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## Effectiveness of Mathematics Module in Foundation Programme in Majan College

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**Abstract:** A Cross sectional survey design was used to conduct a study, on a sample of two hundred and seventy five students taken from a population of level 1 and level 2 under graduate students of Majan College. Convenience sampling technique was used to select the samples from the population. The exclusive criteria were students who have not undergone foundation program in Majan College. The questionnaire consists of students' feedback regarding the mathematics module in foundation programme and its usefulness in their pathway of higher education. The results of the survey showed that the students consider the course contents of Math module in foundation program offered in Majan College to be very effective. A similar study can be recommended on students to increase the effectiveness by adopting various strategies for teaching and learning mathematics.

**Keywords:** Effectiveness, Math Module, Student Feedback, Foundation Programme

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### 1. STATEMENT OF THE PROBLEM

Students learn better, when knowledge is connected to concepts they already know and their individual needs are more easily met. Learning in Mathematics become effective when there is a one to one interaction between the students and the teachers. It helps students to clarify, explain and reflect on their mathematical skills. Learning Mathematics increases critical thinking and logical reasoning. Teachers' action and inactions impact positively or negatively on students learning experiences as majority of the respondents reported that their learning experiences are to a larger extent controlled by the teacher.<sup>[15]</sup>

Reports of studies have proved that student perceptions of learning were highly correlated with their overall ratings of effectiveness of teaching. Mathematics is the root of science and technology. Student feedback on teaching practices and feedback on a particular module is considered to be a reliable and an important variable for measuring effectiveness of the module.<sup>[1],[8],[19]</sup> Omani students lag behind their international counterparts in mathematics and science, according to the recent

'Trends in International Mathematics and Science Study' (TIMSS 2007-11) report. It added that

there is a huge difference when the performance of Omani students in mathematics is compared to that of their Singaporean counterparts. However, the difference was not very significant in science.<sup>[23]</sup> Greenwald, Marsh & Roche in their study agreed that student course evaluations are the "single most valid source on teaching effectiveness". Evaluation of a curriculum is imperative in ensuring best practice and ensure that the services provided were meeting the needs of the students.<sup>[22]</sup> Teachers are very good in evaluating the course content, but students are best in evaluating what worked and what did not work for their learning. According to the report, students who spent at least an hour doing homework and working on computers had better results.<sup>[23]</sup> The study recommended that improving the quality of learning should be the central focus of education policy in Oman. This motivated the researchers to investigate and measure the effectiveness of mathematics in foundation programme in Majan College.

### 2. RELEVANCE OF THE PROBLEM

Mathematics is not about meaningless concepts which are not applicable in real life. It can be interesting, when it is connected to activities of real life. Students' feedback to the faculty member has to be handled carefully so that the faculty member responds positively and does not

feel demoralized. “The perspective of Mathematics students, particularly remedial students, is often overlooked or ignored”<sup>[25]</sup>. Many investigators have reported on the importance of evaluating the effectiveness of mathematics learning centers in tertiary institutions.

Teachers’ perception of their teaching and how they teach is of great importance in measuring the effectiveness of mathematics teaching and learning and it also reinforces teacher’s decision making (Ahmed and Aziz 2009). Ernest (1989) explained that, teaching reforms cannot take place unless teachers’ deeply hold good beliefs about mathematics teaching and learning changes?” (p.249).<sup>[16]</sup> A 2005 study of 357 faculty , revealed that a majority of the instructors surveyed had generally positive views of course evaluations. 63% indicated they did not find them to be intrusive, 70% did not find them to be a waste of time and 82% did not think they were an inappropriate means of assessment.<sup>[6]</sup> Ory (2001) cites studies, that show students provide more constructive, thorough, accurate and positive evaluations when they have been educated about the goals and uses of course evaluations.<sup>[27]</sup> Therefore the researcher is of the opinion that students’ feedback has always been a catalyst in maintaining the quality and standards of higher education. It can also identify whether the learning objectives of the module are achieved. This can be achieved mainly by bridging the gap in mathematical skills between the secondary school and the pathways of higher education. The primary focus of student feedback is students’ involvement in learning experience. It imbues confidence in the students’ by making them realize that their voices are heard and they are involved in analyzing the quality of the programme. Course evaluation is a wonderful tool for reflecting student experience. Exploring Mathematics with your students and reflecting on their experience is very important for a teacher to gain insights into teaching practice and chance of improving. Most of the teachers today see mathematics as a fixed pack of knowledge, teacher centered and their responsibility is to transmit this knowledge to their students. Instead teachers should provide students opportunities to engage in mathematical enquiry and remain flexible and responsive to students’ feedback. Moreover review of literature reveals that very few studies are conducted in Oman on effectiveness of math module on the foundation

programme. Therefore the present study was an attempt to address the growing concern regarding mathematics performance Oman.

### **3. FIELDS OF APPLICATION OF THE PROPOSED RESEARCH RESULTS**

The study results will help Mathematics as well as other module teachers to measure the effectiveness of their module and perform interventions by exploring various teaching pedagogy and learning strategies to increase the effectiveness. It will also help in reflecting on the teachers present practice of teaching.

### **4. REVIEW OF LITERATURE AND OTHER EXISTING INFORMATION**

In recent years, universities and colleges across the globe have found that their students do not have sufficient mathematical preparation or the appropriate mathematical background to deal with their first year mathematics courses and because of this, universities and colleges have seen an increase in failure rates for these subjects<sup>[28]</sup>. The term the Mathematics Problem has been coined to describe this situation. The Mathematics Problem refers to the: “longstanding international disquiet (e.g. UK, USA) that students are entering mathematics intensive courses with fewer of the basic mathematical skills essential for course success”.<sup>[18]</sup> Many reports have emphasized on the importance of evaluating the effectiveness of mathematics learning centers in tertiary institutions. Mathematics, studies have shown that instruction, especially at the high school level, remains overwhelmingly teacher centered, with greater emphasis placed on lecturing, than on helping students to think critically and apply their knowledge to real world situations. The Mathematics syllabus for the grade 1 -3 of the Junior Secondary School in Botswana emphasizes that Learning of Mathematics should be “geared towards developing qualities and skills needed for the world of Work”. These words highlight how practical and useful is Mathematics in the world of work and day to day situations. Cuban (1984) shares his insight that teacher-centered instruction as favoring teacher talk over student talk.<sup>[12]</sup> National Council of Teachers of Mathematics (NCTM) recommended the development of an enquiry based Mathematics tradition. As a result of which students are given opportunities to reason and

construct their understanding as part of a community of learners.<sup>[24]</sup> Marilyn Burns has worked hard to provide the best quality mathematics instruction to students and teachers. She has spent a lifetime identifying the most effective strategies for supporting students who struggle with math. Her research concludes that optimal learning is achieved when students move through phases of dependence to independence through gradual release which is a process that begins with teacher modeling moves to guided practice followed by paired practice and ends with students completing work independently. Providing information about how each student is performing consistently enhances students' mathematics achievement<sup>[14]</sup>. A Mathematics foundation program should support the students to build a strong foundation in computation, numerical sense and problem solving. It helps the students to develop the skills they need to compute with accuracy and efficiency; the numerical sense they need to critically think and the ability to apply their skills and reasoning to solve problems in their pathway of higher levels of learning. It should also provide intervention that is ideal for ensuring that students continue to perform at or above grade level.<sup>[29]</sup> Many studies have reported considering students opinions in improving the learning of mathematics ,as students are in a better position to provide information about their teacher's teaching and how much impact it has on their learning. Therefore it is recommended that evaluation of the teachers' teaching by the students is to be considered to measure the effectiveness of the teachers teaching. Research on student perceptions of course evaluations is limited. Most of the studies have been small, drawing on samples from one institution. Moreover, they also perceive that students can be and are effective evaluators of the curriculum and their process of collecting feedback is considered as valid and useful.<sup>[6],[10]</sup> Reports of many studies have also triggered debates that the falling standards of students achievement in mathematics is due to the curriculum and the teaching of the subject.<sup>[36]-[37]</sup> Many studies have proved that students evaluate course instruction very highly because the instruction has produced effective learning.<sup>[17]</sup> According to Stone, James R, Alfeld, Corinne, Pearson, Donna, numerous high school students enrolled in various professional and technical institutions do not have the basic mathematical skills necessary for today's college entry and high skill workplace. The Nation at

Risk Report (1983) stated that "The teacher preparation curriculum is weighted heavily with courses in education methods at the expense of courses in subject to be taught". Harper and Kuh (2007) note that qualitative means of assessment can often bring to light issues that cannot emerge through conventional quantitative means. According to Herrington (2003) "successful curriculum change is most likely to occur when the curriculum reform goals relating to teachers' practice takes into account of the teacher's belief".<sup>[17]</sup> In researcher's point of view students' feedback on learning experience of Mathematics in the foundation program can be considered to be very important in measuring the effectiveness and the application of the Math module in their field of higher education.

### 5. STATEMENT OF OBJECTIVES

- i. To Measure the effectiveness of Mathematics curriculum in Foundation Programme.

### 6. VARIABLES

- a. Gender.
- b. Helpfulness of the module
- c. Frequency of reference.
- d. Application of Math on other modules.

### 7. RESEARCH METHODOLOGY

#### 7.1. Summary of Methodology

The study was conducted to:

Measure the effectiveness of Math module in foundation programme.

Based on the availability of the samples,

Sample Size : 275

Sampling Technique: Convenience Sampling

Setting : Majan College

Exclusive Criteria : undertaken foundation programme in other colleges

#### 7.2. Selection of Research Strategies

A cross-sectional study design was adopted for the study.

##### 7.2.1 Description of the tool

The survey questionnaire consists of demographic performa and questions related to the integration of math module in foundation with the other modules in higher level of learning. Each respondent was asked on the usefulness and

frequency of reference of foundation handouts. Interviews were conducted related to the concepts and skills of problem solving techniques, independent learning of new ideas and multiple learning strategies adopted in the foundation program was helping them in their pathway of higher education.

**7.3 Validity**

The content validity of the tool was done by experts from the department of Mathematics and research. The modifications and suggestions were incorporated in the final presentation of the tool.

**7.4 Reliability**

The reliability of the questionnaire, determined by spearman’s brown reliability estimate was 60%.

**7.5 Ethical Consideration**

*7.5.1 Permission was obtained from the Dean of Majan College*

*7.5.2 The students were briefed on*

- i. The questionnaire.
- ii. Purpose of the study.
- iii. Selection criteria for subjects.

**7.6 Description of Data Collection**

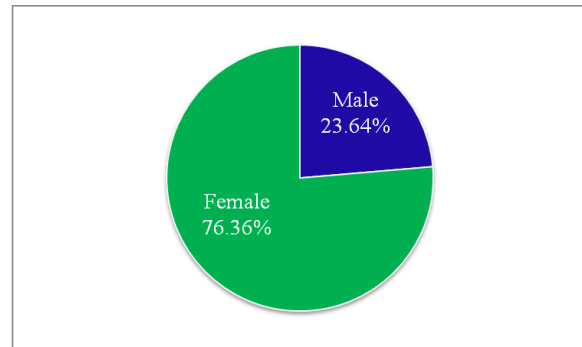
*7.6.1 Recruitment of samples*

The samples have undergone foundation programme in Math in Majan College. The target was 100% coverage of the students satisfying the inclusive criteria. But due to various reasons the target sample could not be reached. The questionnaire was administered to 300 subjects. 275 respondents returned the completely filled questionnaire and participated in the interview.

*7.6.2 Analysis and Findings*

A graphical representation of the samples on the basis of the demographic variables and Descriptive statistics of frequency and percentages were used to summarize the sample characteristics.

Distribution of the respondents on the basis of gender



**Figure 1.** Among the respondents (24%) were males and (76%) were females.

**Table 1.** Tabular representation of the samples representing the application of the module on other modules in higher education

Module	Frequency	Percent
Business Math & Statistics	124	45.1
Mathematical Statistics	92	33.5
Business Math & Introduction to Accounting	59	21.5
Total	275	100.0

Table 1 indicates that 45% of the respondents have responded that Math curriculum in foundation has its application in Business Math and Statistics, nearly 34% in Mathematical Statistics and nearly 22% of the students believe that the curriculum has its application on two of the modules (Business Math and Statistics, Introduction to Business Accounting) in the pathway of higher education. On numerous occasions they have also said that mathematics in the foundation program was having a positive impact because it helped them to gain a greater understanding of mathematics. They consider the learning strategies like class participation, independent learning and peer learning adopted in the foundation level has helped them in gaining an understanding of the mathematical concepts and skills which they are expected to have and use in the university level. This indicates that the curriculum is successful in narrowing the gap of achieving basic mathematical and statistical skills between the secondary level and the higher levels of learning. In their interviews they have justified by giving evidence about their better grades in higher levels. According to them this

significantly improved results was due to their understanding of basic mathematical skills required for undergraduate studies related to business and Information technology in Majan College.

**Table 2.** *Helpfulness of course contents*

Helpfulness	Frequency	Percent
Somewhat helpful	20	7.3
Very helpful	255	92.7
Total	275	100.0

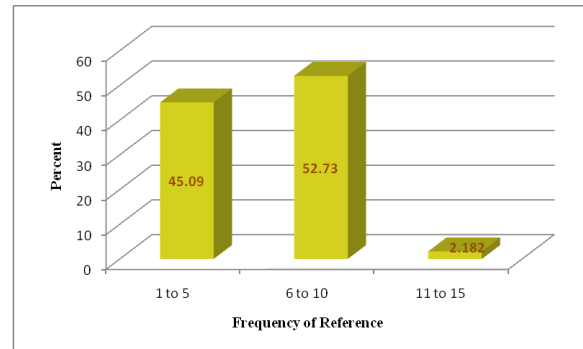
The table above conveys that nearly 93% of the students have realized that course contents of the math module in foundation have been helpful in achieving the basic mathematics skills required for their learning at higher levels. In their interviews with the researcher, the students discussed that the math curriculum in the foundation is integrated with the modules in the diploma/degree level. They commented that certain study habits like doing home work after each class, doing more practice exercises, peer learning in pairs and group had indeed helped them in their learning. Many students said that they now find mathematics easier, more useful or more interesting since they had undergone the mathematics foundation programme. This supports the studies conducted by many researchers that key element of the Lesson Study process is that it helps to facilitate teachers working together using interconnecting skills across grade levels and lessons.<sup>[30]</sup>

Distribution of the respondents on the basis of Frequency of reference of the Math notes of the foundation programme

In the “Figure” 2, 45% of the respondents had referred their foundation notes 1 to 5 times, 53% have referred 6 to 10 times, 2% had referred 11 to 15 times and 0% have referred the notes zero times.

These results prove that Math module in the foundation programme is well connected to the undergraduate programme in Majan College. Qualitative feedback, in the form of written responses to open-ended evaluation questions, can also provide useful and specific information. The students in interviews have repeatedly confirmed that the curriculum of Mathematics in foundation was helpful in achieving the basic Mathematic skills required for higher education

and still helping them in continuing their education related to business and information technology in Majan College.



**Figure 2.** *Distribution of samples on the basis of reference of handouts*

Research evidence supports that a well-developed, tested, student rating forms of teaching effectiveness exhibit both reliability and validity.<sup>[3]</sup> Therefore the students have conveyed that there is a need for a quick reference guide with an insight of all the formulas to aid them in their higher levels of learning in Majan College.

**8. CONCLUSION**

The analysis of the survey indicates that 93% of the students consider the course contents of Math module offered in Majan College to be very useful as they continue into higher level of education. It also shows that 100% of the students have referred to the Math foundation notebook between 1 to 15 times in their immediate year of education. This proves that the students reflect upon the basic mathematical concepts learnt in the foundation in their pathway of higher education. This analysis shows that the students consider the course contents of the Math module offered in Majan College to be very effective. The result is due to the fact that, teachers in the foundation engage, involve and connect the students with the course and as a result the students tend to work harder in that course. Due to their learning experiences in higher levels, they consider the course content to be highly useful as they continue their education in Majan College. As an improvement, they also desire that a quick reference guide be included in the course content which will make it easier to them to access the information quicker and easier as they move to the higher level of education. This was indicated by 100% of the students as positive.

Here the researcher has tried to investigate whether the students' have achieved the mathematical skills required for their college level. The results of the research supports literature reviews indicating that curricula play a vital role in education practice. They are shaped by the teachers who teach them. The results of the study strongly supports the fact that the Math foundation programme in Majan College has the potential to provide students both affective and cognitive support that is very critical to many of the students entering the higher level of education in Majan College. The investigator supports the fact that on the whole, the students, faculty and instructors each benefit from and require different data derived from course evaluations.

## 9. RECOMMENDATIONS

- i. Similar study can be conducted on students of other colleges to measure the effectiveness of math as well as other curriculum.
- ii. Explore many strategies to increase the effectiveness of the course.
- iii. Regular review of evaluation instruments based on institutional needs and goals and in relation to current research findings

## 10. FURTHER RESEARCH

- i. Measure the effectiveness of a Mathematics support class versus a control group.
- ii. On various teaching pedagogies to improve mathematics learning.

## REFERENCES

- [1] Arthur, W., Tubre, T., Paul, D. S., and Edens, P.S. (2003) Teaching effectiveness: The relationship between reactions and learning evaluation criteria. *Educational Psychology*, 23:275-285.
- [2] Ahmad, F., and Aziz J. (2009) Students' perception of their teachers' teaching of literature communicating and understanding through the eyes of the audience *European Journal of Social Science*, 7(3) 17-26.
- [3] Aleamoni, L. M. (1978). The usefulness of student evaluations in improving college teaching. *Instructional Science*, 7, 95-105.
- [4] Aleamoni, L. M. (1981). Student ratings of instruction. In J. Millman (Ed.), *Handbook of teacher evaluation* (pp. 110-145). Beverly Hills, CA: Sage.
- [5] AWONIYI, Samuel Adebayo (PhD). *Arabian Journal of Business and Management Review (OMAN Chapter)* Vol. 2, No.6, Jan. 2013.
- [6] Beran, T., Violato, C., & Kline, D. (2007). What's the 'use' of student ratings of instruction fo administrators? One university's experience. *Canadian Journal of Higher Education*, 17(1), 27-43.
- [7] Blum M. K. (2002). Enhancement of students learning and attitudes towards mathematics through authentic learning experiences, Unpublished Dissertation, Curtin University of Technology, Australia.
- [8] Cashin, W. E., (1995) Student ratings of teaching: The research revisited. IDEA Paper No. 32, IDEA Center, Kansas State University.
- [9] Campbell, Keith Topping; Walter Douglas & Andrea Smith. (2003) Cross-age peer tutoring in mathematics with seven- and 11-year-olds: influence on mathematical vocabulary, strategic dialogue and self-concept. *Educational Research*. Volume 45, Issue 3, 2003.
- [10] Campbell, J.P. & Bozeman, W.C. (2008). The value of student ratings: Perceptions of students, teachers and administrators. *Community College Journal of Research and Practice*, 32(1), 13-24.
- [11] Catherine C. Lewis, Rebecca R. Perry, Shelley Friedkin and Jillian R. Roth. Improving Teaching Does Improve Teachers: Evidence from Lesson Study. *Journal of Teacher Education* 2012 63: 368
- [12] Cuban, L. (1984.) *How teachers taught: Consistency and change in American classrooms, 1890-1980*. New York, NY: Longman.
- [13] Cobb, Wood, Yackel, & Mc Neal (1992). Characteristics of Classroom Mathematics traditions: An interactional Analysis. *American Educational Research Journal*. vol.No.3 pp. 573-604.
- [14] Do the Math: Arithmetic intervention by Marilyn Burns. A Summary of research. (2008) New York Scholastic, Inc
- [15] Ernest Ampadu, Anglia Ruskin University, UK (2012) Students' Perceptions of their Teachers' Teaching of Mathematics: The Case of Ghana. *International Online Journal of Educational Sciences*, 2012, 4 (2), 351-358
- [16] Ernest, P. (1989) the impact of beliefs on the teaching of mathematics, in P. Ernest, Ed. (1989) *Mathematics teaching the state of the art*, London: Falmer Press: 249-254.
- [17] Handal, B. and Herrington, A. (2003) Mathematics teachers' beliefs and curriculum



- reform. *Mathematics Education Research Journal*, 15(1), 59-69.
- [18] Hourigan, M. and O'Donoghue, J. (2007), Mathematical under-preparedness: the influence of the pre-tertiary mathematics experience on student's ability to make a successful transition to tertiary level mathematics courses in Ireland. *International Journal of Mathematical Education in Science and Technology*, 38(4), 461-476.
- [19] John A. Centra, Noreen B. Gaubatz (2005). Student perceptions of learning and instructional effectiveness in college courses a validity study of sir ii.
- [20] Laurel Howar, Kathryn Van Wagoner, Keith White. *Motivating Math Students to Choose Success*
- [21] Mary Kelly (2012). *Student Evaluations of Teaching Effectiveness: Considerations for Ontario Universities*. COU. Academic Colleagues Discussion Paper.
- [22] McKeachie, W.J. (1997). Student ratings: The validity of use. *American Psychologist*, 52(11), 1218-25.
- [23] Muscat Daily (2012). Omani students lag behind GCC peers in Math and Science.
- [24] NCTM, 1989, 1991, 2000 Practice based professional development for teachers in mathematics (2009) Margaret schawn smith.
- [25] Neher, Mallory Jane, MED; P lourde, Lee A, blueprint for aligning high school algebra with state standards: one School's journey, PHD Publication info: *Education* 133.1 (Fall 2012): 85-96.
- [26] NRIC team. (2012), Changing students' perceptions of mathematics and of learning mathematics.
- [27] Ory, J.C. (2001). Faculty thoughts and concerns about student ratings. In K.G. Lewis (Ed.), *Techniques and strategies for interpreting student evaluations [Special issue]*. *New Directions for Teaching and Learning*, 87, 3-15.
- [28] Rylands, L. J. and Coady, C. (2009) Performance of students with weak mathematics in first-year mathematics and science, *International Journal of Mathematical Education in Science and Technology*, 40(6), 741-753.
- [29] *Teaching Today* (2006). Using the Japanese Lesson Study in Mathematics.
- [30] Silver, J Cai (1996). An analysis of arithmetic problem posing by middle school students. *Journal for Research in Mathematics Education*, vol 27, No. 5 pp521-539.
- [31] *Teaching Today* (2006). Using the Japanese Lesson Study in Mathematics.
- [32] Weinstein, G. L. (2004). Their side of the story: Remedial college algebra students. *Mathematics and Computer Education*, 38(3), 230-240.

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