | Senior members | -23.394* | .874 | .000 | -25.65 | -21.14 |
| | Industry | -14.338* | .913 | .000 | -16.69 | -11.99 |

*The mean difference is significant at the .05 level.

Source: Field survey, 2010

The results of the post-hoc comparisons, using the Tukey HSD, indicated that the perception of each pair of the four groups on the industrial attachment programme was statistically significantly different from one another in Ghanaian public polytechnics. Similarly, the mean score for students (M=35.33, SD=4.13); senior members (M=41.64, SD=4.64); industry (M=32.59; SD=3.09) and professional association (M=18.25, SD=9.37) was comparatively significantly different from one another. Indeed, the statistical significance in terms of the actual difference (.06) in the mean scores of the stakeholders was moderate. The effect size was determined by the criterion classification which states .01 as small effect, .06 as moderate effect and .14 as a large effect (Cohen, 1988). The effect size, using eta squared, is defined by dividing the sum of squares between-groups (15827.266) by total sum of squares (28257.751).

Similarly, the one-way between groups ANOVA with post-hoc tests was employed to establish the differences in the perception of industrial attachment across the four polytechnics (Accra, Kumasi, Tamale and Takoradi) in Ghana. The output of the analysis on the descriptive statistics of the polytechnics for the perception of industrial attachment showed an overall mean score (M=35.15, SD=6.90) and category of polytechnics' mean score (Accra [M=33.98, SD=7.81]; Kumasi [M=36.92, SD=4.75]; Tamale [M=35.24; SD=4.60] and Takoradi [M=34.30, SD=8.59]) represent the numerical average difference of the polytechnics in the perception of industrial attachment at 95% confidence interval and not a consensus rating by the polytechnics (Table 8)

**Table 8: Descriptive statistics on the perception of polytechnics on the industrial attachment programme**

| | | | | 95% confidence interval for mean | | | |
|---|---|---|---|---|---|---|---|
| Respondents | N | M | SD | Lower bound | Upper bound | Minimum | Maximum |
| Accra | 128 | 33.98 | 7.812 | .690 | 32.62 | 35.35 | 9 |
| Kumasi | 169 | 36.92 | 4.753 | .366 | 36.20 | 37.64 | 25 |
| Tamale | 113 | 35.24 | 4.595 | .432 | 34.38 | 36.10 | 18 |
| Takoradi | 184 | 34.30 | 8.593 | .633 | 33.05 | 35.55 | 9 |
| Total | 594 | 35.15 | 6.903 | .283 | 34.60 | 35.71 | 9 |

Source: Field survey, 2010

Nevertheless, the mean score does not provide the statistically significant difference on the perception of the polytechnics on industrial attachment. Hence, the need for a test of significant difference using ANOVA. The results of the ANOVA showed that there was a statistically significant difference at the $\rho<.05$ level in the scores for the perception of industrial attachment across the four polytechnics. That is, [$F(3, 590) = 5.99$, $\rho=.001$]. This implies that there is a significant difference somewhere among the mean scores on the dependent variable (overall perception of industrial attachment) for the four polytechnics (Table 9).

**Table 9: Total perception of the polytechnics on the industrial attachment programme**

| Source | Sum of squares | Df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| Between groups | 835.833 | 3 | 278.611 | 5.994 | .001 |
| Within groups | 27421.917 | 590 | 46.478 | | |
| Total | 28257.751 | 593 | | | |

Source: Field survey, 2010

The resulting statistically significant difference in the mean scores on perception of industrial attachment across the four polytechnics in Ghana showed that the hypothesis, which states that there is no significant difference in terms of the perception of the industrial attachment programme across the selected polytechnics (Accra, Kumasi, Tamale, and Takoradi) in Ghana, was not upheld. It means that there are disparities in the perceptions of industrial attachment among the four polytechnics. However, this does not clearly spell out the differences in perception of one polytechnic from the other on industrial attachment.

In this regard, the post-hoc multiple comparisons, using Tukey HSD test, was employed to ascertain the statistical significance of the differences between each pair of the polytechnics. Consequently, the results of the post-hoc comparisons, using the Tukey HSD, indicated that the perception of Accra and Kumasi; as well as Kumasi and Takoradi on industrial attachment was statistically significantly different from one another, and vice versa, in Ghanaian public polytechnics. Similarly, the mean score for Accra (33.98, SD=7.81) and Kumasi (M=36.92, SD=4.75); Kumasi (M=36.92, SD=4.75) and Takoradi (M=34.30, SD=8.59) was significantly different from one another (Table 10). In spite of reaching statistical significance, the actual difference (.03) in the mean scores of the respondents was small. The effect size was determined by the criterion classification which states .01 as small effect, .06 as moderate effect and .14 as a large effect (Cohen, 1988). The effect size, using eta squared, is defined by dividing the sum of squares between-groups (835.833) by total sum of squares (28257.751). However, the difference between Accra and Tamale, Accra and Takoradi, Kumasi and Tamale, Tamale and Takoradi was not significant.

**Table 10: Dependent Variable: Total perception of industrial attachment programme**

Tukey HSD

| (I) | (J) | Mean difference | Std. error | Sig. | 95% confidence interval | |
|---|---|---|---|---|---|---|
| Respondents | Respondents | (I-J) | | | Lower bound | Upper bound |
| Accra | Kumasi | -2.933* | .799 | .001 | -4.99 | -.87 |
| | Tamale | -1.255 | .880 | .484 | -3.52 | 1.01 |
| | Takoradi | -.315 | .785 | .978 | -2.34 | 1.71 |
| Kumasi | Accra | 2.933* | .799 | .001 | .87 | 4.99 |
| | Tamale | 1.678 | .828 | .180 | -.46 | 3.81 |
| | Takoradi | 2.618* | .726 | .002 | .75 | 4.49 |
| Tamale | Accra | 1.255 | .880 | .484 | -1.01 | 3.52 |
| | Kumasi | -1.678 | .828 | .180 | -3.81 | .46 |
| | Takoradi | .940 | .815 | .656 | -1.16 | 3.04 |
| Takoradi | Accra | .315 | .785 | .978 | -1.71 | 2.34 |
| | Kumasi | -2.618* | .726 | .002 | -4.49 | -.75 |
| | Tamale | -.940 | .815 | .656 | -3.04 | 1.16 |

*The mean difference is significant at the .05 level.

Source: Field survey, 2010

## 5. Conclusions and recommendations

The industrial attachment programme based on experiential learning approach has been perceived by stakeholders as a catalyst to human resource development in Ghanaian public polytechnics. It serves as a perfect transition from the classroom to the world of work by developing students' job related skills, and enhancing job placement opportunities, as well as developing the problem solving, communication and human relations skills of students as indicated by Ayarkwa, et al. (2012). It also enhances polytechnic-industry relationship, integrates practical experience with theory, builds students' professional confidence level, and bridges the gap between classroom and world of work. Similarly, it serves as a source of recruiting and selecting new employees, injecting new ideas into an organisation, and developing industry support for polytechnic programmes. However, the disparities in perception of the industrial attachment programme for each pair of the four categories of stakeholders (senior members, students, industry and professional associations) was moderate. Similarly, the disparities in perception of the industrial attachment programme for each pair of the four selected polytechnics (Accra, Kumasi, Tamale, and Takoradi) was small. The implication is that there is the need for an effective blend of theoretical and practical approach to learning in polytechnic education. The development of the human capital potential of students in Ghanaian public polytechnics can be achieved by employing experiential learning via industrial attachment. Therefore, to ensure effective, efficient and holistic practical development of human capital in Ghanaian public polytechnics, experiential learning via industrial attachment should be vigorously pursued by all polytechnics in connection with its stakeholders.

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