American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)
ISSN (Print) 2313-4410, ISSN (Online) 2313-4402

http://asrjetsjournal.org/

Do Lecturers Transfer the Required Skills in Workshops and Laboratories? A Case Study: College of Technological Studies, Kuwait.

Prof. Salah Al-Ali*

Department of Production Engineering, College of Technological Studies Kuwait.
drsalali@yahoo.com

Abstract

Engineering education policy makers and specialists during the last 10 year have focused on linking school, especially vocational and technical institutions, to the world of work, hoping to provide industry and business with the required knowledge, skills, and attitudes. However, there is a considerable gap in the literature between what is learned in workshops and laboratories and the real-life context of vocational and technical students' present and future workplace. Lecturers in the Gulf States (e.g., Kuwait, Saudi Arabia) may have limited experience, compared with their counterparts in developed countries, in terms of the level of knowledge and working experience in those industries and businesses recruiting graduates from vocational and technical institutions. Therefore, lecturers in vocational and technical institutions in the Gulf States may not have the ability to monitor, assess, maintain, and adapt the technology applied in related industries and businesses. This paper examines whether lecturers consider those skills most needed by industry when teaching their workshops and laboratories. In other words, do lecturers know the level of knowledge, skills, and attitudes required in today's workplace? The study also examines the degree of industrial involvement with vocational and technical lecturers in determining the types of knowledge, skills, and attitudes that need to be stressed. The study includes a review of the related literature and a questionnaire distributed to a sample of lecturers at the College of Technological Studies. Personal interviews were conducted with selected heads of departments, deans of industrial liaison offices, and department trainees' direct supervisors in local industry. This paper concludes that lecturers' workshops and laboratories must emphasize and develop the knowledge, skills, and attitudes needed by industries, otherwise industries will continue to rely on expatriates for their workforce.

---

* Corresponding author.
E-mail address: author@institute.xxx .

Keywords: Vocational and technical Education, developing Indigenous Manpower, Interaction between vocational and technical education and local industries, Kuwait.

1. Introduction

Since science and technology are changing rapidly, industry and business require a workforce with a broader skill base, thus placing extensive pressure on vocational education and training providers to improve the competitiveness of their graduates. In most developing countries, especially in the Gulf States, the need for skilled and semi-skilled national labor is considered, first, a government priority in national human resource development. There is much criticism in the literature that what is being taught in the classroom is quite different from what is being practiced in the real life [12,14]. As a result, most developing countries seem reluctant to employ indigenous labor and thus rely on expatriates for their workforce. On the other hand, teachers have been somewhat isolated from technology applied in certain industries, which is negatively reflected in the quality of curricula, teaching methods, research and development, and the level of staff competencies. The authors in [16:45] argued that for fruitful change to occur in the classroom, "teachers need access to information concerning current practices and trends."

Industries and businesses spend billions of dollars every year to employ and train workers to increase profitability by reducing costs associated with training, profits, and production errors [5]. The Partnership for 21st Century Skills in the United States has encouraged institutions to incorporate 21st-century knowledge, skills, and attitudes into educational curricula [11:1]:

In an economy driven by innovation and knowledge ... in marketplaces engaged in intense competition and constant renewal ... in a world of tremendous opportunities and risks ... in a society facing complex business, political, scientific, technological, health and environmental challenges ... and in diverse workplaces and communities that hinge on challenges ... and in diverse workplaces and communities that hinge on collaborative relationships and social networking ... the ingenuity, agility and skills of the United States people are crucial to U.S. competitiveness.

Indeed, the success of an economy would depend extensively on the optimal utilization of its human resources, as the Economic and Social Research Council in 2005 stated [4]: "Economic success is increasingly based on the effective utilization of intangible assets, such as knowledge, skills, and innovative potential as the key resource for competitive advantage." Therefore, vocational and technical education is on the forefront of seeking new strategies and approaches to preparing the workforce of the future.

Much of the vitality of vocational and technical institutions resides in the faculty and how professors connect with their students. Faculty must have opportunities to use and enhance their teaching skills in their classrooms. New teaching strategies and methods should stress active questioning, activities that encourage cooperative learning, and real cases studies and solutions. However, there is a common belief that vocational and technical education is failing to respond to the need of business and industry and thus their graduates lack the skills needed in the world of work. Researchers in the field of vocational and technical education have expressed

serious concern about the obvious gap between what industrialists want and what the recipients of vocational and technical institutions expect [6].

This gap is due to many reasons: Students are not fully aware of course objectives, students are not listening to their lecturers and advisors, a lack of machines and tools in workshops, lack of participation in class exercises, and ineffective appraisal schemes. Therefore, employers seem reluctant to hire vocational and technical graduates who lack certain skills. The *Occupational Outlook Handbook* [15] in 2010 listed the following skills most needed by employers, in order of importance, "communication skills, analytical skills, teamwork skills, technical skills (as related to major), and a strong work ethic" [9]. The Partnership for 21st Century Skills [11:12] listed the skills most needed by industries and businesses as professionalism, teamwork, oral communications, ethics, and social responsibility and the American Management Association [2: 2] has revealed that reading and writing skills are not enough for a worker to start a job, adding critical thinking, communication, collaboration, and creativity.

In Kuwait, the effectiveness and efficiency of vocational and technical education has been a major concern for decision makers for the last 35 years. Suffering from a shortage of local skilled and semi-skilled manpower, the Kuwaiti government established the College of Technological Studies (CTS) under the umbrella of the Public Authority for Applied Education and Training (PAAE&T), established in 1982, hoping to eliminate and/or reduce dependence on expatriates. PAAE&T consists of the CTS, the College of Business Studies, the College of Business Education, and the College of Health Service, the High Institute of Energy, the Sabah Al-Salem and Shweekh branches of the Industrial Training Institute, the Institute of Nursing, and the Higher Institute for Communications and Navigation. According to PAAE&T's main website,

The College of Technological Studies has established an educational philosophy in order to achieve a strategic national objective; that is, to invest in the people of Kuwait in building a productive future for Kuwait. The role of the college is to design and offer study programs that help develop the graduate with executive capabilities and grant academic credentials from vocational licenses to scientific degrees.

In Kuwait, increasing the numbers of skilled and semi-skilled national workers is the highest government priority in national human resource development. Expatriates form 69% of the total workforce. The World Bank classified Kuwait as having the fourth smallest ratio of national to expatriate workers in the world [17]. Kuwait is also currently one of the top countries in terms of financial transfer to expatriates' countries of origin [1]. The domination of expatriates is visible in most sectors, especially manufacturing, construction, transportation, storage, communications, financial insurance, real estate, and business services. This ratio of national labor to expatriates is also noted in occupational groups. In 2008, there were 22,825 non-Kuwaiti medical and science technicians, compared to 7,028 Kuwaitis; 120,438 non-Kuwaitis in the production sector, compared to 8,986 Kuwaitis; and 24,313 non-Kuwaiti engineers, compared to 6,741 Kuwaitis [10].

2. Research objectives

a. Measure the availability of a scheme to evaluate instructors' competencies.

b. Measure the types of skills transferred in workshops and laboratories**.**

c. Measure lecturers' attitudes toward collaboration with industry.

d. Measure industry's perception of CTS graduates.

e. Discussions and conclusions.

3. Research methodology

3.1 Design

This research consists of a descriptive survey designed to measure the perceptions of a selected sample in terms of instructor competencies and the types of skills transferred in workshops and laboratories

3.2 Sample

The target population in this research consists of lecturers (holding a PhD) teaching subjects that involve the analysis of case studies, the application of problem-solving methods, and the use of machines and tools in the coursework, workshops, and laboratories. There were 251 lecturers, 182 of whom held a PhD, teaching in six departments at the CTS. This research selected three, or 50%, of the departments, namely, the Manufacturing Engineering Department, the Electrical Engineering Department, and the Petroleum Engineering Department. From each of these three departments, six PhD holders were chosen for the purpose of this research. The selection criterion for the three departments was that they serve a vital role in the country's economy through the oil industry and electricity and power industry.

Several issues were investigated and discussed with the selected lecturers, including the CTS's required skills for employment, the availability of an evaluation scheme for, teaching loads, instructors' competencies and the types of skills transferred in workshops and laboratories, attitudes toward collaboration with industry, linkages with other similar institutions, and industry's perceptions of the CTS graduates. A personal, in-depth interview was also conducted with the head of the industrial liaison office and heads of selected departments to determine their perceptions of the types of knowledge, skills, and attitudes transferred to students in workshops and laboratories. Among the issues discussed were the lecturers' awareness of the CTS's overall strategy and plan, the degree of industry involvement in the CTS's activities, a measure of the lecturers' overall competencies, and industry requirements.

[Department	Academic Staff (with PhD)	No. of Chosen Staff (%)
Manufacturing Engineering	22	6 (27%)
Petroleum Engineering	18	6 (33%)
Electrical Engineering	22	6 (27%)

Personal interviews were conducted with the direct supervisors of the CTS graduates (in related industries) who had close contact with them. The two essential sectors selected for this purpose were the oil industry and power industry. Three direct supervisors were chosen from each of the two sectors. The criterion for their selection was their direct contact with a large number of graduates from the three chosen departments of the CTS (manufacturing engineering, electrical engineering, and petroleum engineering). Among the issues to be investigated with these supervisors were the quality of industrial training programs, the type of link (if any) between the CTS and related industries, the degree of industrial involvement in the CTS's activities, and the quality of the CTS graduates in terms of their level of knowledge, skills, and attitudes required by related industry—in other words, whether the CTS graduates met industrial requirements.

3.3 Instrumentation

The target population for this research consisted of those lecturers (holding a PhD) at the CTS teaching subjects that involve practical learning in workshops and laboratories.

3.4 Statistics and parameters

The statistics pertain to the **sample**. The parameters pertain to an entire **population**.

The research parameters are as follows:

(a) Lecturers at the CTS.

(b) Heads of selected departments and the head of the industrial liaison office.

*** The research sample is as follows:**

(a) Six lecturers, two from each of the three selected departments at the CTS.

(b) Three direct supervisors of the CTS graduates from each of the two selected industrial sectors.

4. Research findings

4.1 Sample

A questionnaire was sent to a sample of 150 students in each of the three selected departments at the CTS and 125 completed questionnaires were returned, or 83% of the total sample. The percentage of male students was 75%, compared to 25% female students. Kuwaiti students comprised 96% of the total selected students.

Regarding the instructor sample, six lecturers were selected from each of the following departments: Manufacturing Engineering, Petroleum Engineering, and Electrical Engineering. The entire selected sample was male and 57% were Kuwaiti and 43% were non-Kuwaitis. With respect to qualifications, 71% of the selected sample held a PhD, 5% held a master's degree, and 24% held a bachelor's degree. Regarding their teaching

experience, 67% of the selected sample had more than 18 years of teaching experience, 14% between 12 years and 17 years, 14% between six years and 11 years, and 5% between one year and five years. However, when asked to indicate the number of years working in industry, 29% of the selected sample had no work experience, 14% had less than one year of experience, 43% had between one year and five years, 10% had between six years and 11 years, and 5% had more than 18 years. Selected industrialists (three of the students' direct supervisors) were also interviewed to establish their opinions on the quality of the graduates and the efficiency of the industrial training programs. The selected companies were in the oil sector (Kuwait Oil Company, Kuwait National Petroleum Company, and Petrochemical Industries Company).

4.2 The CTS objectives

In any technical and vocational institution, regardless of its mission statement, strategy, objectives, and ownership, the determination, review, updating, and understanding of the objectives by all staff (academic and managerial) as well as all students is of great significance. One cannot deny that the staff's and students' perceptions of the mission statement, strategy, and objectives have great influence on their actions. Indeed, no tangible, satisfactory results can be obtained unless the staff is well aware of their institutional objectives. This research found no concrete evidence of reviews or updates of the CTS's objectives since its establishment. This was clearly noted in the personal interviews with all the selected staff. Despite awareness of the CTS's objectives, 80% of the staff selected had not attempted to establish a strong link with related industry.

4.3 Required skills for employment

The study found no evidence of any system to evaluate the level of knowledge, skills, and attitudes for instructors at the CTS. The CTS does not require the submission of any evidence of teaching skills before employment, except for non-Kuwaiti applicants. Thus, the employment committee must focus on academic qualifications and work experience and publications. It is imperative for the CTS's employment committee to set criteria related to the level and types of knowledge, skills, and attitudes required before recruitment, as well as proof of professional work experience in a related industry. In addition, Kuwaiti instructors are not required to submit any evidence of work experience or publications to be hired by the CTS. Therefore, an academic degree is the only requirement to teach at the CTS.

4.4 Scheme to evaluate instructors' competencies

The findings showed that no efforts were made by the CTS academic dean to establish an evaluation scheme to determining the level of instructors' competencies before employment. Instructors' competencies can be assessed through a student questionnaire during the class, where the students evaluate their instructors in accordance with a list of competencies. This method is optional, however, and the relationships between instructors and students, as well as the instructors' grading systems, can significantly influence results.

4.5 Teaching load

A total of 80% of the selected lecturers considered the teaching load (10–15 hours a week) "a serious problem"

that restricted lecturers from other academic or managerial activities, such as research and development, seminars, problem solving sessions, visits to related industries, and the development of teaching methods.

4.6 Measuring instructors' competencies and the types of skills transferred in workshops and laboratories

Selected students were questioned to assess their instructors with reference to set of 22 competencies, using the following five-point scale: very good (5), good (4), fair (3), poor (2), and very poor (1). The findings revealed general agreement among the selected students that the lecturers had "knowledge of the subject matter," with a mean of 3.20, and "linking theory to practice," with a mean of 3.40. However, students also rated 20 competencies between very poor and fair, with a mean of 1.79. In addition, instructors were found to be inactive in "encouraging a teamwork approach," with a mean of 1.75, and very poor to poor at "developing creative thinking," "enhancing work ethics," "developing skills in reading work manuals," and "developing positive attitudes in the workplace," with means of 1.82, 1.58, 1.85, and 1.87, respectively (see Table 1).

Table 1 show that, despite lecturers' awareness of the knowledge taught in the classroom and their ability to link theory to practice, several essential skills most required by industry were ignored, including "allowing the use of machines and tools," "developing quality assurance skills," "developing respect and appreciation skills at work," and "enhancing work loyalty," with means of 1.94, 2.55, 1.55, and 2.00, respectively. This result could be interpreted as a gap between the CTS and local industry. As mentioned earlier, the only means of contact with industry is through the industrial training program, which has several weaknesses. Close collaboration with related industries is highly recommended, so that industry can determine the level of knowledge, skills, and attitudes required from college graduates. Failure to take serious action will result in increased industrial dependence on foreign workers.

4.7 Attitudes toward collaboration with industry

All the respondents from the three selected departments indicated that they had established a relationship with a related industry. All the interviewed staff in the three chosen departments had positive attitudes toward forging contacts with industry and thus rated collaboration with industry as "very important" and a senior staff member stated that "without forging a proper relationship with industry, courses and curriculum are dead." Another indicated that linkages with industry were significant since, without such linkages, neither staff nor courses would be sufficiently "aware of what is taking place in related industry." However, it was evident that the linkage with industry was very weak, since all the selected supervisors in related industries indicated that the only mean of collaboration with the CTS is through industrial training programs. Such results contradict the responses obtained from the three selected departments at the CTS.

4.8 Types of collaboration

Selected staff members at the CTS were asked to indicate the areas in which industry had collaborated with their activities. Several options were provided (e.g., joint seminars, visiting lecturers, consultancies, joint research, joint seminars, research committee). It is worth emphasizing that the main objectives of founding the CTS were to "supply and develop the national technical skilled and semi-skilled manpower to respond to the need of local

industry." However, the only means of collaboration between the CTS and industry is through industrial training programs, the only means by which students are taught the latest knowledge, skills, and positive attitudes required by local industries. This places great pressure on both the CTS and related industries to ensure that such courses are properly planned, organized, implemented, and assessed to achieve tangible results. Failure to maintain positive tangible outcomes would result in providing local industry with unqualified graduates and thus increase dependence on expatriates.

Table 1: Key instructor competencies.

Competencies	**Importance (mean)**
1. Knowledge of taught subjects	3.20
2. Linking theory to practice.	3.40
3. Applying different teaching techniques	1.87
4. Applying appropriate evaluation methods	2.20
5. Using real cases studies	2.44
6. Considering students' differences	2.77
7. Allowing the use of machines and tools	1.94
8. Enhancing health and safety procedures	1.46
9. Encouraging a teamwork approach	1.75
10. Encouraging the use of English terminology	2.73
11. Developing communication skills	1.69
12. Developing creative thinking	1.82
13. Enhancing report writing skills	1.77
14. Enhancing presentation skills	1.73
15. Enhancing work ethics	1.58
16. Enhancing work loyalty	2.00
17. Developing a positive attitudes in the workplace	1.87
18. Developing skills in reading work manuals	1.85
19. Developing respect and appreciation at work	1.55
20. Enhancing social interactions at work	2.00
21. Action plan skills	1.55
22. Developing quality assurance skills	2.55

Mean Level	Description
4.20–5.00	Very Good
3.40–4.19	Good
2.60–3.39	Fair
1.80–2.59	Poor
1.10–1.79	Very Poor

Students were questioned about issues relating to the industrial training programs, including the suitability of the duration of the industrial training programs (60% negative responses), the availability of the right number of machines and tools (55% negative responses), the correspondence between the theoretical and practical parts of the courses (55% negative responses), the role of the college supervisor in enhancing the industrial training programs (45% negative responses), the availability of health and safety procedures on industrial premises (75% negative responses), the suitability of the evaluation system (70% negative responses), and the overall perception of the industrial training programs (65% negative responses).

An effort was made to question selected academic staff about the quality of the industrial placement program. Generally, most of the selected staff members' attitudes toward strengthening their contacts with local industry were encouraging. However, concerns were voiced by a large proportion (85%) of the staff that the industrial training program could be improved if more effort were exerted. Students should be aware of the purpose of such courses and incentives must be provided to ensure students' continuity of performance. On the other hand, industry must be encouraged to play an active part by allowing more time for students to be exposed to the new technology applied on their premises, conducting extensive in-house training programs to raise the level of the required skills and attitudes, improving the assessment scheme, and encouraging students to work in the field.

4.9 Linkages with similar institutions

The important of links between technical and vocational institutions cannot be overemphasized. Such linkages would not only contribute to be generation of funds for both institutions but also enhance their staff competencies, which would be reflected in the improved standard of graduates. However, this study shows that little collaboration between the CTS and local or external counterpart institutions. Regrettably, 80% of the selected lecturers indicated that they had no contact with a similar institution.

4.10 Industrial perceptions of the quality of graduates

Industry is considered a mirror that largely reflects the performance of vocational and technical institutions. Indeed, industries have not been expecting high-quality trained graduates due to rapid changes in science and technology in the workplace. Therefore, graduates from vocational and technical institutions are assigned to certain departments that assess their current level of knowledge, skills, and attitudes. Then, these graduates are assigned to training programs with clear criteria that coincide with departmental objectives. Personal interviews were conducted with the CTS graduates' direct supervisors (three from each of the selected sectors) in the oil sector and at the Ministry of Electricity and Water. The main aim was to measure industrial perceptions of the quality of the CTS graduates.

Not surprisingly, all the graduates' direct supervisors interviewed in the chosen sectors complained about the standard of the CTS graduates and rated them as either very poor, poor, or fair. The supervisors emphasized the graduates' lack of knowledge, skills, and positive attitudes. One of the senior supervisor at an electrical power station stated that "graduates not only lack basic information about the activities in the electricity power station, but also the ability to conduct simple maintenance on certain machines," adding "we have to consider an

extensive retraining for those graduates and unfortunately the percentage of dropout is high." Another direct supervisor in the oil sector (heavy machines department) indicated, "I used to receive graduates with low level of skills, it is not something new to me, and I'd rather continue to depend on expatriates." Another senior supervisor in the petrochemical industry stated, "We face not only a problem of low skills, but also a high rate of withdrawal from the department." He further added, "the majority of graduates tend to prefer to work indoor rather outdoor and the type of our work is mostly outdoor." Not surprisingly, all the direct supervisors interviewed rejected the notion of replacing Kuwaitis with non-Kuwaitis, since the majority of these graduates disliked such work and the long hours under intense work conditions.

The direct supervisors selected were also asked to indicate if they had collaborated with the CTS besides through industrial training programs. They all answered in the negative, although they all wished that they had established contact with the CTS in various academic activities (e.g., curriculum development, research and development, upgrading workshops and laboratories).

The general rating of the overall quality of the graduates was found to be below the expected standard (weighted mean = 2.47). The results support industry requirements for special training programs before employment. This requirement relates to the process of linking education to practical application and, by extension, to the notion that education is a lifelong undertaking. A summary of the findings is presented in Table 2.

Table 2: Industry's perceptions of vocational and technical graduates

Topic	**Weighted mean**	**Description**
1. Level of knowledge about machines and tools	2.65	Fair
2. Ability to read manuals.	2.58	Poor
3. Ability to perform job on time	2.78	Fair
4. Ability to detect problems	2.25	Poor
5. Meeting work standards	2.75	Good
6. Willingness to work in the field and overtime	1.85	Poor
7. Participation in training programs	3.50	Good
8. Participation in group discussion and presentations	2.55	Poor
9. Ability to write work reports	2.22	Poor
10. Ability to present new ideas	1.65	Very Poor

Mean Level	Description
4.20–5.00	Very Good
3.40–4.19	Good
2.60–3.39	Fair
1.80–2.59	Poor
1.10–1.79	Very Poor

6. Discussion and conclusions

It is now well known that vocational and technical education has unique characteristics. The management of

vocational and technical institutions requires special managerial and technical skills that differ from those required in other educational institutions. Interaction between vocational and technical institutions and related industries is important to obtain positive tangible results. Failure to forge a strong linkage with industry will result in graduates with low levels of the knowledge, skills, and attitudes that are most needed by industry, that is, a type of "black box" in which vocational and technical institutions are unaware of the real needs of industry.

In Kuwait, as in any of the Gulf States, indigenous skilled and semi-skilled labor is lacking in many sectors, especially vital ones (e.g., oil, electricity, and water). Therefore, decision makers have established vocational and technical institutions in the hopes of training students to replace expatriates in the workplace and thus reduce industry dependence on expatriates, particularly in essential sectors. However, many deficiencies have been noted while examining the status of vocational and technical education in Kuwait, particularly at the CTS. Industries were largely isolated from playing a significant role in shaping the standard of the CTS graduates. The linkage between the CTS and industry is limited to industrial training programs, which are proving to be ineffective. Complaints were voiced by direct supervisors in essential sectors (e.g., oil, electricity, and water) about the low standards of the CTS graduates. The lack of the knowledge, skills and attitudes was strongly emphasized when these direct supervisors' perceptions were measured. The low level of work commitment, poor work proficiency, inability to work long hours, inability to finish work on time, and inability to read manuals are some of the issues voiced by the selected CTS graduates' direct supervisors in related industries.

It is not surprising, therefore, that industries have rated the CTS graduates below expected standards. Lecturers at the CTS have partially neglected several skills that are significant in improving the standard of graduates. Despite lecturers' awareness of the CTS's strategy and objectives to supply local industry with skilled and semi-skilled Kuwaiti manpower, several essential skills were either not emphasized or simply ignored in workshops and laboratories, including health and safety procedures, encouragement of a teamwork approach, problem solving techniques, communication skills, report writing skills, and work loyalty. Therefore, the management of the CTS is highly encouraged to realize the importance of forging strong linkages with industry. Continued meetings between the CTS and related industries must be conducted to determine the actual needs of industry. The establishment of an industrial liaison office has proven to be effective, particularly in similar institutions in developed countries, through which lecturers and industrialists can share their experiences and transfer the required technology to enhance their capability to serve each other's needs.

On the other hand, lecturers at the CTS must raise the level of knowledge, skills, and attitudes in their workshops and laboratories. An effective evaluation scheme must be applied to ensure that lecturers meet the required standards of industry. Training lecturers who fail to meet such standards is recommended to ensure the successful transfer of technology. Industrialists must be encouraged to participate in the learning process at the CTS and workshops and laboratories must be updated with new machines and tools that coincide with the rapid changes in science and technology. Last but not least, unless the management of the CTS truly appreciates the role of industries in vocational and technical education, Kuwait and other similar countries will continue to rely extensively on an expatriate workforce.

Acknowledgement

"The author would like to thanks the Public Authority for Applied Education and Training, Kuwait, for funding this research. Research Project No. TS 13-03, Title: An Assessment of Lecturers Ability in transferring the necessary skills in Classroom: The College of Technological Studies, Kuwait; As A Case Study".

References

[1] *AlRai Newspaper* (2010). November 16, 11460, 1 (in Arabic).

[2] American Management Association. (2010). Executives say the 21st century requires more skilled workers. Retrieved from http://www.p21.org/documents/CriticalSkillsSurveyExecutiveSummary.pdf.

[3] Brophy, S., Klein, S., Portsmore, M., & Rogers, C. (2008). Advancing engineering education in P-12 classrooms. Journal of Engineering Education, 97 (3), 369–387.

[4] Economic and Social Research Council (2005). Knowledge economy fact sheet. Swindon, UK.

[5] Ferguson, R. L. (2007). Foundational skills: The currency that purchases opportunity in tomorrow's workplace. Techniques, 82(6), 62.

[6] Hannerman, L., & Gardner, P. (2010). Under the economic turmoil a skills gap simmers. Collegiate Employment Research Institute, Michigan State University.

[7] Hart, P. D. (2006). How should colleges prepare students to succeed in today's global economy? Based on surveys among employers and recent college graduates, Association of American Colleges and Universities report. Retrieved from http://www.aacu.org/leap/documents/Re8097abcombined.pdf.

[8] Hite, R., Fletcher, E., Bruening, P., Durr, A., Yontz, B., Zatezalo, R., et al. (2009). The preparation, roles, and responsibilities of teacher educators. In A. Selkirk & M. Tichenor (Eds.), Teacher education: Policy, practice, and research. Hauppage, NY: Nova Publishers, pp. 83–104.

[9] Koc, E., & Koncz, A. (2009). Job outlook 2010. Bethlehem, PA: National Association of Colleges and Employers.

[10] Ministry of Planning, Annual statistical abstract, 2009.

[11] Partnership for 21st Century Skills. (2008). 21st century skills, education & competitiveness: A resource and policy guide. Tucson: Partnership for 21st Century Skills. Retrieved from http://www.p21.org/documents/21st_century_skills_education_and_competitiveness_guide.pdf.

[12] Muskin, J.A. (1997). Becoming an independent entrepreneur in the formal sector of northern Côte d'Ivoire: What role can primary schooling play? International Journal of Educational Development, 17, 265–283.

[13] Public Authority for Applied Education & Training. Retrieved from http://www.paaet.edu.kw/mysite/Default.aspx?tabid=4229&language=ar-KW.

[14] Tabron, G., & Yang, J. (1997): The interaction between technical and vocational education and training (TVET) and economic development in advanced countries. *International Journal of Educational Development,* 17, 323–334.

[15] Occupational Outlook handbook (2010).

[16] Wash, S., Lovedahl, B., & Paige, W. (2000). A comparison of traditionally and alternatively certified

technology education teachers' professional development and receptivity to change. Journal of Industrial Teacher Education, 37(2), 31-46.

[17] World Bank (2008). The growth report: Strategies for sustained and inclusive development. Commission on Growth and Development. Washington, DC: World Bank, p. 11.