

Implementing New ICT Strategies for Students with Special Needs

Dr. Ahmed Bello Abubakar,
University College
U.A.E. University, Al-Ain
United Arab Emirates

Abstract—The number of special need students entering Higher Education increasing every year; thus, it is essential that a supportive and inclusive culture is developed in all aspects of university life. The ICT (Information and Communication Technology) curriculum is a one of the major aspects. Traditional strategies for teaching ICT courses to students with special needs usually require enormous student motivation and perseverance with varying results. We tackled these problems by promoting a natural way of infusing thinking skills and metacognition in the classroom by structuring lessons where students with special needs manage their own learning. New teaching strategies were used with three ICT sections of students with special needs. This paper describes the new teaching strategies, their overall effectiveness, and future plans. It also discusses the impact of these lessons on student learning and also in terms of educational goals and contents. The outcome of this research indicates that changes in ICT classroom teaching methods can help students with special needs become self-learner, able to search out, understand, analyze, and synthesize information in a better way.

Keywords- ICT; United Arab Emirates University; Special Needs.

I. INTRODUCTION

Information and Communication Technology (ICT) in the United Arab Emirates University (UAEU) plays a very important role to students, faculty and staff of the university. In addition to the College of Information Technology which is mainly academic awarding degrees in areas like Electronic Commerce, Networking, etc., the University has a separate Information Technology sector called University Information Technology Services (UITS) that supports the mission of the university by providing information technology products and services that support the University's teaching, learning, research and administrative activities by delivering innovative technology solutions. This sector has four departments, The IT Support Services (ITSS), Enterprise Applications and Integration Department

(EAI), Infrastructure and Core Technologies Department and the Project Management Office (PMO).

A major paradigmatic teaching shift has taken place in the United Arab Emirates, from the traditional format to one in which students are actively engaged in their own learning process. While core values that are central to Islamic beliefs are retained, the methodology now focuses on teaching curriculums based on thinking, rather than rote memorization.

In this new era, University General Requirements Unit (UGRU) of United Arab Emirates University (UAEU), in spring 2005, replaced the traditional Information Technology (IT) curriculum with a new Information and Communication Technology (ICT) curriculum. The university faculty found new ICT curriculum better than the traditional curriculum in terms of educational goals, content, teaching methods and assessment areas. In particular, it integrates thinking skills into the technologically oriented curriculum. More recently many new instructional technology tools have emerged and are being used in teaching ICT. For example as described in [11] there are hundreds of Apps and features iPad that can be used in teaching students with special needs as explained below:

Voice Over: Scroll iPad objects and menus without seeing the screen. It gives also information about iPad battery, network signal and time/date, etc

- Adjustable speaking rate: you can set the reading speed that suits you, 36 languages included
- Applications: Voice Over support several iPad apps such as, email, safari, iTunes, iBooks, calendar
- Wireless display Braille
- Zoom: you can zoom specific elements or the entire screen
- Speak selection: lets you highlight text from website, mail, announcement, message, by double tapping it, it will read it for you
- Large Text: you can enlarge any text up to 56

Also as detailed in [12] there are many computer technology packages like Augmentative and Alternative Communication (AAC) device, Assistive listening Device (ALD) that can be used in teaching students with special needs. The new ICT curriculum was not specially designed considering the requirements of special need students.

Different students have different styles and strategies of learning.

The number of special need students entering Higher Education increasing every year, thus, it is essential that a supportive and inclusive culture is developed in all aspects of university life. The ICT curriculum is a one of the major aspects. The university, through its equal opportunities policy, is committed to making its facilities and curriculum as accessible as possible to all students, including those with additional support requirements.

II. PRELUDE

First let us understand and analyze creativity, communication, collaboration, environment, and the human brain. Perhaps we should begin with a more basic question: what do we mean by creativity? The basis of creativity is achieving something that did not exist previously, breaking down established patterns, seeing things in a new way. But what drives people to think of something new? How does the creative process work? The creative process may manifest itself in different ways. "Chance favors the prepared mind," the famous scientist Louis Pasteur once said. Pathologist Peyton Rouse spoke likewise of "a prepared mind making its own chances." Are we going to prepare our students using new tools of information technology for future and using creative and critical thinking, value of good communication, and habits of collaboration or wait for the chances? [1]

Several influences have converged to create a new emphasis on the teaching of a thinking skills based IT curriculum around the world. Prominent among these are workplace readiness and the constructivist movement. [2] Although education in the Arab nations was tied to religious fundamentalism during the 20th century and traditional teaching techniques relied primarily on rote learning within a lecturer-centered, religious-oriented context, teaching thinking in IT is not at all antithetical to the Holy Qur'an. In fact, more than 640 verses in the Holy Qur'an challenge believers to use their minds for critical thinking, problem-solving, creative thinking, and decision-making. In the 21st century, it is particularly important to cultivate these skills to enable our youth to function effectively in their own world as well as in the global community. [3] The constructivist movement, based on the teachings of Jean Piaget (who saw children as actively constructing their own understanding of the world as they encounter and organize their experiences), has also led to a greater emphasis on teaching thinking, along with problem-solving, teamwork, and other cognitive skills. [4]

The new ICT curriculum focuses on critical and creative thinking. Perkins [5] notes six basic priorities for lecturers who actively teach for understanding rather than for memorization. Among those priorities is an emphasis on learning as a long-term, thinking-centered process, rather than for a short-term memorization of a set of facts.

Cognitive research and theory has changed the way many in the education system think about educational practice, including curriculum design, assessment, and learning environments. Greeno, Collins, and Resnick [6] emphasize that the design of learning environments can support cognitive or brain-based learning. A number of general principles for creating constructivist classrooms support the cognitive approach to learning. Brooks and Brooks [4] describe several of these. For example, students need to be provided with curriculum holistically, emphasizing large concepts, rather than the fragments, or basic skills as building blocks that is typically the current approach. Students generally are thought of as theory-builders and meaning-makers, and their questions are encouraged and sought after. It is very much relevant for teaching IT [7]. These skills are used intelligently in the new ICT curriculum. New ICT uses a new rubric system for assessment.

III. REASONS FOR SEARCH OF NEW TEACHING STRATEGY

Some of the reasons for the search of new teaching strategy are as follows:

- There is a gap in present and future Information Technology (IT), taught in higher education, and real use of IT.
- Educators are confused and students are bewildered about IT programs in higher education.
- Traditional IT courses require enormous motivation to go through the material, let alone learn from it.
- Serious concerns can be raised regarding gaining relevant knowledge or developing required skills through traditional approach.
- Different students have different styles and strategies of learning.

It was surprising to find in four classroom studies in fall 2004 [8] that not more than 37% students in UGRU want to learn IT using traditional methods. The rise of affordable computers and the internet have made IT learning ubiquitous. Yet much of what is offered under the guise of e-learning completely fails to make use of the essential features of either the computer or the Internet. More often than not the computer is used as little more than a television or a post box. Attempts to address this situation by making instruction interactive typically fall short, in part for the same reasons, but also because of a failure to understand what is essential about interactivity. [9]

We strongly believe that new strategy of teaching can be an effective counter to many of the aforementioned issues. It is more relevant in case of special need students.

According to Harvard professor Dr. Howard Gardner in his multiple intelligence theory, students are one of the following types of learners: (i) A linguistic learner (excels at words); (ii) A logical learner (excels at numbers); (iii) A spatial learner (excels at visualizing); (iv) A musical learner (excels at music); (v) A kinesthetic learner (excels at physical activity); (vi) An interpersonal learner (excels at

relationships); (vii) An intrapersonal learner (excels at working alone); (viii) A naturalistic intelligence; or (ix) An intelligence existential. [10] Our research in fall 2004 about learning styles and strategies about UAE University students revealed interesting outcomes. The results are summarized in Table 1. All the earlier reasons are instrumental in the search of a new strategy of teaching to special need students.

Table 1: Learning styles and strategies of some ICT students.

How do You want to learn ICT?	Number of Students	% of Students
By words (A linguistic learner)	3	2.57
By Pictures (A spatial learner)	21	17.95
By Doing Step by Step (A logical learner)	20	17.09
By Music (A musical learner)	7	5.98
By Moving or Dancing (A kinesthetic learner)	13	11.11
By working alone (An intrapersonal learner)	24	20.51
By working in a group (An interpersonal learner)	29	24.79
Total	117	100

IV. OUR SPECIAL NEEDS STUDENTS

This paper deals with three different ICT sections of special need students from academic years 2005 to 2009. The students could be divided into three categories which are as follows: (i) Deaf and Dumb, (ii) Slightly blind, and (iii) Almost blind.

The student from the first category had some other problems also which we are not medically qualified to comment but we observed her behavior was slightly different than other normal students. These students were from ICT1 as well as ICT2.

V. TEACHING STYLES FOR SPECIAL NEEDS STUDENTS

We always kept in our mind the problems faced by special need students. We were extra sympathetic, cooperative and sensitive about these students.

A. Why a Special Need Students Learn from us?

Some of the compelling reasons are as follows:

- We understand the learning requirements of students.
- We are available most of the time.
- We are intelligent to know what we are doing.
- We do not show negative emotions.
- We do not use any religious example in teaching.
- We provide interesting scenarios to play very realistic "what-if" games.

B. First Thing First: Connecting with Students

Use Connectivity with students by finding out their social activities and trying to be involved as to gather some knowledge of the traditional games, playing computer games, etc. were some of the methods for connecting with our clients (special need students).

C. Method of Delivery

We passed a flash drive to the students, in the beginning of each session that contains the lesson for the day. We discussed the material. Students were required to present some examples to show their learning level. Then we went over the exercises.

We used Microsoft Office 2007 tools, like, Word, PowerPoint, Excel and Access programs for everyday problem solving. We also used TypingMaster program for improving their keyboarding skills. Excel was used for calculations purposes; it is manageable and its usage makes students memorize fewer keys than using calculators. PowerPoint and Words were very useful for completing their homework assignments in other subjects also. Students found Access program little difficult but when they were told to compare it with the process of storing and recalling telephone numbers from their mobile phones they found it interesting.

D. A New technological Setup for New a Strategy

Figure 1 shows a special setup designed by us for our special need students

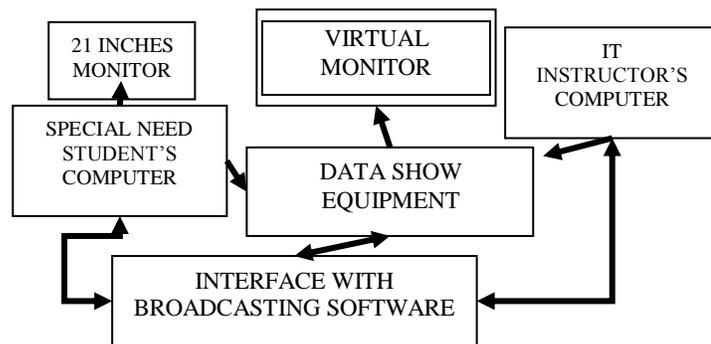


Figure 1: A prototype of a new technological setup designed by us for our special need students.

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VII. ASSESSMENT RESULTS OF SPECIAL NEEDS STUDENTS

The students from all three categories showed good performance in regular tasks, homework and quizzes. They enjoyed learning ICT. Our student from first category decided not to appear for examination while students from other two categories continued their studies and showed very high level of performance in their all examinations. Students also secured full marks in their Mid Term examination and excellent marks (even 99% also) in their Final examinations. The overall result was a great satisfaction provider

VIII. DISCUSSIONS

The following experiences will be useful for other educators also. The teaching process was very enjoyable and satisfying. We group these experiences in two categories: (i) Classroom observations and (ii) Challenges.

A. Classroom Observations

The teaching is experience had many rewarding facets. Some observations are as follows:

- We found the student highly motivated.
- The students do not want anyone to feel sorry for them.
- They want teacher to become very friendly with them.
- They are generally hard working and submit assignment in time
- They are very social (or want be social)
- Willingness of learning
- Class participation

- Effort to study
- Course material
- Openness of students
- Involvement of students

Students really enjoyed learning the material; they showed great motivation in the classroom: by asking directly and indirectly related questions. Their involvement was undeniable.

B. Challenges

The classroom experiences helped us investigate the difficulties that special needs students have in learning IT. We tried different methods and strategies. Some were successful and some resulted in complete failure, especially in case of category 1 student. Some of the challenges faced by instructors while teaching Microsoft Office 2007 suite were as follows:

- Using symbols
- Reading tables
- Reading equations from Microsoft Equation, and
- Doing long calculations.

The common problems faced by instructors were as follows

- Explaining visual concepts as colors, shapes,
- Reading long sentences,
- Lack of networking
- Lack of talking calculators, etc.

IX. CONCLUSIONS

Our research clearly shows that students really enjoyed learning the ICT material; they showed great motivation in the classroom: by asking directly and indirectly related questions. Their involvement was undeniable. There were also some challenges. The new prototype designed by us was an innovative use of technology.

The new strategy of teaching ICT curriculum to special need students is one of the right steps to educate students of higher education in the new Arab world. Certain changes were made in the IT curriculum with respect to educational goals, content, teaching methods, and methods of assessment. Still it is not enough. For example, course content in the new ICT curriculum does not contain all the information needed for students to learn a subject, thereby requiring the students to do their own research to

complement the information in their texts. Regarding teaching methods, lecturers now share the class time with the students, thus engaging them in their learning experience. Generally speaking, the new strategy of teaching ICT curriculum has changed from a textbook, lecturer-centred model to a learner-centred model, providing more active student participation in the educational process of university life. Making IT accessible to the special need students is a challenging and difficult process. Every student is capable of learning and has a right to an instruction that maximizes his opportunity to obtain the highest functional level possible with his abilities. For this reason, we helped ICT students to optimize those areas that afford development of their potential in the cognitive and effective domains. The new strategy of teaching ICT to special need students is a gift of the UAE University to a new Arab world. It will lead us to a new future horizon.

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- Some areas still need improvement, but the current trend is one that will be consistent with guiding our students to become critical and creative thinkers, able to search out, understand, analyse, and synthesize the information they will need to become world citizens and world leaders.
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