



CLOSING THE PERFORMANCE GAP BETWEEN TECHNICAL EDUCATION AND INDUSTRY

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ABSTRACT

Knowledge is the most powerful engine of production. The importance of a strong skills base and skill formation system to economic competitiveness and productivity is well recognized by enterprises, industries, regions and nations across the globe. This calls for a renewed focus on knowledge as the means of improving economic performance.

In a knowledge-driven economy, partnership is essential to competition. To exploit capabilities in people and technologies, businesses have to collaborate across sectors, throughout regions and with education. Thus, strong capabilities in skills, science and entrepreneurship, and collaboration between companies and between companies and educational institutions are needed.

The considerable effort and time needed to turn fresh graduates into productive employees suggests a lack of symmetry between what colleges want from industry and what industry expect from colleges.

This paper sets out the relationship between technical colleges and industry, and will consider what might be done to improve this relation and to better prepare students for the world of work.

Keywords: *Technical Education, Industry, Knowledge Driven Economy, Economic Competitiveness.*

1. INTRODUCTION

Entering the 21st century, we embark on an era of historic change in which the new communication, computing and information technologies have the potential to renovate education and society fully for the betterment of humankind. Throughout the world, information and communications technologies are generating a new industrial revolution already as significant and far-reaching as those of the past. It is a revolution based on information. Technological progress now enables us to process, store, retrieve and communicate information in whatever form it may take oral, written or visual, unconstrained by distance, time or volume. This revolution adds huge new capacities to human intelligence and constitutes a resource, which changes the way we work together and the way we live together.

Knowledge is the most powerful engine of production. Today we can see a number of processes at work, some entirely new, others that have developed over many years, which together are transforming the way in which businesses, individuals and policy-makers operate. This calls for a renewed focus on knowledge as the means of improving economic performance. Knowledge-driven economy is thus, one in which the generation and the exploitation of knowledge have come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use of exploitation on of all types of knowledge in all manner of economic activity. The emergence of knowledge based economies has profound implications for the determinants of growth, the organization of production and its effect on employment and skill requirements and may call for new orientations in industry-related policies [Abramowitz, 1986]. Competitiveness thus, depends on making the most of distinctive and valuable assets, which competitors find hard to imitate. In a modern economy those distinctive assets are knowledge, skills and creativity rather than traditional factors such as land and other natural resources.

The world economy is also becoming more open. There are larger markets offering greater opportunities. At the same time competitors are stronger and more numerous, and an increasing number of low cost countries have educated and skilled work forces, well resourced and capable of delivering sophisticated goods and services. Nations across the world are becoming progressively more sophisticated and well educated. All markets increasingly demand innovative and higher quality products and services.

In the global marketplace, knowledge, skills and creativity are needed above all to give the Kingdom of Saudi Arabia (KSA) a competitive edge. These are the distinctive assets of knowledge driven economy. They are essential to creating high-value products and services and to improving business processes. They are as vital in traditional engineering industries and in services as in high-technology business. The educational institutions should set out the role they and business need to play in improving the KSA's competitiveness, and try to close

the performance gap between the educational institutions and industry. This is a job for business but government of the KSA must create the right environment for business success by providing an economic framework, which is stable and enterprising. The KSA needs to put in place policies and programmes to help businesses innovate and succeed as we all face the challenge of the knowledge of economy.

This paper addresses the status of the relationship between technical colleges and industry and provides assistance in the development of academic curriculum based on industry needs in the preparation of students for the world of work.

2. BUILDING THE KNOWLEDGE-DRIVEN ECONOMY

Knowledge has always been important, but now four mutually reinforcing processes are increasing its importance for prosperity.

- a- Information and communications technology
- b- Increases speed of scientific and technological development
- c- Increased global competition
- d- Changing demand.

In a knowledge-driven economy, partnership is essential to competition. To exploit our capabilities in people and technologies, businesses have to collaborate throughout regions and with education sector. Thus, strong capabilities in skills, science and entrepreneurship, and collaboration between companies and between companies and technical colleges are needed.

Government of KSA cannot create wealth-only business can do that. But it needs an investment in Saudi capabilities such as science, skills innovative finance and digital technologies and this can be done according to the following:

- Spend an extra budget into the science and engineering base and into the information and communications technology for technical education.
- Reward educational institutions for strategies and activities to enhance interaction with business.
- Help small businesses become proficient in the technologies they need to complete in the digital marketplace.
- Encourage the development of entrepreneurship skills, especially amongst students and researchers.

This process must be led by the private sector- the main wealth creator- by investment in new business development, research, information technology and skills. The government has a critical part to play in building the capabilities the KSA needs to compete and this could be reached by:

- strengthening Saudi's capacity for innovation and risk-taking
- Investing in the knowledge base, particularly in science and engineering
- Improving the skills and capabilities of the workforce by raising educational standards
- Helping business make the most of information technology and research and development.

The distinctive capabilities must be knowledge, skills and creativity, which help create high productivity business processes and high value goals and services. That is why the KSA will only compete successfully in future if it creates an economy that is genuinely "knowledge-driven " and thus the KSA needs to encourage:

- More businesses and colleges to work together to support higher educational standards, especially in the teaching of work- related and entrepreneurial skills.
- The development of learning and support materials, which will help teachers and students, appreciate business needs and improve the relevance of education to tomorrow's job market.

3. THE PERVASIVE POWER OF DIGITAL TECHNOLOGIES

Digital technology is the nerve system of the knowledge driven economy. Huge advances have been made in our ability to collect, store, retrieve, analyze and communicate information, whether in the form of numerical data, text, sound or image. This revolution reaches into our homes as well as into our classrooms and workplaces. All the nations around the globe have been experiencing a higher growth rate of productivity-output per hour worked-in recent years. The improvements in computing power and communication and information technology appear to have been a major force behind this beneficial trend.

Information is cheap and plentiful. It is not enough, however, for business simply to collect information. It has to use it effectively to raise productivity, develop new products and processes and serve customers more intelligently. The KSA should thus, be well positioned for the information age and also needs more businesses that are wired up to the digital marketplace and every college graduate to have the skills needed to use digital technologies and feel confident using them. A national strategy to meet the skills needed of the information technology and communication technologies (ICT) should thus be produced which will include technical colleges.

4. TECHNICAL EDUCATION QUALITY

The importance of a strong skills base and skill formation system to economic competitiveness and productivity is well recognized by enterprises, industries, regions and nations across the globe. Higher economic growth and improved productivity performance,

achieved in part by quality training, can lead to the creation of additional jobs. An additional indirect relationship is that those individuals with relatively higher skill levels are exposed to lower risks of becoming unemployed.

The industry-based skill standards, should be introducing as a means of strengthening the connection between education and employment, offer a benchmark to help vocational educators improve the quality of education. Two models of skills standards are currently being explored-the skills component model and the professional model. In the skills components framework, the focus is on the task performance. In the professional model, the focus is less on what the worker does and more on the functions of the generic job category-how the work is done, e.g., through problem solving, reasoning, using judgment, contributing ideas etc.. [Baily et al., 1995]. The use of both models is consistent with the models for assessing a company's quality management system.

By developing colleges of technology, the Government of KSA wants to help businesses get the skills they want and to get the best out of education and training providers. It supports a wide variety of skills development schemes, which do not work together as effectively as intended. The KSA is requested to contribute to an expansion of the highly successful modern apprenticeship initiative. This will meet the growing demand for more sector-specific skills from both businesses and young people. Many of these initiatives reflect the close relations between industry and education in promoting workforce development. This partnership marks a new approach by the government, bringing together business and training providers to create a better understanding of what skills are needed for the future.

5. WHAT IS VOCATIONAL EDUCATION'S ROLE?

Should vocational education concentrate on preparing students for specific jobs or should it be more focused on broader career development, including lifelong learning, employability, and cognitive skills? This paper explores these questions and examines how vocational education programs can best prepare students to meet the demands of the current and future workplace.

5.1. Job training and vocational education

When asked to describe the role of vocational education in the technical colleges, most educators (and citizens) would say it is to prepare students for work in a given trade or vocational area. For many years, this preparation has focused on job skill training, the philosophy being that training individuals in the "hands-on" tasks required for work is of primary importance in ensuring their employability and job market success. This singular attention to job-specific skills continues to characterize many vocational education programs. The controversy among educators is whether or not students are actually acquiring the appropriate job-specific skills and whether or not those skills are sufficient for the comprehensive education of student.

6. HOW WELL DOES TECHNICAL EDUCATION MATCH THE NEEDS OF THE INDUSTRY IT SERVES?

Some educators believe that this new and emerging workplace eliminates the viability of vocational education programs that concentrate solely on the acquisition of job skills. They contend that vocational education should concentrate more broadly on all aspects of their students' career development - that it should expand its focus by initiating programs that prepare students with the " basic academic skills, the teachability and flexibility, the commitment to lifelong learning that permits them to rapidly change in ways required by new organizations of work or content changes in the processes and performances of work [Herr, 1995]. [Kincheloe et.al.,1995] criticizes vocational education's focus on specific job skills. Contending that "most observers agree that vocational education is indeed a failure, " he notes that "very few vocational students find work immediately after college that is related to their vocational education.

Another criticism of vocational education's focus on job-specific training is that it tends to filter the working class and poor students into its programs, thus neglecting the broader career development perspective that this vulnerable population needs to compete in the global workplace. Additionally, as mainstream society refuses to value the knowledge of job preparation, the status of work-related knowledge is low.

7. ASPECTS OF EXCELLENCE IN TEACHER

For a successful and developed vocational education, there must be a worthy mission for educators, but to fulfill it, they too must master the possibilities of the new technologies. Formal education must adopt a new pedagogy, oriented not to text-bound subject matters, but to dynamic operational skills and collaborative modes of inter-disciplinary thinking. Students will require a multi-model literacy involving video, audio, graphics, animation, and simulation, as well as text, because education will increasingly be judged, not only by what the educated person knows, but also by what they are empowered to do in fulfilling their lives and contributing to the greater social good. Thus, highly effective teachers need to get the answers to the following questions:

- 1- What must teachers know about teaching, learning, and subject matter?
- 2- What is the subject matter of vocational education?
- 3- What must teachers know about students?
- 4- Where does the knowledge come from in vocational education, and how does it differ from general education?
- 5- Is teaching (and teacher education) based on intuition and experience or a researchable knowledge base?
- 6- What is effective teaching?
- 7- How does knowledge translate into practice?

7.1. Networking

Networking is an important aspect of any educational endeavor. Finding out what others in the field are doing can be invaluable in planning programs. The Internet has made the networking process almost effortless.

Locating education curriculum materials can be a frustrating and time-consuming job [Wagner, 1995]. The General Organisation for Technical Education and Vocational Training (GOTEVOT) should provide a variety of sources for curricula, lessons plans, and other instructional materials, as well as websites and listservs related to vocational education and training on the internet.

8. TECHNICAL EDUCATION'S RESPONSE TO INDUSTRY

Let us consider what might be done to improve the relationship between technical colleges and industry. Let us start with those activities where the initiative resides within academia.

8.1. Curriculum development

Technical programmes should solicit industry input regarding the required skills that are not currently being taught at the diplomas and bachelors levels.

- 1- Provide a comprehensive quality curriculum in all of its degree programs in order to meet the needs of students in this region. Included in this curriculum should be a core curriculum and major requirement for the development of oral, written, creative and critical thinking, and computational skills.
- 2- Recruit and retain talented students, staff, and administrators committed to the mission of the college.
- 3- Encourage research, scholarship, service, continuing education and creative work that meets regional needs, support academic excellence, develops knowledge, and enhances professional development to continue to grow as a distinguished college.
- 4- Encourage the effectiveness and performance of the institution

From the above GOTEVOT in its program of practice, needs to empower the creative reform of education through three types of work with technology;

- (1) To implement, according to constructivist principles, real-word projects using multimedia and network technologies to create sophisticated learning environments;
- (2) To sponsor exploratory development and participatory design efforts to discover the academic potentials of emerging technologies, and
- (3) To sustain public policy initiatives that mobilize broad coalitions of interested parties from academe, government and industry in order to transform technical education.

8.2. Encourage students to obtain experience in industry before they graduate

Cooperative programmes, in which students spend at least an entire semester in industry as part of their undergraduate training, have shown to be successful in this respect and a longer period is needed.

Summer work in industry is valuable. It is of an important interest that GOTEVOT have to set up formal programmes to get their students into the technical education workplace during the summer vacation.

The importance of providing students with experience in industry before graduation is a major supporter of technical education and research in the KSA. GOTEVOT should set up an industrial internship programme, which will support undergraduate (and graduate) technical education in summer jobs.

8.3. Develop and strengthen undergraduate programmes in technical education

This is a step, which is absolutely necessary for maturation of the technical education profession. Programmes and assessment procedures should be put in place to measure on a continuing basis how well academia is meeting employers' needs and expectations and contributing to the economic, educational and community development of KSA.

Thus the KSA government's overall aim within education and training should:

- support economic growth and improve the nation's competitiveness and quality of life by raising standards of educational achievement and skills;
- promote an efficient and flexible labor market by enhancing choice, diversity and excellence in education and training, and by encouraging lifelong learning.
- provide guidance and fund an institutional framework in which training decisions can be taken. It also funds work-related training, especially for young and unemployed people.

9. INDUSTRY'S RESPONSE TO TECHNICAL EDUCATION

There is also an active role for the industry to play in enhancing the ability of its new graduate employees to become productive sooner.

9.1 A needs survey

The collegial community has very little reliable information regarding the skill sets that the industry needs, or what the trends are. There are several industry and professional groups in the KSA and GOTEVOT, these are well positioned to get useful data which could be invaluable in helping technical education colleges to design more relevant courses, curricula

and programmes. And even providing training courses for companies to upgrade the skills and capabilities of the existing workforce.

9.2. Further involvement with the academic enterprise

This can be done on both an individual basis and at the corporate level. Companies should encourage their staff to help guide graduate student research; to teach in courses where they have unique expertise; and to participate in seminar series, as appropriate; and consistent with the policies of the host institution.

Indeed, industry should consider granting selected staff engineers' sabbaticals to receive and deliver training at a host college. Such a "industry adjunct "faculty would act as a model and information sources for students considering or intending to pursue industrial careers. Ultimately, industry must provide the training opportunities and contribute funds to help academia implement the educational changes that infuse international concepts into vocational education programs so that the youth of today are prepared for the global workplace [Osthermer, 1995] and will improve its ability to meet industry's need for relevant engineers. An investment by industry in an endowed chair, educational tools, fellowships or scholarships, or course development support yields the long-term benefit of a more useful and effective technical workforce.

10. TRAINING QUALITY AND DEVELOPMENT OF A TRAINEESHIP SYSTEM

The traineeship system should be implemented by GOTEVOT in collaboration with employers, in which trainees and employers mutually agree the employer will provide a job together with structured training and the trainee will undertake productive work and acquire agreed skills.

The primary purpose of traineeships generally moves along five principal axes: to

- 1- develop vocational skills
stimulate job creation with some skills development.
- 2- For new entrants to the workforce
For existing workers
- 3- support new and emerging industries
support existing industries
- 4- develop undergraduate entry-level skills
develop postgraduate entry-level skills
- 5- Through on and off-the-job training
Through fully on-the-job training.

Reducing unemployment is a priority area for government action in KSA. However, training is no panacea for unemployment or guarantee of employment. As the Economist has observed...no known system of education and training, however sophisticated, has succeeded in banishing the specter of unemployment [Clark, 1992]. Nevertheless, there is an indirect relationship between training and unemployment. Skills and competence of the labor force are significant determinants of measured economic growth and productivity performance [Economist, 1994] thus; companies should be forming alliances with local community colleges [Dreyfuss, 1990].

11. HOW TO GET THE BEST PEOPLE FOR THE JOB

Teachers often work in isolation and could especially benefit from sharing with other professionals. Traditionally the students, not the teachers, get computer time and professional training. It is absurd to talk about technology and students if you are not even talking about how we have equipped and supported the professional teachers to do the job. Technology training in colleges of technology cannot be inclusive. To be effective, training should be ongoing and related to using the technology within the curriculum [Branscum, 1992]. But to talk about what should be improved, we first need to know what employers look for and what are the steps that students need to start traineeships while they are at college or higher institute.

11.1. What employers look for?

Employers want more from graduates than simple entry-level job skills, they want them to be ready to function in collaborative settings, interpret complex requirements, and exhibit self-directed, self-assessing behavior on the job. In other words employers look for someone who...

- will quickly fit in with the company
- will promote the company
- will stay on and grow with the company
- has effective communication skills
- will be a benefit to the company
- has leadership qualities and initiative
- has a positive attitude
- is willing to work hard
- is willing to take up challenges
- has a good academic background
- has relevant experience where needed.

From the above, it is clear that employers want the right man for the right job. However, to get such characteristics of high standards and attainment levels in education and training, employers should invest in employee training and development to achieve business success, and let individuals have access to education and training opportunities, leading to recognized qualifications, which meet their needs and aspirations

11.2. Steps towards traineeships support

Traineeship system should support student's learning while he works, student can also start traineeships while they are at college. In response to the challenge of business and industry to successfully operate a traineeship system, trainee and employers should mutually agree on the following steps:

Step 1: Student decides what he wants to do

To have the best chance of finding an occupation student should think about what he enjoys and what interest him. Find out if there is an apprenticeship or traineeship offering skills he will enjoy learning.

Step 2: Find an employer

Once student has decided which apprenticeships or traineeships he wants to do, he will need to find an employer to give him a job so he can earn while he learns

Student will learn many of his skills at work, but may also receive training with registered educational institutions. It is their job to make sure student get the right training during their apprenticeship or traineeship. They can help by:

- Working with student and his employer to design the training plan
- checking what previous work experience or training student has to see how it fits in with the training plan
- Providing student with a training record files and other materials he may need for his training
- Training student and assisting his employer to make sure his training is completed on time.

Step 3: Agree to work together

Step 4: Create a training plan to gain new skills

Map out student training through a training plan. It is important to map out a training plan to make sure student learn new skills. An outline of a training plan should be included with the training agreement.

12. CONCLUSIONS

For technical education to continue to grow as a distinct branch of education there must be an industry that it serves and that relies on it not only for technical advances, but also to provide its workforce. With an academic enterprise that meets these needs, technical education will be well on its way to full membership in the family of engineering.

Technical education system should play a very significant role in the process of economic and technological development of KSA by producing high quality manpower needed for various sectors and by providing essential services through research and innovations. Thus a strong linkage between technical institutions and industry should be developed.

The development of learning and support materials, which will help teachers and students appreciate business needs and improve the relevance of education to tomorrow's job market.

Technical education and training should be available at work, at home, in part-time and full-time study, at times and places which suit individual needs.

Employment objectives and training objectives are inevitably intertwined in both apprenticeships and traineeships. However the primary purpose must be clear. For the reasons discussed throughout this paper, traineeships in KSA should have training objectives as their primary purpose and employment outcomes as a secondary purpose. Thus, quality skills formation and not employment numbers need to drive the system.

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