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# 17P. Building ICT Success Using PBL Based Practices

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## **17P. Building ICT Success Using PBL Based Practices**

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### ***Abstract***

Increasingly, nowadays students must learn more advanced technical skills in order to secure jobs in a competitive 21st century workforce. This is true even in the Gulf Countries, including the UAE, where less IT work opportunities are available and where competition to find a good IT job is becoming harder. Yet the curriculum that was available to teach them these cutting-edge skills was often textbook-based, uninspiring, and limited in its appeal. Therefore, it was essential to address these issues at the curriculum of developmental program of United Arab Emirates University (UAEU) before students move on to their specific discipline. Considering the earlier mentioned flaws in IT, UGRU curriculum, leadership team in spring 2005 decided to introduce critical and creative thinking and cognition based ICT literacy program along with PBL (Problem Based Learning). The basic objectives of the PBL projects are to promote (i) Research, (ii) Critical Thinking, and (iii) Application of ICT knowledge. The themes of the projects are based on geo-social, scientific or general awareness. In this paper the IT UGRU developmental program will be compared to those counterparts that exist in leading Universities such as UAE, Kingdom of Saudi Arabia, Qatar, Australia, New Zealand, Norway, UK, Canada, and USA. This paper describes the PBL based teaching strategies and their overall effectiveness. It also discusses the impact of these projects on student learning and achieving educational goals. Results are very encouraging. The outcome of this research indicates that using PBL in ICT classrooms can help students become self learners, able to search out, understand, analyze, and synthesize information in a better way. It also helps them to understand the real value of ICT in their lives.

### ***Keywords***

Problem Based Learning (PBL), Independent Learning Program (ILP), Critical, Creative, Thinking, Cognitive Skills, Developmental Program, ICT, UGRU, and ETS.

## **1. Introduction**

Teaching and learning in Higher Education in the United Arab Emirates have recently undergone a major paradigmatic shift, from the traditional format to one in which students are actively engaged in their own learning process. This is true for IT as well as other subjects. 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 spring 2005, the University General Requirements Unit (UGRU) of the United Arab Emirates University (UAEU), replaced the traditional Information Technology (IT) curriculum with a new Information and Communication Technology (ICT) curriculum for all classes. All the students took these changes positively. This paper will focus on the new features of the new IT, UGRU program.

### **1.1 The Context**

In the UAE there are two main types of universities: government controlled public universities, and privately funded universities. This study deals with the public university situated in Al Ain. At the initiative of the late President His Highness Sheik Zayed Bin Sultan Al Nahyan, the UAE University was inaugurated in November 1977. This federal university with Gulf, Arab and Islamic dimensions is meant to be a fountainhead of knowledge, culture, and sciences and to contribute to building a modern state by utilizing all available resources (Sharma, A., Khalifa A. A., Hussein C., & Boylan, S., 2005).

The UAE University has about 17,000 students. It consists of the following colleges: (i) College of Humanities and Social Sciences, (ii) College of Food Systems, (iii) College of Science, (iv) College of Education, (v) College of Engineering, (vi) College of Shari'ah and Law, (vii) College of Business and Economics, (viii) College of Medicine and Health Sciences, and (ix) College of Information Technology. In most of the courses the medium of instruction is English (Sharma, A., Khalifa A. A., Hussein C., & Boylan, S., 2005). Over the past eight years, the UAE University has carried out a fully-fledged review of all its academic programs and plans to use modern methodology and international criteria suitable for its circumstances in all its colleges. The UAE university rank is 374<sup>th</sup> in the QS World University Ranking 2009.

## **2. UAE University's Developmental Program**

The UGRU monitors and prepares students for all nine university colleges. The UGRU program was founded in 1990 as the Basic University Education Center (BUEC) (Sharma, A., Khalifa A. A., Hussein C., & Boylan, S., 2005). That time it provided a bridge between the Ministry of Education and its schools on the one hand and the university colleges on the other hand. Now it is a first year developmental program. Students come with very little formal computer background. Undeniably the majority of students entering UGRU IT have, at best, limited technical computing abilities and even less cognitive skills in terms of problem solving via the computing medium. The technical aspect of our teaching attempts to create a common ground between students who come from smaller Emirates and remote areas where IT practice is inadequate as well as between the Art and Science students and those coming from private schools. The authors in the past have been very much involved in studying status of public and private school education system and levels of K to 12 students in this country which are provider of main input to UAEU and other universities.

It will take long time before our schools will be able to provide the students who will directly become useful and ready to learn in existing colleges of universities. UGRU strives to be the most effective freshman program in the Arab world, coping with the current international trends, and applying the most up-to-date concepts and instructional technology. The mission of UGRU is to provide the University Faculties with students who possess the knowledge, learning skills, values, and attitude, which are the necessary underpinnings of a sound and successful university education.

## **2.1 Information Technology Program (IT) of UGRU**

The Information Technology Program is one of four Programs in the University General Requirements Unit that must be taken by all entering students to the United Arab Emirates University. As such, it is a students-centered Program whose mission is to provide quality education at the same time as it provides a bridge between the Ministry of Education and its schools on the one hand and the University Faculties on the other hand. The program consists of two tracks namely Information and Communication Technology Level 1 (ICT 1) and Level 2 (ICT 2). Mainly there are six learning areas which are related to ICT Proficiency: (i) ICT Fundamentals, (ii) Technology Skills for Problem Solving, (iii) Technology Skills for Information Management, (iv) Technology Skills for Communication, (v) Culture and Values for ICT, and (vi) Learning for Life Skills. The key difference between the two levels is that while learning “how to” tools are heavier in the first level, these are de-emphasized in the second level. Instead students will apply the skills in a variety of ways to solve problems, to improve their communication skills and to organize information better. The way of learning/teaching ICT is mostly done through the use of tasks (Ranginya & McKenzie, 2005).

## **2.2 Teaching and Learning Strategies**

In keeping pace with the well-established universities of the world, the UAE University encourages innovative development of the courses themselves and their teaching methods and technologies so as to guarantee the highest level of education for its graduates. The UAE University expects its faculty members to use modern teaching methodology, develop non-traditional interactive education in order to achieve the desired academic goals associated with the continuously developed programs and curricula. As a Program we have attempted to educate our students within this framework. We focus on teaching ICT, with the recognition that it serves to form the basis of lifelong learning. It is common to all disciplines, to all learning environments, and to all levels of education. “It enables learners to master content and extend their investigations, become self-directed, and to assume greater control over their own learning (I. L. C. S. H. E., 2000).”

An important study undertaken nationwide by America’s ETS, in which students were asked to complete 15 information technology tasks, reveal very disappointing results. Some of the most surprising preliminary research findings are that only 52% of test takers could correctly judge the objectivity of a Web site, and only 65% could correctly judge the site’s authoritativeness. In a Web search task, only 40% entered multiple search terms to narrow the results. And when selecting a research statement for a class assignment, only 44% identified a statement that captured the demands of the assignment. The results may be surprising to the general public because there is an assumption that because students have grown up with computers, they are ICT literate,” says Irvin R. Katz, Senior Research Scientist at ETS (College Students Fall Short).

Large corporations have also made their views known about the importance of Information Literacy. For example, the Bank of Montreal, one of North America's larger banks stated to University of Toronto's graduating class that "whatever else you bring to the 21st century workplace, however great your technical skills and however attractive your attitude and however deep your commitment to excellence, the bottom line is that to be successful, you need to acquire a high level of Information Literacy (<http://www.bmo.com>)." Terry Crane, VP for Education Products at AOL (American on Line) also stated: "Young people need a baseline of communication, analytical, and technical skills." We are no longer teaching about technology, but about information literacy—which is the process of turning information into meaning, and understanding new ideas. Students need the thinking, reasoning, and civic abilities that enable them to succeed in—and ultimately lead—a contemporary democratic economy, workforce, and society (Terry, C., 2000)."

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 (Greeno, J. G., Collins, A., & Resnick, L. B., 1996) 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 (Brooks, J. G., & Brooks, M. G., 1993) 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 most 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. These skills are intelligently used in our new ICT curriculum. For assessment in ICT curriculum we use a new rubric system.

### **3. Developmental Programs From Other Countries**

We made a comparison of our IT courses to the same program at other leading universities of the world and we found out that ICT, UGRU program is very much compatible or excelling than other similar programs. A list of leading Universities with similar to UGRU (IT) foundation programs in UAE, Kingdom of Saudi Arabia, Qatar, Australia, New Zealand, Norway, UK, Canada, and USA is shown in Table 1. This table is not comprehensive, but rather an abridged list with the sole aim of demonstrating correlation between UGRU IT and other leading educational institutions.

Australia for example, has long been an international leader in such programs, and consequently the table comprises several top level Australian Universities. The courses offered in such Universities are typically intensive one-year preparatory courses, but the time frame can sometimes be altered according to the student's needs. Students capable of accelerated learning may be able to complete programs in nine months. Other courses may be lengthened to allow students more time to prepare for their university courses. Foundation courses in Australian Universities are generally divided into subject streams, such as business or IT studies, according to the student's choice of undergraduate course. Most foundation courses offer a range of compulsory and elective subjects. Many universities and some other institutions also offer 'bridging' courses, which are shorter, intensive courses designed for students who are about to enter a Degree course but do not meet assumed knowledge requirements, or who wish to be better prepared for university study.

Name of University	Course	Time	URL Address
Higher Colleges of Technology (HCT) in Abu Dhabi and Dubai, UAE	Computer Literacy	1 Year (2 semesters)	<a href="http://www.hct.ac.ae/programs/asp/academic_programs.aspx">http://www.hct.ac.ae/programs/asp/academic_programs.aspx</a>
King Fahd University, Dhahran, Kingdom of Saudi Arabia	Prep Computer Science	1 semester (16 weeks)	<a href="http://www.kfupm.edu.sa/kfupm/academic/overview.aspx">http://www.kfupm.edu.sa/kfupm/academic/overview.aspx</a>
Qatar University, Doha, Qatar	IT Level 1 and IT Level 2	1 Year (2 semesters)	<a href="http://www.qu.edu.qa/foundation/">http://www.qu.edu.qa/foundation/</a>
The Foundation Studies Program in Adelaide (at Eynesbury College) Australia	Introduction & Computing	1 Year (2 semesters)	<a href="http://www.foundationstudies.com.au/australia/foundation-adelaide/">http://www.foundationstudies.com.au/australia/foundation-adelaide/</a>
University of Tasmania Foundation Year, Australia	Computing Skills and Research	1 Semester of 24 wks	<a href="http://www.foundationstudies.com.au/programs/tasmania/">http://www.foundationstudies.com.au/programs/tasmania/</a>
Brisbane Queensland Foundation Year, Australia	Information Tech	2 semesters.	<a href="http://www.foundationstudies.com.au/programs/quit/">http://www.foundationstudies.com.au/programs/quit/</a>
Melbourne Victoria Foundation Year, Australia	Information Tech	2 semesters	<a href="http://www.foundationstudies.com.au/australia/foundation-melbourne/">http://www.foundationstudies.com.au/australia/foundation-melbourne/</a>
University of Sydney Foundation, Australia	IT Skills	1 hour per wk for 15 weeks	<a href="http://www.usyd.edu.au/fstudent/international/undergrad/apply/foundation.shtml">http://www.usyd.edu.au/fstudent/international/undergrad/apply/foundation.shtml</a>
University of Canberra, Australia	IT Courses	Semester based	<a href="http://www.canberra.edu.au">http://www.canberra.edu.au</a>
Bond College Foundation Program, Australia	Core 110 Info. Tech1	Semester 2. 14 wk	<a href="http://www.bond.edu.au/bondcollege/foundation/">http://www.bond.edu.au/bondcollege/foundation/</a>
Murdoch University Foundation Program, Australia	Information Tech	9 hrs per WK over 15 WKS trimester (3CH)	<a href="http://www.studiesinaustralia.com/">http://www.studiesinaustralia.com/</a>
University of Queensland, Australia	Information Tech	27-42 wks	<a href="http://studylink.com/display/course/course-info.html">http://studylink.com/display/course/course-info.html</a>
Swinburne University of Technology, Australia	Information Tech & Multimedia	9-12 months	<a href="http://www.studiesinaustralia.com/">http://www.studiesinaustralia.com/</a>
Curtin University Foundation Year, Australia	Computing Skills	45 Hrs of 1 sem. (1.5CH)	<a href="http://www.curtin.edu.au">http://www.curtin.edu.au</a>
University of Newcastle, Australia	University Computing Skills	Pre-Semester 1	<a href="http://www.newcastle.edu.au/centre/elfsc/bridging/courses.html">http://www.newcastle.edu.au/centre/elfsc/bridging/courses.html</a>
Taylors College Foundation Program, New Zealand	Computer Science	39 weeks Standard Program	<a href="http://www.taylorscollege.edu.au/courses/mufy_compare.aspx">http://www.taylorscollege.edu.au/courses/mufy_compare.aspx</a>
HedMark University College, Norway	ICT Course by the Library	1 Year program	<a href="http://english.hihm.no/eduscience/engelsk-aarsenhet.pdf">http://english.hihm.no/eduscience/engelsk-aarsenhet.pdf</a>
Foundation Year in Informatics at University of Bradford, UK	Computing	2 semesters	<a href="http://www.inf.brad.ac.uk/clearing/course.php?id=34&amp;d=cfy&amp;type=d">http://www.inf.brad.ac.uk/clearing/course.php?id=34&amp;d=cfy&amp;type=d</a>
Liverpool John Moores University, UK	IT Courses	Semester based	<a href="http://www.ljmu.ac.uk/">http://www.ljmu.ac.uk/</a>
University of Leeds International Foundation Year, UK	Computing course	1 year of computing	<a href="http://www.leeds.ac.uk/international/foundation.htm">http://www.leeds.ac.uk/international/foundation.htm</a>
Willis College Foundation Program, Canada	Info. Tech Skills 1 & 2	2 semesters	<a href="http://www.williscollege.com/International/Programs/Lambton/IFY/index.html">http://www.williscollege.com/International/Programs/Lambton/IFY/index.html</a>
University of Ottawa, Canada	IT Courses	Semester based	<a href="http://www.uottawa.ca/">http://www.uottawa.ca/</a>
University of Waterloo, Canada	IT Courses	Semester based	<a href="http://www.uwaterloo.ca/">http://www.uwaterloo.ca/</a>
Lambton College, Canada	IT Skills for Tech	1 semester	<a href="http://www.lambton.on.ca/Courses/course.html?Course=ITS+1013">http://www.lambton.on.ca/Courses/course.html?Course=ITS+1013</a>
University of Texas, USA	IT Courses	Semester based	<a href="http://www.utsystem.edu/">http://www.utsystem.edu/</a>
CSU Maritime Academy, Vallejo, California, USA	Information Fluency in a Dig. World	1 semester (32 Hrs)	<a href="http://www.csum.edu/academics/index.asp">http://www.csum.edu/academics/index.asp</a>

**Table 1:** A list of leading Universities with similar to UGRU (IT) programs in UAE, Kingdom of Saudi Arabia, Qatar, Australia, New Zealand, Norway, UK, Canada, and USA.

It should also be noted that many North American Colleges and Universities offer programs that prepare students for College and University studies. They have not been included here for several reasons. There is not consistent application of course lengths, content and purpose. For example many of these courses are short intensive summer programs, while others are intended to bridge knowledge gaps between potential students and require semester duration. Other programs are either voluntary or mandatory depending upon students' prerequisites. Many of these courses offered can range from a summer course to over a semester in duration. This may also depend upon the faculty the student wishes to enter. The nature of the course may also vary depending upon the faculty of study. For example an ICT course for an engineering student may focus more on technical computing rather than report writing for social science students. CSU Maritime Academy, Vallejo, California, USA provides an excellent computer literacy program. Qatar University has a similar to UGRU IT program with two levels IT1 and IT2. In UAE, Zayed University does not have any similar program while Higher Colleges of Technologies offer Computer Literacy program. King Fahad University of Saudi Arabia offers a Preparatory Computer Science program.

At UGRU, the goal is to prepare students for entry into faculties. Students have the opportunity to bypass UGRU if they are able to pass placement and challenge exams. If UGRU students cannot pass UGRU courses they are unable to continue their studies. It is the same in North American, European and Australian institutions. Author found out that ICT, UGRU program is very much compatible or excelling than other similar programs.

#### **4. Problem Based Learning (PBL):**

Here we will discuss the conceptual framework of PBL, teaching and learning strategies used in classroom instructions and implementation in ICT, UGRU.

##### **4.1 Conceptual Framework**

Despite the structural heterogeneity of problem-based learning (PBL) curricula, most PBL schools have embraced self-directed learning, emphasizing the use of small-group discussion and integration of the basic theories with real life problems. Self-directed learning is but one of the many terms such as discovery method or study-centered education adopted by authors since Dewey to describe an educational approach that places the learner in control of his or her learning (Knowles, M., 1975). The putative benefits of self-directed learning include enhanced opportunities to elaborate one's knowledge through active involvement and verbalization, enhanced motivation through an increase in relevance and personal control, and the practice of skills needed in lifelong learning (Schmidt, H.G., 1983) (Neville, A. J., 1999).

##### **4.2 Teaching and Learning Strategies**

In this educational milieu, the role of the `teacher' requires revision; new skills are required of the teaching faculty so that they are willing and competent to allow students to take an active role in guiding their own learning and in teaching one another (Barrows, H.S. & Tamblyn, R., 1980). In reflecting on how the prospective PBL instructor might prepare for the role of learning facilitator, Malcolm Knowles (1975) identified seven elements for an andragogical learning process design. These can be paraphrased as follows: (1) *Climate setting*: helping the learners become acquainted with each other as persons and as mutual learning resources, develop the skills of self-directed learning and understanding the role of the facilitator; (2) *Planning*: deciding on how classes will run and how teaching process and function decisions are to be made; (3) *Designing needs for learning*: consideration of how the

facilitator can frame content objectives so that students can take ownership of the learning process and compare their existing knowledge with the required objectives; (4) *Setting goals*: helping the students translates the diagnosed needs into clear, feasible learning objectives; (5) *Designing a learning plan*: helping the students design their learning plans, develop strategies for accessing resources etc. (6) *Engaging in learning activities*: whereby the tutor considers what part of the learning should be his/her responsibility and what the students should be responsible for, collectively or individually; (7) *Evaluating learning outcomes*: how to give constructive feedback to the students so as to enhance the self-directed learning process.

The strategy of problem solving which best describes the activities within the PBL small-group tutorial is the hypothetico-deductive model (A model which describes the way in which all the different branches of science work. It describes the process of finding out new information about the world). Within this context, the role of the tutor in the problem-solving process can be defined. Many PBL curricula are designed so that the students receive the 'problems' first and attempt to work through them 'cold'. The rationale is that problem-oriented processing may promote eventual processing of an analogous problem (Szekely, L. , 1950). Despite these caveats, however, there is some evidence from the educational and psychology literature to support and define the learning role of the facilitator (Neville, A. J., 1999).

There is a clear divergence of opinion in the literature as to the benefit or disruptiveness of facilitator content-knowledge expertise on the facilitation of student learning and teaching function in PBL. This is important, because, in some reports, the concern is not only that content expert facilitators detract from students' self-directed learning by 'teaching' or 'lecturing' the students with their expertise, but also that they dominate the group dynamic, resulting in less collaborative learning (Zeitz, H.J. & Paul, H., 1993). Schmidt et al. (Schmidt, H.G., 1983) found that students taught by experts spent more time on self-directed study and had higher achievement scores. These findings were most noticeable for first-year students, suggesting that novice students were more dependent on their facilitators' expertise than advanced students (Neville, A. J., 1999).

The debate surrounding the use of the facilitator in PBL as a student evaluator remains as unresolved as that of the issue of knowledge content expertise. In 1981, Johnson et al. published a meta-analysis of the effects of cooperative, competitive and individualistic goal structures on achievement (Johnson, D.W. et al., 1981). The extent to which faculty influence learning in PBL remains the subject of debate and further research is required to elucidate the effects of the facilitator on the extent or breadth of learning and the development of self-directed learning skills.

### **4.3 PBL in IT, UGRU**

At present we are using PBL based projects in the form of ILP1 and ILP2. At the end of each semester these projects are collected by lecturers and evaluated using a rubric system. The rubric has following three major evaluation features: (i) Content, (ii) Format, and (iii) Application of Knowledge which includes use of Math, ICT, and English. Student receives a group grade for the oral presentation (40%) and the written product (30%). The student's final grade also includes his/her individual contribution (30%) which is based on his assessed preparation for each session.



## 5. Students' Views about PBL Based Projects

It was important to assess the feelings of the students about this PBL based projects (ILP) in IT. Considering this fact the author decided to go back to our students to find their liking and disliking about this new concept in IT program. In students' liking survey they have already accepted or discarded some of the new ideas introduced by IT, UGRU. Section 6.1 describes students' liking survey of different UGRU programs while Section 6.2 shows the benefits of ICT in improving learning areas as discussed in Section 2.1.

### The Research Objective

Some of the reasons for conducting this research are as follows:

- (i) There is a gap in present and future ICT programs because technology is changing very rapidly.
- (ii) Students find traditional classroom lessons boring.
- (iii) Traditional IT courses require enormous motivation to go through the material, let alone learn from it.
- (iv) Serious concerns have been raised about usefulness of ICT program.
- (v) Different students have different styles and strategies of learning which has not yet been addressed by ICT program.
- (vi) UAE University has to become more research oriented in future.

Author strongly believes that our students are the best persons to provide us useful direction in this matter. It will help us in future to effectively counter many of the aforementioned issues. To find this students' opinion was collected.

### The Research Design

A classroom survey instrument was used as a means of data collection. The survey instrument was similar to the one used in the past which was approved by a group of experts in the field of education. Total ninety students from the five sections of ICT2 (608, 611, 614, 618 and 635) participated in this research project.

### Collection of the data

The survey tool was used in the author's five sections anonymously. The data analysis has been done by an outsider. Students were not given any hint in advance. They were told not to write their names on the survey instruments to keep the survey as much as impartial as possible.

### Data analysis

The data analysis has been done very impartially and honestly. The data collection and analysis were carried out by two different individuals. They don't know each other.

## 5.1 Students' Likings Survey of Different UGRU Foundation Programs

To determine the students' opinions about different types of ICT learning areas and concepts the following question was asked.

### Question

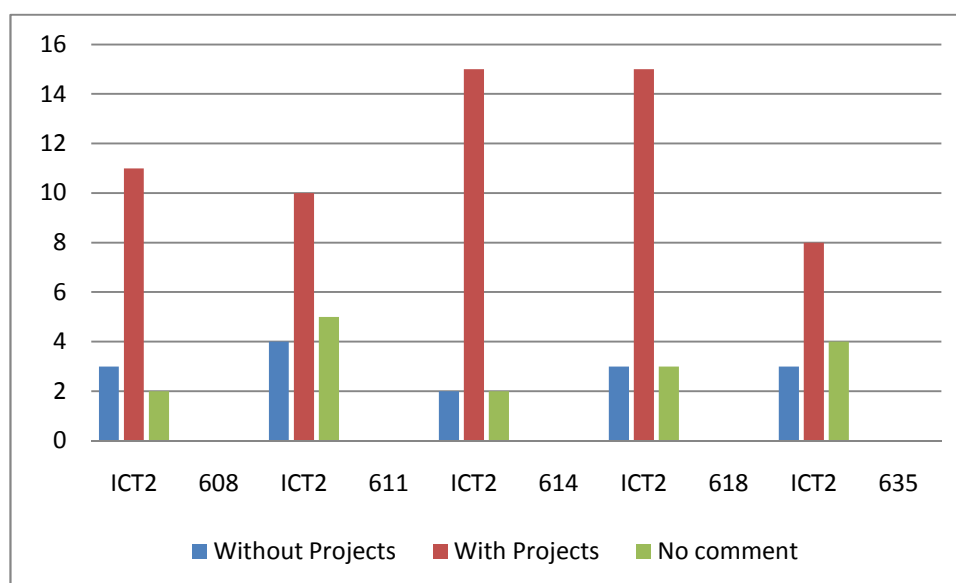
Which type of ICT learning you like better: with or without projects? Tick[X]:

- (i) Without Projects [ ]                      (ii) With Projects [ ]                      (iii) No Comment.

Students' Responses:

Class & Section	Total	Without Projects	With Projects	No comment
ICT2 608	16	3	11	2
ICT2 611	19	4	10	5
ICT2 614	19	2	15	2
ICT2 618	21	3	15	3
ICT2 635	15	3	8	4
<b>Total</b>	<b>90</b>	<b>15</b>	<b>59</b>	<b>16</b>

**Table 2:** Which type of ICT learning you like better: with or without projects? Tick[X]:  
 (i) Without Projects [ ] (ii) With Projects [ ] (iii) No Comment.



**Figure 1:** Graphical representation of the students' responses about type of learning they like.

In general, the results of the study indicated that students believed that the PBL practices based curriculum is better than the traditional curriculum. The Table 2 and Figure 1 shows students' opinion about PBL project based learning.

## 5.2 Benefits of ICT in Improving Learning Areas

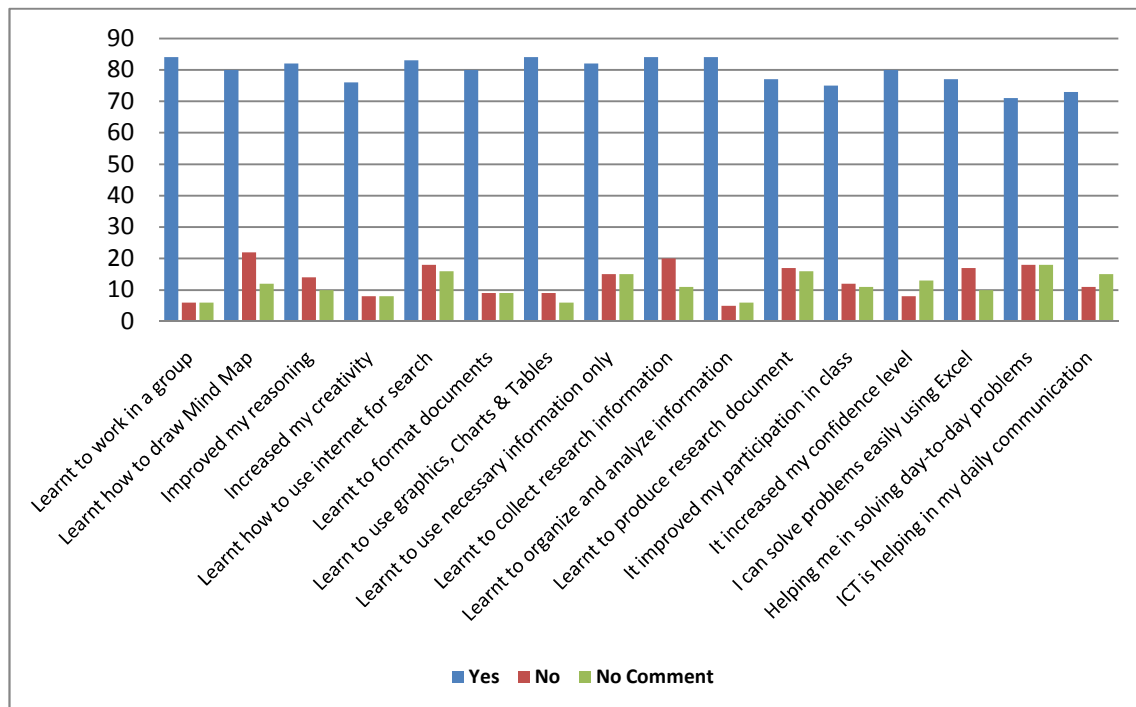
To find the benefits of ICT in improving learning areas in UGRU Foundation program the following sixteen questions were asked. These questions are built around six learning areas on which ICT curriculum contents are designed as discussed in Section 2.1. These questions also take care of the conceptual framework for ICT literacy.

S. No.	Benefits in the classroom	Yes	No	No Comment
1	Learnt to work in a group and cooperate with others	84	4	2
2	Learnt how to draw Mind Map	80	8	2
3	Improved my reasoning	82	6	2
4	Increased my creativity. Now I can handle new problems easily	76	9	5
5	Learnt how to use internet for search (Use search engines)	83	5	2
6	Learnt to format documents	80	9	1
7	Learn to use (i) graphics (ii) Charts (iii) Tables	84	4	2
8	Learnt to use necessary information and avoid unnecessary information	82	7	1
9	Learnt to collect research information	84	4	2
10	Learnt to organize and analyze information	84	4	2
11	Learnt to produce complete research document	77	10	3
12	It improved my participation in class	75	11	4
13	It increased my confidence level	80	6	4
14	I can solve problems (mathematical) easily (using Excel) now	77	9	4
15	ICT is helping me in solving day-to-day problems	71	17	2
16	ICT is helping in my daily communication (Word and PowerPoint)	73	11	2
<b>Total</b>		<b>90</b>		

**Table 3:** Sixteen questions based on ICT conceptual framework & learning areas and students' responses.

It was clear that the students were satisfied with the projects because no examination was involved but they were not satisfied because proper guidelines were not provided. Sometimes they were not happy with their group members because some students did not provide adequate contribution to the group activities. A strong and salient feature of the IT program is the curriculum, both its design and its heavy reliance on modern technology. The curriculum gets away from rote-learning and emphasizes critical thinking, problem solving, investigation, self-learning and creativity. The students were found to enjoy the practical, application-oriented; PBL practices based project part compared to the abstract, concept-oriented theory part of the IT courses. The students in general felt that this course would have

an influence on their future career and in higher education. The students' feedbacks with data analysis are shown in Table 3. The graphical analysis is shown in Figure 2.



**Figure 2:** Graphical analysis of students' responses about ICT learning areas.

## 6. Conclusions

IT, UGRU vision is to be a model Information Technology (IT) program within a developmental first year institution that is known for its student focus, innovative curriculum, and excellence in instruction. Our program aims to assist students to build the confidence and apply technology skills necessary for them to succeed in their personal, academic and professional lives. The IT UGRU foundation program was also compared to those counterparts that exist in leading Universities such as in UAE, Kingdom of Saudi Arabia, Qatar, Australia, New Zealand, Norway, UK, Canada, and USA. In this paper we described the PBL based teaching strategies and their overall effectiveness. We also discussed the impact of these projects on student learning and achieving educational goals. In general, the results of the study indicated that students believed that the PBL practices based curriculum is better than the traditional curriculum.

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