

Issues in the Implementation of Science and Technology Education in Saudi Arabia

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Abstract

Science and technology topics are very important in today's global world. It takes the educators attention and concern to look and search for the importance of implementing this issue. On the other hand, educators voice-up the usefulness of using science and technology in school. Indeed, this paper discuss about the barriers in the implementation of science and technology in Arab world. Eventually, language, curriculums, and method of teaching need concern. Hence, it is highly advisable to teach and guiding the young generation how to implement the study of science and technology through schools.

KEYWORD: Science and technology; Education; Issues in ST; Barriers; Professional Development.

INTRODUCTION

Science and technology are becoming increasingly important in today's modern world. Educators are aware that it is already an important force in modern education. However, there have been debates and discussions about the effects of using science and technology in school. Some educational theories are convinced that technology will significantly change every culture and revolutionize the education process. Some theories think that technology and internet as example are the enemies of culture and morality with negative impact on issues such as ethics. Other theories, however, see technology as basically an additive to the existing culture. They believe that it will speed up the transmission of information in education but will not change the fundamental nature of educational process (Al-Alwani A.E.S. and Soomro S. (2009).

The observer of long-term planning for education and literacy programs in the light of the concept of Science and technology Education in the Kingdom of Saudi Arabia will notice that it has proceeded on the basis of a defined vision which accords with social requirements and subsequent formulation of general and specific goals on the basis of that vision and in line with a criteria-based strategy for the design and application of courses, textbooks, evaluation tools, teacher training and competent educational management. Given the variability of the pivotal elements, a strategy for change and development had to be put in place within the overall, long-term plan to keep pace with constant changes in science and technology. The education policy in the Kingdom of Saudi Arabia concerns with the education system as a civilizational demand which it endeavors to meet by the continuous development of educational systems and regulations to keep pace with the rapid developments in human activity. Education policy in the Kingdom of Saudi Arabia believes in the principle, based on religious and social constants and engagement with international agreements and declarations (Al shaer A.I., 2007).

On the other hand, the Saudi education system is subject to extensive criticism: "The country needs educated young Saudis with marketable skills and a capacity for innovation and entrepreneurship. That's not generally what Saudi Arabia's educational system delivers, steeped as it is in rote learning and religious instruction (Ursula Lindsey, 2010). The study of Islam dominates the Saudi educational system. In particular, the memorization by rote of large parts of the Qu'ran, its interpretation and understanding (Tafsir) and the application of Islamic tradition to everyday life is at the core of the curriculum. Religion taught in this manner is also a compulsory subject for all University students (Robert Sedgwick, 2011). As a consequence, Saudi youth "generally lacks the education and technical skills the private sector needs".

A further criticism of the religious focus of the Saudi education system is the nature of the Wahhabi-controlled curriculum. The Islamic aspect of the Saudi national curriculum is examined in a 2006 report by Freedom House which concluded that "the Saudi public school religious curriculum continues to propagate an ideology of hate toward the "unbeliever," that is, Christians, Jews, Shiites, Sufis, Sunni Muslims who do not follow Wahhabi doctrine, Hindus, atheists and others" (Shea, Nona, et al., 2006; Laura Ingalls, 2006) The Saudi religious studies curriculum is taught outside the Kingdom in *Madrasah* throughout the world. Critics have described the education system as 'medieval' and that its primary goal 'is to maintain the rule of absolute monarchy by casting it as the ordained protector of the faith, and that Islam is at war with other faiths and cultures' (Ali Al-Ahmed, 2010).

The consequence of this approach is considered by many, including, it appears, the Saudi government, to have encouraged theoretical study and memorization of subjects in schools rather than practical and implementation of science and technology.

THE BACKGROUND OF ARAB EDUCATION

Education at all levels of progression has an essential role to play in putting our science technology and innovation back on a growth path. It is the key to enabling us to be both competitive and prosperous. Malaysia should aim to have one of the best education systems in the world. Our future prosperity is acutely dependent on the quality of our knowledge and human capital because the success of our country will depend on our ability to perform successfully in STI with ever more knowledge intensive products and services. Education has been one of the most important dimensions of development for all countries in view of its contribution towards national economic and social growth and development. The first form of educational system in Saudi Arabia was the kutab where students learned basic writing and arithmetical skills in groups. In 1924 a Directorate of Education was established which was replaced later in 1953 by a new Ministry of Education. The Ministry of Education was given the specific task of expanding the national school system for males, and to give it a modern basis comparable with that of Western states (Al-Sadan, 2000).

The government of Saudi Arabia has given substantial attention to education under the global slogan Education for all, and has allocated about 20% of the overall budget for k-12 education annually. therefore, the educational system in Saudi has made many successful strides over the past few decades, however it has encountered many challenges related to on one hand the quick changes locally and internationally in all the life aspects, and on the other hand, to the characteristic of the system itself. Many researchers (Al-Sadan, 2000; Bahgat, 1999; Rugh, 2002; Samman, 2003) argued that reforming Saudi educational system was not an easy task, partly because the educational system is centralized, and secondly, because there are serious obstacles facing development and change of the educational system. These relate especially to curriculum, assessment, teaching styles, and the learning process generally. Other researchers (Abdaljoad, 2005; Al-Ebarahim, 2001; BouJaoude, 2003) consider that the efforts directed toward the development of science curriculum and assessment practices were inappropriate and did not take into account the teachers' professional development needs.

Every society today is aiming towards building an economically competitive and sustainable society – a knowledge-based society – a society that thrives on science and technology education, scientific research and technological innovation, displacing traditional factors of economic growth with knowledge. The urgency for education reform in the Arab world has been manifested in the various initiatives aimed at improving the quality and quantity of education, especially education that base on science and technology. Recent years have witnessed many Arab countries making efforts to develop and implement comprehensive education reform programs that can result in a skilled, knowledge-based workforce in line with socioeconomic goals (Nabih Maroun, etc, 2008). Day after day, the importance of technology becomes more evident and requires more of our attention. Through the use of technology information is now more accurate than ever before. Look into a great and big country like Saudi Arabia, educator are trying their best to be swamped with information and increasingly derive knowledge gained from information distributed by the Internet, newspapers, television, computers, magazines, books, radio, etc. Information technology penetrates every corner of their world.

What does that mean to them? How can they evaluate the legitimacy of the new “technology era” and realize its promise of greater knowledge for the many? Science is a reliable source of objective knowledge and expertise, while education performs its role in training future researchers, strengthening human resources in science and technology. Nobody will deny today the value of educational activity realized by the researchers as well as the scientific work done by educational staff. Nowadays, education face the challenge of increasing the interest in science and technology among youth, improving the quality of scientific teaching and encouraging creativity. Throughout the implementation of science and technology education, development will be achieved in Arab countries in view of its contribution towards national economic and social growth and development. But the question that needs study, and investigation is what are the issues in the implementation of science and technology education policy in Arab countries especially Saudi Arabia? Before answering this question let us see together the record of science and technology education in this country.

ISSUES IN THE IMPLEMENTATION OF SCIENCE AND TECHNOLOGY EDUCATION IN SAUDI ARABIA

What are the important issues that face science and technology education (STE) in the Arab world? The two major problems that face Arab science education are the level of access to, and the quality of, education.

The problems of access are manifest in the enduring high levels of illiteracy, especially among females. Saudi Arabia as well as many Arab states is attempting to increase access to education through a variety of programs and strategies. This is evident from the increase in student enrolment at all educational levels in recent decades and the decrease in illiteracy among the population in general and among women more specifically. However, the illiteracy rates are still generally very high. Basic literacy is no longer sufficient. The need now is for scientifically and technologically literate individuals who can function in a global village characterized by intense competition and the rapid production of knowledge. In such a world, 'catching up' is extremely difficult even for those who are highly educated and trained.

Even when the problems of access are addressed, a very serious problem in the Arab world is the low quality of education experienced by students at all levels. The problem of quality is manifest in outdated curricula and teaching methods, an emphasis on theoretical science education to the detriment of hands-on and practical activities, a lack of access to computers (or the use of obsolete equipment) and to the Internet, the low quality of science and technology education (STE) programs, a lack of teacher support to implement new teaching methodologies and the use of new technologies, and inadequate budgets to improve the quality of education. There have been many attempts to reform science curricula in the Arab world. The Arab League Educational, Cultural and Scientific Organization (ALECSO) have been instrumental in promoting science and technology. As early as 1989, ALECSO published an Arab strategy for science and technology. This was followed by an Arab strategy for information in the Internet age in 1999. In 1994, the Organization published a strategy for biotechnology in Arab countries and subsequently made available a reference book on the integration of subjects at the basic level of education in 1996. More recently, ALECSO published model audio-visual educational tools packages for teaching and learning in the field of renewable energies. This will be distributed to training centers in the Arab world along with a number of dictionaries that are aimed at standardizing usage of science and technology terminology in the Arab world (Boujaoude S. et al., 2008).

According to Sleem (1996), a number of Arab states have adopted science frameworks developed by ALESCO. These curricula have the advantage of being developed by Arab experts who were in tune with the needs of Arab society. Other countries have adopted or adapted science education reform projects developed in the West to their different needs. A third group of countries has contracted Arab curriculum design specialists to develop their curricula.

Nashwan (1993) analyzed the science curricula of eleven randomly selected Arab countries. He found that they focused on the theoretical aspects of science, neglected the applications of science in novel and everyday situations and did not develop students' abilities to use investigative, problem solving and thinking skills. They also ignored students' interests, backgrounds and environments, paid no attention to creativity and imagination, did not attempt to address students' unacceptable beliefs in myths and superstitions and did not help them to understand their bodies and take care of their health and hygiene. Nashwan concluded that science curricula in the Arab world should not be focused solely on helping students to know scientific facts but should also assist them to apply scientific knowledge to solve everyday problems.

Similarly, Badran (1993) conducted a study to assess the quality of science curricula and textbooks in seven Gulf States including Saudi Arabia. The results of this study indicate that the curricula did not benefit from the new technologies in teaching science and did not address social and environmental problems associated with the applications of science and technology (S&T). Moreover Badran found that the contents of school science textbooks appeared to be copied from foreign books with no emphasis on local science-related social and environmental problems or on the applications of science in technology and in everyday life. To make matters worse, the textbooks were outdated and lacked emphasis on inquiry type activities.

Another issue that face science and technology education (STE) in Saudi Arabia is related to the unique barriers encountered by Saudi educators in the transition to technology facilitated education. Many studies outlined the barriers that prevent effective use of science and technology education in Saudi Arabia. Weber (1996) surveyed three major themes related to of science and technology education barriers: (a) inadequate instruction; (b) inadequate computer systems; and (c) frustration. Examples of barriers that Weber identified include lack of administrative support, financial constraints, policy confusion, logistic limitations, conflicting purchasing decisions, support service deficiencies, and untrained personnel. In addition, he categorized groups of barriers to the use of technology that many researchers have also identified.

These are: (a) anxiety; (b) stress; (c) feelings of stupidity, fear of the unfamiliar, and fear of dehumanizing effects; (d) the extreme of computer addiction (microcomputer mania); and (e) the extreme of computer phobia (cyberphobia), potentially involving active resistance, and sabotage.

In addition to that, Beggs (2000) posited one critical barrier pertains to science educators' as poor preparation and lack of confidence related to technology. While there is some evidence of a history of using technology in science classrooms, not all science educators are ready to use the technology in teaching science. Some instructors, even those well educated and highly competent in the field of science, have been documented as fearing technology, most particularly fearing looking stupid in front of their students by failing in their use of technology. Fear of failure is a very legitimate problem. Ertmer (1999) pointed out that many teachers may ask themselves a hard-to-answer question: "What will I do if the technology fails and I can't complete the lesson as planned?" This may interfere with the adoption of technology in the classroom. Logically, to the extent that teacher training and technical support can answer teachers' questions of what happens when technology does not work, this barrier is reduced.

Moreover, the literature on technology diffusion in Saudi Arabian higher education is scarce and limited in scope to specific domains or institutions. On the other hand, not much has been published in the international domain and is mostly in the Arabic language and hosted in local libraries, reducing accessibility of such materials. Studies examining technology usage since the advent of the Technology in 1999 are surveyed and discussed here. The focus is on faculty because the adoption and usage of technologies is essentially an individual decision in many Saudi education institutions. Nevertheless, faculty are increasingly expected to utilize these technologies with the aim of providing improved academic environments and meeting the needs of students. In study done by Al-Alwani A. E. S. (2005) highlighted that the low level of science and technology achievement in most of the Muslim countries results from the cumulative effect of multiple factors, and not from a single dominant cause. And some these factors are as demographics, language, and education.

The demographics in Saudi Arabia show that the number of research scientists and engineers remains well below that of rich countries as well as Latin America and South and East Asia. Science and engineering students are drawn primarily from urban middle-income backgrounds; few of the much larger number of poor students can pursue research careers. Participation by women in science remains low, as the disincentives, formal and informal, for women to study science or engineering are formidable. Only a handful of mostly urban, middle-class male students have sufficient exposure to science to even consider making it a career (Al-Alwani, 2005). The other factor that leads to low level of science and technology achievement in Saudi Arabia is the language. With an estimated 80 percent of the world's scientific literature appearing first in English, the literature in Arabic is inadequate for teaching students as well as researchers. Scientific work, therefore, requires a competence in reading, writing, and comprehending English, an area in which Muslims overall lag behind other peoples. Even though the Arab League has systematically promoted scientific translations and an updated Arab vocabulary, Where English or French are the language of instruction, hostility often develops between students in science, who study in a foreign language, and those in other disciplines, who work in Arabic (Al-Alwani, 2005).

Furthermore, effective science education at primary and secondary levels is available in many countries only at a handful of urban private schools. There is too much rote learning, a legacy in part of Qur'anic schools, and far too little support for science education at all levels. Universities and technical schools emphasize teaching rather than research. Few strong doctoral programs or research centers of academic excellence exist. Overcrowded, under funded, and turbulent universities have been unable to protect space and resources for research (Al-Alwani, 2005). Many studies of technology adoption and diffusion in the context of Saudi education report a wide range of problems experienced by faculty members in their adoption of technologies for teaching and/or research.

Among these problem is the language. As known to us, in early studies of Internet diffusion, English was the dominant language, on the other hand, lack of Arabic content was cited as an obstacle to using Internet technologies by many faculty members in Arab world. Problems related to language barriers were more prevalent and ranked higher in studies conducted with faculties in disciplines in the humanities and religious studies (e.g., Al-Harbi, 2003; Al-Khabra, 2003). Although problems related to the dominance of English content on the Internet continue to be cited by faculty in more recent studies (Al-Dubayan, 2005; Al-Far, 2004), they have been ranked lower in significance as Arabic content increases and online translation is provided for web users. In addition to the compatibility with cultural and religious values, it is a truism that Saudi Arabia is a conservative society.

Cultural barriers and negative attitudes towards Internet content were prevalent in early studies conducted in the first few years of Internet diffusion in Saudi Arabia. For example, a survey conducted by Al-Sharhan (2002) with faculty in King Saud University cited obstacles such as incompatibility of some content with cultural beliefs. Furthermore, Al-Harbi (2003) reported the 'exposure to inappropriate content' as a commonly cited deterrent for faculty in the colleges of religious studies. More recent studies indicate that the Internet is becoming increasingly accepted and desired by academics as its potential to enhance academic work is being recognized (Al-Kahtani, 2006; Sait et al., 2003).

Furthermore, inadequate training and professional development programs were reported as major obstacles in many survey studies (Al-Khabra, 2003; Al-Far, 2004; Al-Fulih, 2002). Studies have also reported problems related to the lack of clear policies in using Internet technologies and ways of integrating them into the curriculum. Efforts have been made towards suggestions for utilizing the Internet in public education at the K-12 level (Al-Mousa, 2002); however, empirical evidence to support proposals for higher education is not well established.

THE WAY FORWARD

Saouma BouJaoude (2003) investigated about the problems to be solved and the issues to be addressed for improving science and technology education in Saudi Arabia to fulfill the promise and confront the challenges of the twenty-first century. According to him teachers and students of the first few decades of the twenty-first century should work in school environments that are positive, supportive and demanding. These schools should implement integrated curricula that are up to date, flexible and intellectually rigorous. Teachers and students should have access to well-equipped science and technology laboratories and classrooms. They should value education, science, and technology, be reflective and thoughtful about the advantages and disadvantages of science and technology, and be productive and reflective problem solvers.

Saouma BouJaoude (2003) added, initially, increasing access to well-equipped schools should move hand-in hand with improving education by reforming teacher education programs, providing teachers with the appropriate means to help their students, and designing and implementing up to date curricula, teaching, and evaluation methods. Teacher education programs appropriate for the twenty-first century are those that prepare technologically and scientifically literate teachers. Teachers who are not themselves scientifically and technologically literate cannot prepare students to be so. Moreover, continuous follow-up in classrooms to support teachers' work is essential. (Boujaoude S., 2003). In addition to updated flexible and rigorous curricula that emphasize thinking and problem-solving are essential if Arab students are to do well in the twenty-first century. Science and technology curricula that emphasize breadth rather than depth are inappropriate. If students are to be able to think, they need a deep and coherent knowledge base, the necessary skills along with encouragement and opportunities to use them, and evaluation systems that reflect these desired outcomes. Moreover, they need the skills to reflect upon what they have learnt. (Boujaoude S., 2003).

Moreover, understanding the nature of science and including it in science curricula may have another advantage. Students who are religious sometimes find it hard to reconcile their religious and scientific beliefs if science is considered as the only truth. However, when science is taught as one way of knowing and understanding the natural world, students may feel less threatened by it and consequently may pursue careers in science. Additionally, having access to the Internet at present requires students to master at least one language other than Arabic. Consequently, very serious efforts are needed to improve the quality of foreign language instruction at all education in schools. The emphasis needs to be on teaching scientific and technological terminology to provide students with the necessary tools to access information. This does not preclude emphasizing the learning of Arabic and trying to write science in this language. Rather, it provides students with the competitive advantage of knowing another language (Boujaoude S., 2003).

Finally, science and technology have been traditionally considered male subjects. This bias cannot and should not be sustained in the twenty-first century. Depriving women of the opportunity to fulfill their potential and aspirations is indefensible on moral as well as economic grounds. The rights of individuals to pursue their ambitions are supported by all international conventions. Moreover, squandering the productive potential of half the population may deprive nations of their competitive edge in the global economy (Jaoude S., 2003).

CONCLUSION

I strongly recommend the Implementation of the above Saouma BouJaoude's idea.

Because I believe that his idea will help Arab countries to be developed in science and technology. Therefore, strongly I encourage educators to teach and guiding the young generation how to implement the study of science and technology and how to care about it. Moreover, educator need to be aware of the importance of English language in teaching science and technology, for that reasons ministry of education need to revise their curriculum by making English subjects to be compulsory at primary level. In addition to that educators need to encourage thinking and problem-solving, by guiding the students how to be creative thinking in all subjects.

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