

The Reasons behind the Weakness of some Students in Programming Courses in the College of Applied Science, Ibri

Saad Mamoun AbdelRahman

College of Applied Sciences, Ibri / IT Dept., Ibri, Sultanate of Oman
E-mail: Saadn3@hotmail.com / saadmamoun.ibr@cas.edu.om

Buthaina AL-Syabi and Etab Al Sharji and Salima Said Al Kaabi

College of Applied Sciences, Ibri / IT Dept., Ibri, Sultanate of Oman
E-mail: Btnbtn45@hotmail.com, queenofoman1992@hotmail.com, jvasw2011@gmail.com

Abstract—This research aims to find the reasons which affects students in college of applied sciences in Ibri. The programming courses are very important for the Information technology students in general.

The sample consisted of 50 students from Ibri College. A questionnaire was developed for the purpose of this study. Content validity and reliability were ensured to be sufficient for the study.

The finding of study showed that the students faced some problems during their study in the programming courses like the short time for practical, some of them as their English language is not good so it also affects their skills and knowledge in programming.

Finally this study presents recommendations and advice to improve student's skills and help them to avoid getting low marks in programming courses.

Index Terms—Students weakness, programming languages, Ibri college.

I. INTRODUCTION

Computer process data under the control of sets of instruction called computer program. These programs guide the computer through orderly sets of actions specified by people called computer programmers.[2]

Programming course is the courses which the information technology students study it in their colleges,

Students in college of applied science in Ibri they study many programming courses and other courses which are separate into two parts, theory and practical, also this practical depend on the programming concepts. (see Table 1).

The students face changes among two levels of studying in schools and university and college. Students during their study in schools are learning all their material in Arabic language except for one subject of each semester unlike colleges where all materials are in English language. In addition, students in school care about understanding every subject by finding any materials that will help them. On the other hand, some

students at college of Applied Science in Ibri are careless about their academic study.

The researchers noticed that the programming subjects are hard and difficult for some of the students, so they focus on this case.

This research will benefit the students of the Faculty of Applied Science Ibri and maybe in other universities inside or outside Oman by providing many useful observations to them from the reality of their colleagues advice, as the study also provided tips to instructors about their courses and the teaching method in addition to the necessity of activating and developing, themes and contents of the course.

II. RESEARCH PROBLEM

This research hopes to answer the following questions?

- What are the causes of this problem?
- What are the reasons of the problem (is it from students' side, material or the topics of programming courses, content, or instructor's habits or their strategies of teaching, lack of hours)?
- How can we solve the weakness of students in programming languages?
- Do the students need extra hours to improve their skills on programing language?

III. RESEARCH OBJECTIVES

The objective of this research is to try and figure out the constraints and reasons that lead to the low level of some students in the College in programming courses. And so through the following:

1. Identify the reasons or motives that lead to increased student interest in the programming languages.
2. Identification of the nature of the obstacles faced by these students during their studies with the

programming languages.

3. Propose methods and ways to overcome obstacles that the students may face.
4. In the light of the results who can be reached out to with many of the recommendations that can be for students or lecturers programming language C++ be guided by the decisions to avoid these obstacles.

IV. RESEARCH BORDER

The border time of this study is second semester, academic year 2014/2015.

Spatial border to the research in college of applied sciences, Ibri, in Sultanate of Oman.

V. LITERATURE REVIEW

It will be better if the IT students study the concepts of programming individually, after that they can go in depth of the details of program.

First important concept is software (program) life cycle, second is programming techniques and the basic structure of programs.

First: Software (Program) Life Cycle

There are views of the software life cycle have been proposed over the years and are in use today. There are also many different ways of organizing the activities that transfer the software from one stage to another. The simplest version is the water fall model: [3]

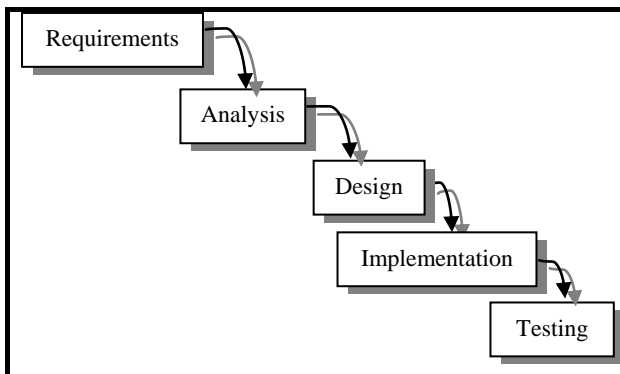


Fig.1. The Water Fall Software Life Cycle Model

Requirements: the requirements for the software system are determined.

Analysis: the requirements are studied and clarified, and the overall architecture of the solution is determined. Each major subsystem is analyzed, and its components are determined. Also many interactions between components are determined.

Design: methods and data fields are defined for classes. Detailed algorithms for the methods are defined.

Implementation: the individual classes and methods are coded in the target programming language.

Testing: the methods of each class are tested in isolation and as a class (unit test). The methods and

classes are tested together (integration testing) to verify that they work together and meet the requirements [3].

The advantage of the waterfall model is that documentation is produced at each phase and that it fits with other engineering process models. Its major problem is its inflexible partitioning of the project into distinct stages. Commitments must be made at an early stage in the process, which makes it difficult to respond to changing customer requirements. [7]

The Importance Of Software Development:

We considered that the software development is the most important thing which needs to improve our life, so day by day we have seen the huge improvement in the field of Information Technology and things are getting improved to deal with life easier. Also the importance of a Software Development is inevitable and you cannot get any success in any business without integrating proper software technology in it. Now a day the programming language is widely spread in the world which makes the operation, calculation and things completed during short time without human error.

At this time we have seen many students interested to work in jobs that use programming language, but the difficulties of studying this major prevent them from working on that jobs. In this research we would like to elicit the reasons of reluctance of students from this major and find the solution of those reasons.

Second: Understanding The Evaluation Of Programming Techniques:

There are two major techniques used to develop programs and their procedures:

1. **Procedural programming:** focus on the procedure that programmers create. In other words procedural programmers focus on the actions that are carried out.
2. **Object oriented programming:** focuses on objects, or "things" and describes their features, or attributes and their behaviors [4].

Third: The Three Basic Structure:

Structure is a basic unit of programming logic. Each structure is a sequence, selection, or loop.

1. **Sequence structure:** you perform an action or task, and then you perform the next action, in order. Once you start a series of actions in a sequence, you must continue step by step until the sequence ends. See figure no(2).
2. **Selection structure (decision structure):** with this structure you ask a question, and depending on the answer, you take one of two courses of action. Then no matter which path you follow, you continue with the next task. See figure no (3).
3. **Loop structure (repetition/ iteration):** you continue to repeat actions based on the answer to a question. If the answer requires that the action be taken again, you take the action and then ask the original

question again. This continues until the answer to the question is such that the action is no longer required, then you exit the structure. See figure no (4).

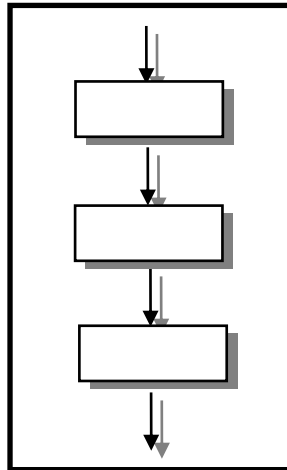


Fig.2. The Sequence Structure

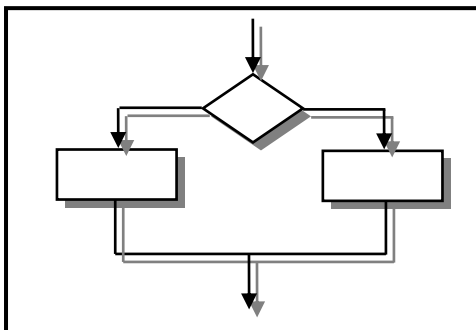


Fig.3. The Selection Structure

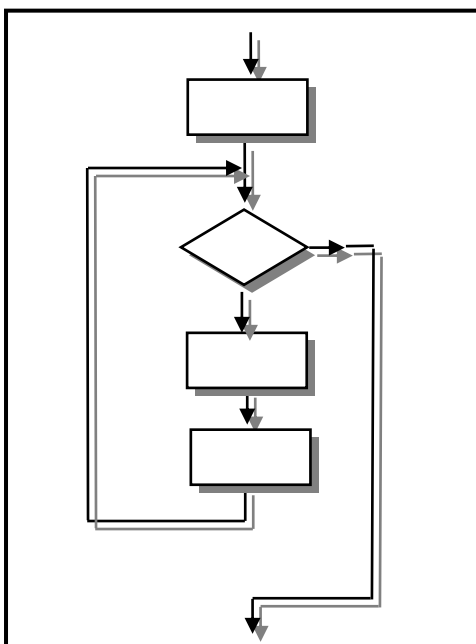


Fig.4. The Loop Structure

There are many research papers and studies that focus on the weakness of students we presents some of them which are from new countries:

1. Dr. Khalil Nofal study:

“This paper is intended to investigate and scrutinize the reasons behind the weaknesses of English major students in Philadelphia University. One thing I would like to make clear beforehand is that my observations and conclusions are based on my personal experience gained during my work as General Education Specialist (English) UNRWA – UNESCO through classroom visits to some community colleges and Education Science Faculties in the five fields of UNRWA operations, namely, Jordan, Syria, Lebanon, West Bank and Gaza on the one hand, and as a teacher of English in both Philadelphia University and the University of Jordan on the other hand. I have discovered that the reasons behind our students' weaknesses may refer to the learner, the curriculum or the study plan with its three major components, namely, language, linguistics and literature, and methods and teaching strategies. ”

2. Dr. Sulatan AL-dmeaty say:

“The study aimed to examine the reality of academic problems faced by students of the University of Thebes and their causes, identify the order of academic problems for students and its relationship with some variables: (study level-alklah), stand on the nature of the relationship between academic problems University for students and good level Aloda.oda imagine a proposal to the role of the University Tiba to address these problems and improve the academic performance of students. The study was descriptive survey method was used to identify the most important academic problems faced by students and their order of importance from their perspective, as well as the relationship of these problems, their academic performance. The study applied a questionnaire designed by the researcher on a random sample of students of the University of Thebes their number reached 384 students.

The study showed that the academic problems related to courses ranked first for the students, followed by problems related to faculty members, then the problems related to the university library, and occupied the problems related to the school schedules ranked last. The results of the study also found that the most important influence on the academic performance of the students are in-circuit television, and faculty, and curriculum changes. Also found several recommendations including what is directed to the university administration and the recommendations addressed to the faculty.

Among these recommendations:

The need for a comprehensive strategy to solve and prevent academic problems faced by students the university, re-curricula and programs the university, implementation, evaluation and development of design mode, the need for the establishment of halls and wide buildings able to accommodate the growing numbers of students and to solve the overcrowding halls problems,

Related Works:

the need to plan and organize academic guidance processes to ensure directing students solve their problems and help them different, and the need to organize and hold training programs for university faculty members to develop their skills in the use of modern methods of teaching and testing, and taking into account the good and balanced distribution of tables of study and examination tables by officials at colleges.”

3. Mr. Sadiq Hamed Moustafa Say:

“This research seeks to assist the teaching of Accounting and Auditing Organization members to provide students with a better understanding of the environment external audit by bringing practical experience of the reality of professional life to the classroom .vama we were able to find a real description and realistic accounting and auditing profession, all the accounting levels of education should be subject to the development of serious and more than that, this development must begin with the objectives of the decisions of the plan Dracie accounting and auditing current placing them where they will not give us graduates specialists have the ability to analysis and interpretation of the provisions and make personal judgments.

This research derives its importance from being deals with the broad goals for the education of the review decisions. Collective purpose of these goals is to assist in the preparation and rehabilitation of the student in order to occupy his place in the profession as well as the development of his personality through knowledge and skills, and others. Therefore, this paper presents the results of analysis and thinking on the review of basic education within the audit objectives study accounting faculties of economics and management plan in order to meet the needs of students and facilities audit profession and its comprehensive concept.”

VI. RESEARCH METHODOLOGY

In this research we used questionnaires and interviews to collect the data for the research. Questionnaires were distributed to the IT students and interview were conducted with the academic staff in IT dept.

In the college within the information technology department you can find four majors (networks, software development, database, information security). All the study plans of these majors has computer programming courses which are prerequisite and depend on one other.

The finding of the student’s Questionnaire:

The staff in Ibr consist of international instructors from different countries, so it is normally that there multi different accent of English language, the students sometimes didn’t understanding regarding to this reason. (see figure no 5)

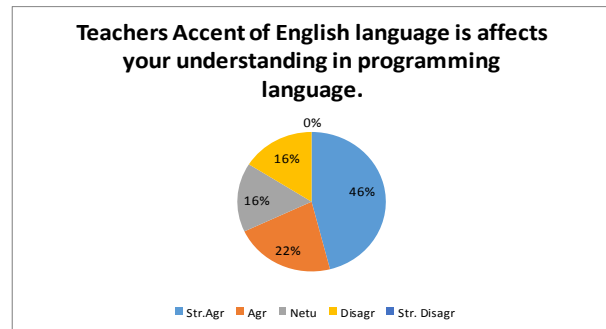


Fig.5. Teachers Accent Factor.

The most programming courses in CAS has four contact hours (two hours for theory, two hours for practical) the researchers check this factor if it is effect or not but find it in balance. (see figure no 6)

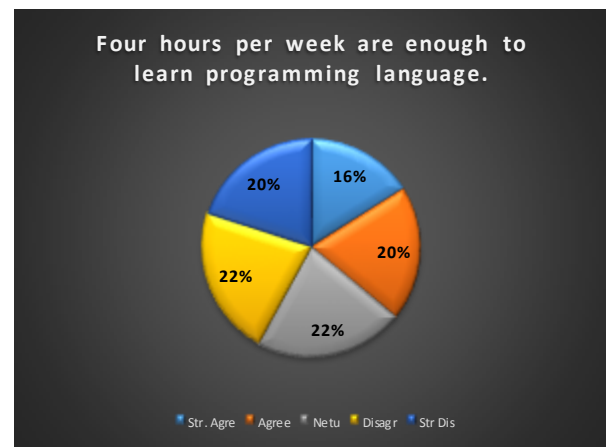


Fig.6. Lack of Practical Time Factor

All the students think if their teachers use the best teach techniques that can be good to understand the lectures. (see figure no 7).

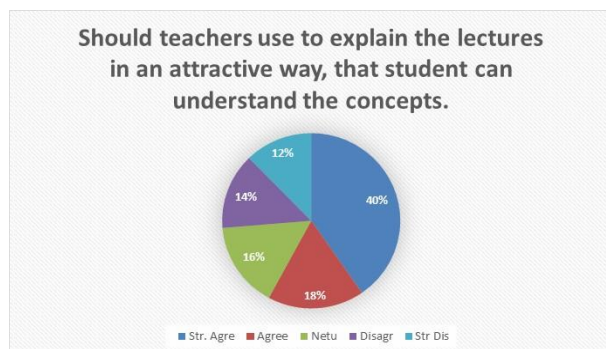


Fig.7. Teach Techniques Factor.

The researchers asked this question in order to test the acceptance of students with material of programming course. The major of students think it is not clear so not support them to understanding. (see figure no:8)

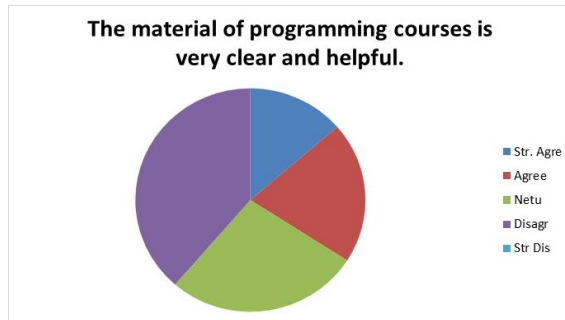


Fig.8. Material Courses Factor

Some students only just lecture content without reference to other sources in order to get adequate information. So the researchers felt the need to draw students' attention to the need for attention by reference to scientific books and CDs educational programming. (see figure no 9)

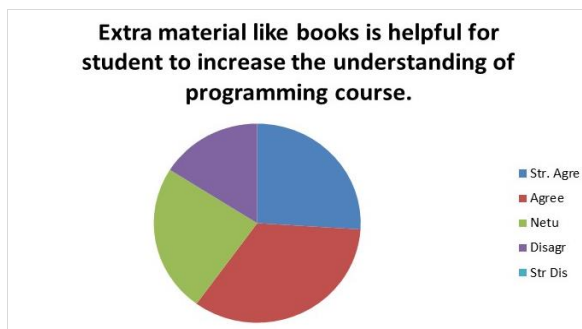


Fig.9. Extra Material Factors.

Discuss some of the challenges of Arab students:

For most of students in the Arab world, when they come from schools to universities for higher education, there are many things which affect the way they select their majors for example:

- The parents and family requests.
- His/her image in the eyes of members of the community.
- His/her job opportunity in the future.
- He/she cannot link between his skills and the majors.
- Sometimes he/she selects majors without any knowledge about it.
- He/she tries to emulate other person in his community without assessing his own skills.

For the above reasons, the Arab students need strong support when he starts his university life. In addition, most of the schools in Arab world close the main gates from the morning till the end of the day at afternoon, which is different in the universities. So when the students join the universities feeling their freedom more than before, this affects badly on their academic performance. Also the community of students in university is bigger than the community in schools so the behavior of the people is also different. Also the

community of students in university is bigger than the community in schools so the behavior of the people is so different also.

Finally find solutions for this challenges help Arab students in their academic life.

Some members of staff in Ibr give us some advices that may help and develop the skills of students in programming course such as, students need more practical and practice by his hand to learn more rather than copy paste. Also, they told us that students must study extra hour and spend their time with programming because the time of class not enough to teach every things and they must keep maintaining their teacher every own work to be on right way.

VII. THE RELATION BETWEEN MATHEMATICAL AND PROGRAMMING

When the computer science appeared in the world as the major and specialization it was a small section in the mathematics department in the faculty of sciences, after that becomes fully department in the faculty of sciences, recently it is not individual faculty of computer sciences only but they're new specialization created which maybe will be college in the future. The major of teachers in that previous period with math background, so the teach using math example, and start to put in the student's mind this message "the computer is sub science from math!"

There are big questions being inside the teacher's and student's minds the most famous of them is "Can a weak mathematics student become a good programmer?" the student during his study in bachelor degree he is very impressionistic, so if he put it in his mind it will be difficult to take it out again. Mr. Michal Young [7] he said for this point:

"I teach computer science courses at various levels from the majors intro course (which I'm teaching right now) through graduate courses at a public research university in the U.S. My colleagues have done a fair amount of analysis recently on predicting success from performance in the beginning courses for majors and from the discrete mathematics courses that students take at the same time. We found that poor performance in either series, CS or math, is a strong predictor of failure later in the curriculum.

You might reasonably object that success in a degree program is not the same as being a good programmer, and some of the students who fail out of our curriculum could be good programmers. In some limited sense of "good", this could be true. However, advanced programming requires a lot of formal and mathematical reasoning. I have seen students who are good in math but cannot grasp programming, but I have yet to see a really good programmer --- one who can construct a simple, efficient solution to a complex problem, creatively combining elements from a broad knowledge of algorithms, data structures, and programming techniques --- who isn't also pretty strong in mathematics.

What I have seen, though, are several students who didn't consider themselves strong in mathematics because

they had been exposed only to poorly taught high school mathematics, with an emphasis on memorization and calculation. Sometimes when these students encounter the kind of mathematics we use in computer science, including logic, set theory, graph theory, and combinatorics, they discover that math is actually much more interesting than they imagined, and that they are better at it than they thought”.

My advice for this point:

When I was students in bachelor degree there were more mathematical courses in the study plan because at that time the major is not clearly and there are only one specialization “Computer science”. But recently there are many majors appeared come from computer science like software engineering, information systems, databases, networks and other. The IT students study mathematical to give them ideas for how to solve problems and to how to gather the input data and how to recognize his ideas to find the solutions. Also the math support the students to prepare algorithm for the program before he is starting to write programs.

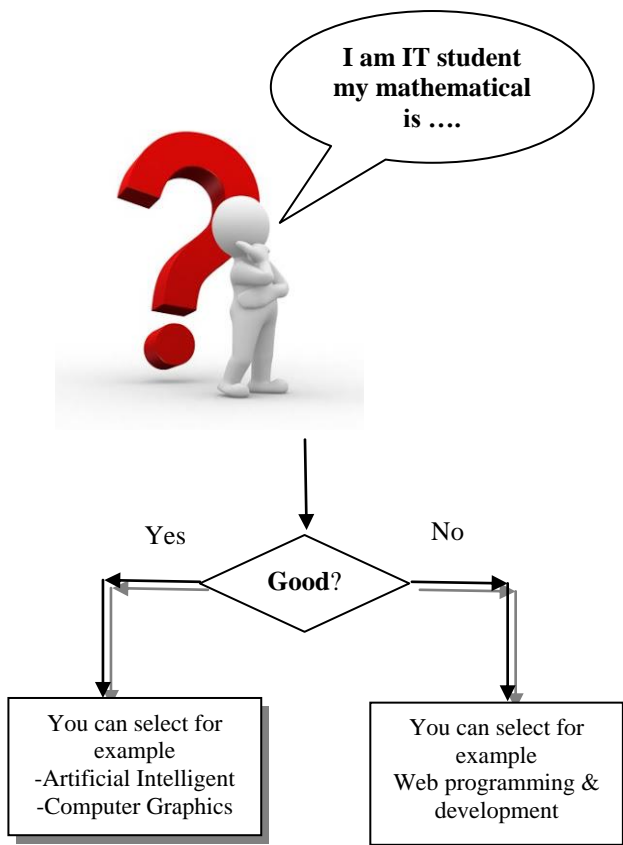


Fig.10. Mathematical Challenge Faces IT Students.

VIII. RECOMMENDATIONS

We can distribute the recommendations for this research into three parts: first part recommendations to the parents and families, second recommendations to the students last one to the teachers and staff:

First Parts: recommendations to the parents and families:

- i. Send message to the parents and family to allow autonomy to their sons while selecting the suitable majors depending on their skills and knowledge. Because the students face many academic problems in the future otherwise.
- ii. Be close to your son/daughter and give him part of the time, maybe he/she needs helps and didn't find you.
- iii. Contact with academic supervisor in his/her college using e-mail or social media to be near if any some things happen.

Second Parts: recommendations to the students:

- i. The students must improve their English language, because it helps them to understand what is being taught.
- ii. Review your lessons day by day and using your computer to write the programs and remember any things it will be difficult for the first time.
- iii. You need to a solid your understanding Discrete Mathematics, Logic and set theory.

Table 1. Examples of Programming Courses from CAS Study Plan

Year	Semester 1	Semester 2
First	Foundation year	
Second	IT Fundamental	Programming Fundamentals
Third	Programming	Introduction to Databases
		Data structure 1
Fourth	Application Software Development	Data Structures (2)
	Systems Analysis and Design	Innovation in Software Development
Fifth	Object Oriented Programming and User-interfaces	Software Engineering Project B
	Software Engineering Project A	Software Project Management

Third Parts: recommendations to the Teachers:

- i. It is better to discuss in the class rooms using clear and simple language and audible voice.
- ii. It is better to have more than one teacher with the students in the lab because the students feel the teacher's presence near them and support them and give them swift help. For example if lab capacity is 25 computers that means you need 3 teachers in the lab.
- iii. Establishment of software programming competitions between students and the allocation of prizes.
- iv. In the labs rooms give students more examples and the teachers must allow the students to discuss about the example and brainstorm solutions.

- v. As some of the students need extra time in lab, the teachers must give them more than 2 hours in the lab rooms.
- vi. Give students lessons to improve their ideas and discuss with them different ways of thinking.
- vii. Improve the student's logic by giving them simple tutorials on mathematics and logic.
- viii. Academic supervisors must be aware of the weaknesses of the students and encourage them to work and write many codes in programming languages.

IX. CONCLUSIONS

Program courses are very important for the IT students and it will be in study plan. In this paper we intended to investigate and scrutinize the reasons behind the weakness of IT students in programming courses in CAS (College of Applied sciences) in Sultanate of Oman. The researchers found that there are many reasons for that from student's side and staff side.

The research discuss about the relationship between the mathematical and programming and try to answer the question in the IT students mind "I am not good in math and logic can I be good programmer?!" and try to explain the best ways which they follow if they are good or poor in math courses.

Finally the paper presents some of recommendations for the parents and family, teachers or staff and students. To reduce and avoid many problems which maybe will face it during their study.

REFERENCES

- [1] Dr.Khalil Nofal "The reasons behind the English majors students' weakness in Philadelphia University," Oman, *Jordan*.
- [2] Paul Deitel and Harvery Deitel. (2010). Java How to program. *Pearson Education International, New Jersey, USA*.
- [3] Elliot B.Koffman, (2005). Data structures and Design using Java. John wiley, USA.
- [4] Jouce Farrell (2008), Programming Logic and Design, Boston, USA.
- [5] Dr Sulatan AL-dmeaty, "Academic problems for students Taibah University and its relationship to the level of performance", Taibah University. Taibah, Saudi Arabia kingdom, 1429 H.
- [6] Mr. Sadiq Hamed Moustafa, "Some basic objectives for the education of present and future decisions of the Review" king AbduAL-Aziz University, Jeddah, Saudi Arabia kingdom, 1418 H.
- [7] Somerville (2007), Softawre Engineering 8, Pearson Education Limited, Edinburgh, England.
- [8] <https://www.quora.com/Can-a-weak-mathematics-student-become-a-good-programmer>. (Print on 11/10/2015).

Authors' Profiles



Saad Mamoun was born in Omudrman, Sudan. He got his Bachelor's degree in Computer Sciences from International University of Africa, Khartoum/ Sudan in 1997. He completed his Master's degree in Computer Sciences from AL-Nealian University, Khartoum Sudan in 2004. He got his Ph.D degree in Computer Sciences (Biometrics Area) from Sudan University of Sciences & Technology college of Graduate Studies, Khartoum, Sudan in 2012.

He has worked in many universities in Khartoum – Sudan. He has also worked in Jazan University, Kingdom of Saudi Arabia. Presently, he is Assisstant Professor, working in College of Applied Sciences, Ibri, in Sultanate of Oman since August 2013.

He is the member of program committee, and reviewer in many international conferences. He has widely published many scientific research papers in various international conferences and journals.

Buthaina AL-Syabi, Etab Al Sharji and Salima Said Al Kaabi are female students in IT department in the college of Applied sciences, Ibri, Sultanate of Oman.