Statistics by Statistician: Importance in Education

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ABSTRACT

Statistics is an incredibly useful course and becomes an important part of life. Confidence theory, null hypothesis, odds or likelihood and also research shows that there is almost no end to the significance of statistics. The importance of statistics is great because it provides detailed information about situations. But currently many fields have abused the statisticians in many ways such as eliminate the statistical courses in their program structure. Therefore this study is conducted to determine the statisticians' role especially in higher learning education level. Findings from selected higher learning institution revealed that there is a significance difference in learning and teaching process between taught by statistician and non-statistician who is statistician was better. Statistician more efficient because 48.78 percent of students got excellent result compared for those taught by non statistician with only 10.17 percent. It shows that statistician can attract student to enjoy learning statistics. Hopefully this study can provide useful information for everybody about the importance of statistics in education and the role of statisticians in statistics course.

Keywords*: statistics, statistician, importance of statistics*

Introduction

In the process of reaching a fully developed country by the year 2020, science, mathematics and technology have become an emphasis in the education system in Malaysia. According to the fourth prime minister of Malaysia, Tun Dr. Mahathir bin Mohamad who had introduced the Vision 2020, there are many challenges in achieving the vision. One of the challenges is on the weak performance of students in mathematical course, including statistics (Pandangan Masyarakat Terhadap Subjek Matematik, n.d.). Although statistics course has been introduced to the students since their primary school, solving basic statistics questions is still become a problem to many students in higher level institution. Most of students think statistics course is a tough paper, difficult to learn, very complex and so on. Whatever perception given to it, statistics has to be accepted as a passport to either being able to continue for further education or a promise to a better paid job either in the government or private sectors. In addition, a strong background in statistics is critical for many career and job opportunities in today's increasingly technological society.

In relation to higher demand in government and private sectors, statistics becomes among the most important course in higher education level. This course is useful for daily life and applicable to a wide variety of academic discipline including social sciences and science and technology. Most of the programs are offered this course due to the necessity in doing academic research or non-academic research. Therefore, statistics are becoming more relevant in many workforces that very useful especially in decision making process. By definition "Statistics is a methodological discipline study of a coherent set of ideas and tools for dealing with data. The focus on variability naturally gives statistics a particular content that sets it apart from mathematics itself and from other mathematical sciences, but there is more than just content that distinguishes statistical thinking and mathematical thinking, because data are not just number, they are number with a context" (Cobb & Moore, 1997).

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Cobb and Moore (1997) stated that data are not a number only but come with a context. This statement implies that teaching statistics requires an understanding of mathematical theory and statistical ideas. Teaching statistics also requires better understanding of the type of contexts to support and drive statistical process. It is also supported by Hannigan et al. (2013) that a suitable instructor can support students in developing their statistical thinking which depends a lot on interpretation and critical judgement. A good understanding in statistics is very important, so that the correct method can be chosen and being applied.

Many disciplines need knowledge and statistical skills such as accountancy, business, engineering, information technology, wood technology, agro technology and so on. Statistics only can be learned from statistician for better understanding and best application in any kinds of discipline. But, this scenario had changed nowadays because there exists non-statisticians teach statistics in their own style. Botanero et al. (2011) concluded that many mathematics teachers do not consider themselves well prepared to teach statistics even have been given training for five years. Mathematical and statistical thinking are very different thoughts even though mathematicians and statisticians himself working in same department. Many statistics courses require mathematical skills in order to learn and apply statistics but this is not a license for mathematics teacher to teach statistics as mentioned by Hannigan et al. (2013). Hughes et al. (2012) also stated in their study that statistician plays the most important part in pharmacy field because statistician is being selected as a team leader in pharmacy research.

The problem of this study is unprofessional person teaching statistics and this situation gives the effect of "double blind" course. There are a lot of study addresses this problem such as Moore, Davis (1988, 1997), Botanero et al. (2011) and Hannigan et al. (2013). Simultaneously, students who learn this course will consult the statistician for better understanding of statistics. As a result, the student's academic performance may be affected.

Research Methodology

The case study on the student's performance in Statistics course was conducted at one of the public universities in Malaysia during same intake. 100 students from selected faculties and who had undergone the same statistics course during their program structure become sample. The main source of data was the students' final examination scores provided by their respective lecturers. The examination paper comprised of multiple-choice, structured (calculations and conceptual questions) and essay questions.

The information obtained was analyzed using statistical procedures executed by the SPSS 21.0 including descriptive statistics and t-test analysis. The hypothesis tested in this study is as follow:

H_0: There is no significance difference of student's performance in statistics taught by statisticians and non-statisticians.

The grades of at higher level education were ranked consistently as shown in Table 1.

TABLE 1: Rank of Higher Level Education Grades

Grade	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	E	F
Rank	13	12	11	10	9	8	7	6	5	4	3	2	1

Findings and Discussion

Out of 100 total samples, 59 respondents (59.00%) were taught by non-statisticians and the other 41 respondents (41.00%) were taught by statisticians. Table 2 shows that there is no respondents that scored below C in Statistics course when they are taught by statisticians, but 1.69% respondents scored below C when they are taught by non-statisticians. Even though the percentage is not high, but this gives a negative implication to students. Most of the respondents (60.98%) scored at least B+ when they learned Statistics course with statistician compared to non-statisticians with only 32.19%. This reflects that majority of the selected respondents have excellent results in Statistics course taught by statisticians.

Table 2: Results for Statistics Course

Grade	Statisticians Number of Students (%)	Non-Statisticians Number of Students (%)
A	13 (31.71%)	1 (1.69%)
A-	7 (17.07%)	5 (8.47%)

B+	5 (12.20%)	13 (22.03%)
B	3 (7.32%)	11 (18.64%)
B-	4 (9.76%)	14 (23.73%)
C+	2 (4.88%)	7 (11.86%)
C	7 (17.07%)	7 (11.86%)
D+	0	1 (1.69%)

In addition, the mean score of respondent's result taught by statisticians is 9.7073 and by non-statisticians is 8.5254. It shows that student performed better when they taught Statistics course by Statisticians. Hence, comparison in teaching and learning process of statistics course between statisticians and non-statisticians is also conducted to determine whether there is a significance difference of respondent's result in statistics course at the university. Independent sample t-test is used to achieve the stated hypothesis since the number of sample is not equal for each group. A t-test analysis indicated that the result was significant (t = 2.858, p-value = 0.006) and it shows there is enough evidence to reject the stated hypothesis since the p-value obtained is less than 0.05. Thus, there is a significance difference of respondent's result in statistics taught by statisticians and non-statisticians at Malaysian higher level institution. It also indicates that their level of performance in statistics taught by statisticians was better by one grade (mean difference grade=9.7073-8.5254) compared to respondents taught by non-statisticians. This result is consistent with Hannigan et al. (2013) who found that even mathematics teacher cannot teach statistics very well.

Conclusion and Recommendation

Issues on the students' performance in statistics have been raised by many people over the past decade. Whatever perception given to it such as a tough paper, difficult to learn, very complex and so on, but statistics has to be accepted as a passport to either being able to continue for further education or a promise to a better paid job either in the government or private sectors. Therefore, statistics become an extra skills needed in many sectors. Students with excellent performance in that course will get better pay in their job.

This study focused on the significance difference of student achievement taught by statistician and non-statistician. It clearly shows that the conceptual knowledge of statistics is very important as a key element in teaching and learning process in statistics course. This course requires very good discipline to ensure the learning process is successful. In addition, statistical thinking takes much time to develop and only most suitable instructor can create it. It can be own created by instructor's experience as early stage of his learning process.

Hence, in order to improve the statistics performance in higher level institution, more attention must be taken especially to those learning statistics course from non-statisticians. Although the number of students who scored below C in examination is small that is less than 2%, an aggressive action has to be done to ensure that students can perform better in their statistics course so that the university can improve the academic quality of the university. Thus, the finding is hoped to provide some useful information to all people in the academic system in improving the statistics performance in higher level institution.

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