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iv

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    NEED/IMPORTANCE OF THE STUDY

    STATEMENT OF THE PROBLEM

    OBJECTIVES

    HYPOTHESES

    RESEARCH METHODOLOGY

    RESULTS & DISCUSSION

    FINDINGS

    RECOMMENDATIONS/SUGGESTIONS

    CONCLUSIONS

    SCOPE FOR FURTHER RESEARCH

    ACKNOWLEDGMENTS

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BOOKS

*   Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
*   Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

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*   Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

*   Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

*   Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, KurukshetraUniversity, Kurukshetra.

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WEBSITES

*   Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

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A STUDY ON EVALUATING THE EFFECTIVENESS OF TUTORIAL PROGRAMS IN QUANTITATIVE TECHNIQUES

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ABSTRACT
The intake of students into the master's programme of business studies poses many problems with regard to the curriculum. Students come from a wide spectrum of undergraduate courses that range from English Literature to Engineering and Commerce. This results in great variances in quantitative and accounting abilities. To bridge the apparent gaps many b-schools have adopted bridge courses as a tool to stabilize the learning outcomes. However these were found to be inadequate and the result is the slowing down of the teaching process to accommodate those with weaker foundations. The article discusses the adoption of a tutorial system to go alongside the main course for a select group of students. In parallel, the teaching of the main course was restricted to the prescribed hours. The results show a significant improvement of scores along with a significant reduction of student hours.

KEYWORDS
curriculum, quantitative, tutorial system, learning outcomes, student hours.

INTRODUCTION

The intake of students into the master's programme of business studies poses many problems with regard to the curriculum. Usually students are admitted on the basis of an aptitude test which tests their analytical and verbal abilities. However these tests don't take into account any specific subject content. Students come from a wide spectrum of graduate courses that range from English Literature to Engineering to Commerce. This results in great variances in quantitative and accounting levels of students within the same batch. To bridge the apparent gaps many b-schools have adopted bridge courses as a tool to stabilize the learning outcomes. However these prove to be inadequate as many concepts are still not well assimilated by the time the actual course commences and this slows down the teaching process during the actual allotted schedule. This often results in the extension of the class hours to accommodate those students with weaker foundations in the relevant subjects.

This has been the practice in many b-schools and for the purposes of this study, this will be termed as the traditional method. This method is problematic and inefficient in many ways. Firstly, it results in the extension of class hours, and the accommodation of unscheduled hours into the semester negatively affects the efficiency of the programme. Secondly the extended coaching benefits only a few students who have graduated from programmes that do not include mathematics and statistics. This leads to a heavy wastage of formal class hours for students who do not need the extra input. Thirdly, the large student-teacher ratios limit the effectiveness of the class for two reasons- the first is that this factor may facilitate acquisition of knowledge but will be less effective in the process of analysis and synthesis of information; the second is that opportunities for individual attention may be limited in large classrooms.

REVIEW OF LITERATURE

TEACHING METHOD

Teaching method comprises the methods which are used by the instructor for delivering the subject to the students. Lecture based classroom teaching has been supported by many researchers as one that is appropriate to achieve the learning outcomes expected. A study by Barnes & Blevins (2003, p.41) suggests that active, discussion-based methods are inferior to the traditional lecture-based method. In contrast, a more modern view of learning is constructivism, where students are expected to be active in the learning process by participating in discussion and/or collaborative activities (Fosnot, 1989, p.89). Overall, the results of recent studies concerning the effectiveness of teaching methods favor constructivist, active learning methods. The findings of a study by de Caprariis, Barman, & Magee (2001, p.1) suggest that lecture leads to the ability to recall facts, but discussion produces higher level comprehension. Further, research on group-oriented discussion methods has shown that team learning and student-led discussions not only produce favorable student performance outcomes, but also foster greater participation, self confidence and leadership ability (Perkins & Saris, 2001, p.111; Yoder & Hochevar, 2005, p.479). Hunt, Haidet, Coverdale, and Richards (2003, p.53) examined student performance in team learning methods, finding positive learning outcomes as compared to traditional lecture-based methods.

Thus both methods seem to have their own respective merits. A comparison of lecture combined with discussion versus active, cooperative learning methods by Morgan, Whorton, & Gunsalus (2000, p.341) demonstrated that the use of the lecture combined with discussion resulted in superior retention of material among students. A study conducted by Sweeney and Ingram (2001, p.55) has found that foreign students who were weak in language were provided with different web based tutorials as additional hours. These have produced excellent results in the performance of the students, as the extra time used for developing the answers and analyzing the process built their confidence levels and enhanced their performance in the class.

In terms of students' preferences for teaching methods, a study by Qualters (2001, p.51) suggests that students do not favor active learning methods because of the in-class time taken by the activities, fear of not covering all of the material in the course, and anxiety about changing from traditional classroom expectations to the active structure. In contrast, research by Casado (2000, p.65) examined perceptions across six teaching methods: lecture/discussion, lab work, in-class exercises, guest speakers, applied projects, and oral presentations. Students most preferred the lecture/discussion method. Lab work, oral presentation, and applied projects were also favorably regarded. Hunt et al (2003, p.53) also noted favorable student attitudes towards active learning methods.

Extant research on the relationship between class size and student performance has identified conflicting results (Toth & Montagna, 2002, p.253). The results of some studies show no significant relationship between class size and student performance (Hancock, 1996, p.479; Kennedy & Siegfried, 1997, p.385), while other studies favor small class environments (Gibbs, Lucas, & Simonite, 1996, p.261; Borden & Burton, 1999, p.6; Arias & Walker, 2004, p.311). Results vary based on the criteria used to gauge student performance, as well as the class size measure itself. When traditional achievement tests are used, small classes provide no advantage over large classes (Kennedy & Siegfried, 1997, p.397). However, if additional performance criteria are used (e.g., long-term retention, problem-solving skills), it appears that small classes hold an advantage (Gibbs et al., 1996, p.270; Arias & Walker, 2004, p.325).

Tutorials also harness the advantages of small groups. In a study by Sargent, Borthick and Lederberg (2011, p.76) among accounting students, it was seen that tutorial use rates were more than 60%even though there were no credits attached to its use. Tutorial use was correlated to lower course drop rates, higher exam scores and better pass rates.

ATTENDANCE AND PERFORMANCE OF THE STUDENTS

Several studies have investigated the relationship between attendance and grades. Silvestri (2003, p.483) found a significant but weak negative correlation between the number of absences and course grades for students who missed three or fewer classes. However, for students who missed four or more classes, the author found a significant and strong negative correlation between the number of absences and course grades. Callahan (1993, p.23) found a relationship between attendance and grades in basic mathematics courses (see also Thomas & Higbee, 2000, p.67). In addition, the level of the student does not seem to influence the relationship between attendance and grades. Moore (2003, p.367) discovered that class attendance is influenced by whether students receive points for attending. He has found that even without the motivation of points for attending class, there is a strong positive correlation between attendance and grades. Similarly, Shimoff and Catrina (2001, p.192) found that students who signed in at each class meeting attended more classes and scored higher grades on quizzes. Levine (1992, p.4) discovered that there were significantly more absences when attendance was not required. Davenport (1990, p.8) found that attendance and grade point averages dropped when attendance was no longer required.

THE NEED FOR SUPPORT IN MATHEMATICS FOR MANAGEMENT COURSES

Quantitative methods have become an integral part of the syllabus for Business Studies. Fisher (1966, p.67) explains that modern techniques of quality control, production scheduling, research and development planning where network systems are used—all require a fairly thorough knowledge of mathematics and statistics. Moreover, the trend is towards technological advancements and therefore the b-school graduate will be able to cope with his professional environment only if he has a basic knowledge of mathematics and Statistics.

Sargent, Borthick and Lederberg (2011, p.15) speak of the maths anxiety among students which affects their math's performance. They quote Yates (2005, p.600) when they argue that classroom teaching is not enough and 'building in a process for remediation, re-teaching topics, and tailoring instruction to individual students should reduce avoidant behaviors that math anxiety prompts'

HYPOTHESES

On the basis of these considerations it must be determined which is the best way to design the course so that the hours spent by the students to learn and understand the subject can be well utilized. From literature we understand that attendance is related to performance, and it is important to determine the relationship with the target group.

The three hypotheses proposed for this investigation are as follows:

1.   Extended classroom teaching results in inefficient utilization of student hours
2.   Attendance in tutorials significantly increases performance in the subjects
3.   Equal or higher student performance is registered in fewer student hours using the new method. For the purpose of this study the term **student hours** for an intervention is calculated in the following manner:

Number of attending students x number of hours taken =number of student hours

RESEARCH METHODOLOGY

The total sample of 240 students who were doing MBA degree from a leading Business School in India during the year 2010-12 was selected. The sample consists of 120 students from MBA 2010-12 batch and 120 students from MBA 2011-13 batches.

DESIGN OF THE LEARNING PROCESS

STUDY 1

Study 1 is the data based on the 2010-11 MBA batch of students who were subject to a bridge course of 20 hours in Basic Mathematics and Statistics before the commencement of the main First semester courses in Business Statistics and Business Mathematics. Each of these core courses have a stipulated time slot of about 50 hours in the academic schedule for the semester. However due to the inability of students of non-math backgrounds to keep pace with engineering and math related graduates, extra classes are scheduled outside the academic schedule to facilitate a better understanding of the subject. On an average the students have been subject to 25-30 extra hours in order to achieve the desired learning objectives. Their marks in the mid-semester (Internal Assessment Test 1 or IAT-1) as well as end semester examinations (Internal Assessment Test 2 or IAT-2) of Business Mathematics and Business Statistics were recorded.
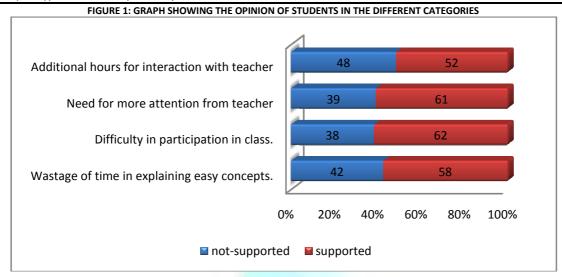
STUDY 2

Study 2 is based on data from the 2011-12 batches of MBA students who were subject to the newly designed teaching process. This includes 20 hours of the bridge programme in Basic Mathematics and Statistics. The core courses in Business Statistics and Business Mathematics in the first semester were restricted to 53 hours each. The tutorial sessions in Business Mathematics and Statistics were introduced and the intake of the number of students in each tutorial was restricted to 25. The tutorial programme was given as three hour sessions per week for the selected students for three months and their performance was measured through the first internal assessment test which is taken for all subjects as a mid-semester exam. On the basis of their mid-semester evaluation in Business Mathematics and Statistics for Managers, the students who had showed considerable improvement in their performance were relieved from the tutorials and others who had shown a significant drop in performance from the screening test to the mid semester exam were taken in for the next phase of tutorials. The final results were taken from their performance in the end-semester examinations.

PROCEDURE AND ANALYSIS

A needs analysis was conducted among the 2010-12 batch of MBA students (Study 1) to assess the strengths and deficiencies of the traditional process. An open ended questionnaire was used to assess student expectations. Based on the responses the researcher has segregated the responses in four different categories. These categories are

1.   Wastage of time in explaining easy concepts.
2.   Difficulty in participation in class.
3.   Need for more attention from teacher
4.   Additional hours necessary for interaction with teacher

Figure 1 show the percentage of students who agreed and disagreed with the following categories. While 58% of the students felt that their class hours were wasted with unnecessarily detailed explanations of known concepts, the rest felt the time was well spent. 62% found it difficult to participate in class mainly due to the disparity of knowledge among class members. 61% felt that they needed more individual attention from the teacher to clarify their doubts and 52% felt that the extra hours were justified as it gave them the much needed opportunity to interact with the teacher.

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FIGURE 1: GRAPH SHOWING THE OPINION OF STUDENTS IN THE DIFFERENT CATEGORIES

TESTING OF HYPOTHESIS

Hypotheses H1:- Extended classroom teaching results in inefficient utilization of student hours

Student hours can be defined as the number of hours spent on the subject by the students as stipulated by the college.

The formula for calculating student hours

= total number of hours for both the subjects * number of students

Student hours for the group in Study 1

Total number of hours for both the subjects (regular class) is 150 hrs

Total number of students in class = 120

Students hours used in Study 1= 150*120 = **18000**

Student hours for the group in Study 2

Students hour = total number of hours for both subjects (regular class) * number of students + total number of hours in tutorial class* number of students in tutorial class

Total number of hours for both the subject = 106

Number of student =120

Total number of hours in tutorial class = 36

Number of students in tutorial class =25

Student hours for the group in Study 2 = (106*120) + (36*25)

= 12720 + 900 = **13620**

What we can conclude from the needs assessment done for the group in Study 1 is that while there was a need for personal attention and opportunities for interaction, there were students who felt that their hours were being wasted with repetitive learning. Others felt that the presence in the class of members with higher levels of knowledge in the subject was creating an unhealthy learning environment that was stifling class participation. On the basis of this we can conclude that a number of students were dissatisfied with the manner in which the student hours were utilized.

Compared with the model in Study 1 which uses 18,000 student hours, the model in Study 2 uses only 13,620 hours to achieve the same objectives. Thus we can conclude that Hypothesis 1 is proved true and extended classroom teaching results in inefficient utilization of student hours.

Hypotheses 2:- Attendance in tutorials significantly increases performance in the subjects

In this study the researcher has examined the relationship between attendance of the students in tutorials and their performance in the mid semester and final semester examinations (IAT 1&2). There were two groups for tutorials. The first group was chosen on basis of their performance in the examination after the bridge course. The group was reshuffled after the mid semester   IAT 1 to exclude the students whose performance had considerably improved and to include instead those whose performance showed a downward trend.

Table I shows the relationship between attendance and the performance of the tutorial students in IAT 1. Spearman correlation was used as the statistical tool as the sample for the study was small and did not follow a normal distribution. The result for the first group of the study shows that there is a significant relation between attendance and exam performance (p value< 0.05).

TABLE I: TABLE SHOWING THE RELATIONSHIP BETWEEN ATTENDANCE AND PERFORMANCE IN IAT 1

		IAT 1	ATTEND
IAT 1	Pearson Correlation	1	.053*
	Sig. (2-tailed)		.045
ATTENDANCE	Pearson Correlation	.053*	1
	Sig. (2-tailed)	.045	

Table II shows the relationship between attendance and the performance of the tutorial students in IAT 2. The result from the test shows that there is significant relationship between the attendance of students and their performance in the test (p value< 0.05).

TABLE II: TABLE SHOWING THE RELATIONSHIP BETWEEN ATTENDANCE AND PERFORMANCE IN IAT 2

		ATTEND	IAT 2
ATTENDANCE	Correlation Coefficient	1.000	.164
	Sig. (2-tailed)	.	.007
IAT 2	Correlation Coefficient	.164	1.000
	Sig. (2-tailed)	.007	.

Thus we can conclude that Hypothesis 2 is true for the subjects under study.

Hypotheses 3:- Equal or higher performance is registered in fewer student hours using the new method.

To test this hypothesis a paired sample t test was carried out where marks obtained by the students in Study 2 in the post bridge examination, IAT 1 and IAT-2 were taken and compared. The results obtained by the analysis are given below.

Table III shows the mean score obtained for the post Bridge exam, IAT 1 &IAT 2 of students in Study 2.The mean score of IAT I (60.04) shows that there is increase in the performance when compared to mean of the post Bridge exam (51.35). There is a further improvement in the mean score comparison between IAT I and IAT II . The mean value of IAT II (63.95) is higher than the mean recorded value of IAT 1(60.04)

TABLE III: TABLE SHOWING THE MEAN MARK OBTAINED FOR THE POST BRIDGE EXAM, IAT 1 &IAT 2 OF STUDENTS IN STUDY 2

	Mean	N	Std. Deviation	Std. Error Mean
Bridge exam	51.3559	118	16.68283	1.53578
IAT I	60.0424	118	19.77972	1.82087
IAT II	63.9576	118	24.84667	2.28732

Table IV table shows the difference between performances of the students in study 2 in the post bridge examination and IAT I, and between the performance in the two IATs. The paired sample t-test shows that the differences registered are statistically significant.   This significant increase in the performance of students was registered in 13620 student hours.

TABLE IV: TABLE SHOWING THE RESULTS OF THE PAIRED SAMPLE T-TESTS FOR THE POST BRIDGE EXAM, IAT 1 &IAT 2 OF STUDENTS IN STUDY 2

		PAIRED SAMPLE t-TEST					
		Mean	Std. Deviation	Std. Error Mean	t value	df	Sig.
Pair 1	Bridge- IAT I	-8.68644	17.51322	1.61222	-5.388	117	.000
Pair 2	IAT I- IAT II	-3.91525	22.89499	2.10766	-1.858	117	.006

PERFORMANCE OF STUDENTS IN STUDY 1

The performance on the three exams by the students in Study 1 were also analysed and the results have been recorded in Table 5&6

Table V shows the mean score obtained for the post Bridge exam, IAT 1 &IAT 2 of students in Study 1. The mean score in the bridge test (68.14) is higher than the mean performance score in IAT I (65.78). The mean score in IAT 2 (66.15) shows an increased mean performance level when compared with IAT 1.

TABLE V: TABLE SHOWING THE MEAN MARK OBTAINED FOR THE POST BRIDGE EXAM, IAT 1 &IAT 2 OF STUDENTS IN STUDY 1

	Mean	N	Std. Deviation	Std. Error Mean
bridge	68.1441	111	18.98365	1.80185
IAT I	65.7876	113	25.15291	2.36619
IAT II	66.1504	113	29.83982	2.80709

Table VI table shows the difference between performances of the students in study 1 in the post bridge examination and IAT I, and between the performance in the two IATs. There is a significant difference between the performance in the Bridge test and IAT I as the mean score of bridge test (68.14) is significantly higher when compared to IAT I (65.78). The performance of the student in IAT II (66.15) is significantly higher when as compared to IAT I. This significant increase in the performance of students is done in the 18000 student hours. From the results of the analyses done for both studies we can conclude that Hypothesis 3 has been proved right.

TABLE VI: TABLE SHOWING THE RESULTS OF THE PAIRED SAMPLE T-TESTS FOR THE POST BRIDGE EXAM, IAT 1 &IAT 2 OF STUDENTS IN STUDY 1

		PAIRED SAMPLE t-TEST					
		Mean	Std. Deviation	Std. Error Mean	t value	df	Sig.
Pair 1	Bridge- IAT I	2.38739	30.90960	2.93381	.814	110	.018
Pair 2	IAT I- IAT II	-0.36283	25.49617	2.39848	1.933	112	.046

DISCUSSION

Tutorials were found to be effective as a tool that would help teachers to concentrate their extra inputs in the weakest areas and ensure improvement in these. It also ensures the utilization of students' time in the most efficient and effective manner. The three hour tutorial class was given regularly every week. This provided an opportunity for the students to clarify the doubts that could not be dealt with in the scheduled class and get some practice on the ongoing exercises before they moved on to a new topic in the next week.

The advantage of the limited size of the class gave students ample opportunities for discussion, repeated explanations and extra time for supervised practice. Class participation was free of the usual anxiety that surfaces when intra-class knowledge levels are skewed. Inspite of this, there was unwillingness among some students to attend the tutorials perhaps because of the pressure it exerted on the crowded schedule of the students. This was one of the factors that affected the performance of students.

CONCLUSION

The entry and exit to and from the tutorial class on the basis of performance was one of major reasons for the success of this model in terms of improvement in subject knowledge of the participants . One weakness of the model under study was that reduced motivation levels may have hampered the teaching learning process to some extent as can be seen from the results of students who cut tutorial classes whenever possible. There are other models that have been tested that have enrollment on a voluntary basis. It remains to be seen whether the motivation factor in these type of tutorials drive participants to greater success. The results of comparative studies in this area could lead to greater success in the application of this method of teaching support in institutions of higher learning.

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