

On-campus and Distance Learning of Educational Statistical Research Course: A Comparative Analysis of Postgraduates' Academic Performance*

Curso de investigación estadística educativa en el campus y a distancia: un análisis comparativo del rendimiento académico de los posgraduados

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ABSTRACT

The purpose of this study was to examine the differences in academic performance of students in on-campus and distance learning postgraduate programs at a public research university in Malaysia. The study depended on data from 121 postgraduates drawn from 21 specializations of the Master of Education. The postgraduates were enrolled in an Advanced Research Methodology course involving statistical analysis in the educational field. The study employed a survey for data collection and independent *t* test for data analysis. The study's findings reported no significant differences in terms of the academic performance between on-campus students and distance students in educational statistical analysis. However, the two groups of students differed significantly in terms of their age composition as distance learning students comprised the majority of mature working students (25 years or older) relative to their counterparts in the on-campus program. Further, the study showed that on-campus and distance students were indistinguishable from each other, in terms of their grade point average scores and passing rates. Hence, the findings of the study can potentially be applied to higher education institutions that are considering offering distance learning as a studying mode in determining whether distance learning can be as effective as on-campus learning.

Keywords: Postgraduate education, educational statistical learning, advanced, research methodology course, on-campus learning, distance learning.

RESUMEN

El propósito de este estudio fue examinar las diferencias en el rendimiento académico de los estudiantes en los programas de posgrado de educación a distancia y en el campus de una universidad pública de investigación en Malasia. El estudio dependió de datos de 121 postgraduados extraídos de 21 especializaciones de la Maestría en Educación. Los postgraduados se inscribieron en un curso de Metodología de Investigación Avanzada que involucra análisis estadísticos en el campo educativo. El estudio empleó una encuesta para la recolección de datos y una prueba *t* independiente para el análisis de datos. Los resultados del estudio no informaron diferencias significativas en términos del rendimiento académico entre los estudiantes en el campus y los estudiantes a distancia en el análisis estadístico educativo. Sin embargo, los dos grupos de estudiantes diferían significativamente en términos de su composición por edad, ya que los estudiantes de educación a distancia constituían la mayoría de los estudiantes maduros que trabajaban (25 años o más) en relación con sus contrapartes en el programa en el campus. Además, el estudio mostró que los estudiantes en el campus y a distancia no se podían distinguir entre sí, en términos de sus puntajes promedio de calificaciones y tasas de aprobación. Por lo tanto, los resultados del estudio pueden aplicarse potencialmente a las instituciones de educación superior que están considerando ofrecer el aprendizaje a distancia como un modo de estudio para determinar si el aprendizaje a distancia puede ser tan efectivo como el aprendizaje en el campus.

Palabras clave: educación de posgrado, aprendizaje estadístico educativo, curso de metodología, investigación avanzada, aprendizaje en el campus, la educación a distancia.

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INTRODUCTION

Statistical assessments are an essential part for conducting quantitative studies in the education field (Chen & Hero, 2015; Nordin et al., 2016; Adnan & Ritzhaupt, 2018). Yet, postgraduates are facing problems in understanding and applying statistical approaches when conducting their research. This involves application of inferential statistics on data collected for their studies (Zhang et al., 2012; Chiou et al., 2014). In addition, some students are studying while working in distance learning settings, and this causes issues, as these students juggle between work and studies (Chiou et al., 2014; Hannigan et al., 2014). Previous research has also indicated that distance learning settings have a negative effect on academic performance of educational postgraduate studies (Zhang et al., 2012; Hannigan et al., 2014). Yet, there are limited studies that have been conducted in terms of educational statistical learning in postgraduate levels particularly in comparing on-campus and distance learning settings (Chiou et al., 2014; Hannigan et al., 2014). As such, the study investigates this issue by comparing both on-campus and distance modes of learning with regards to educational statistical learning in postgraduate education settings.

Distance Learning and Educational Statistics Learning

Due to work or family commitments, distance students are unable to pursue learning in residential on-campus learning. This calls for more flexible learning environments that allow learning to be suited to their daily workloads or family commitments, which can be catered for in distance learning settings. For distance learning to be successful, there is also a need for digital instruction that enables learning communities to become a platform for promoting social interactions, completely independent of geographical boundaries (Norman et al., 2015; Nordin et al., 2016; Andersen et al., 2018). The availability of these flexible courses with short-term assignments have been reported as a key elements to address within distance education. Within the rapid advancements of the fourth industrial revolution, this will lead to an inevitable scenario of distance instruction evolution, in which new distance learning approaches and assessments are needed for digital education.

Digital education offers several advantages that suit lifelong learners. First, its flexibility allows students to access online learning materials and activities at their own time and place, at their own convenience. In some cases, lectures and formal meetings are conducted in the evenings or weekends to avoid disrupting working times. Second, distance postgraduates do not have to take a break from work, allowing career progression. Third, students are provided the chance to collaborate and network with other students that have diverse backgrounds in their working professions. Finally, it enables them to also gain expertise and develop skills related to their careers as well as reduce financial burden (Hashim et al., 2018; Nordin et al., 2018). Albeit these benefits, distance education raises several challenges to postgraduates as it is extremely difficult to balance work and study. These issues can cause negative effects to both work and study.

METHOD

Participants

The study's participant are 121 students enrolled in Advanced Research Methodology course as part of a Master degree through on-campus and distance learning as learning modes in a local public university. The students are from 21 specializations on education, which were curriculum and pedagogy, Malay language, Teaching English as a Second Language (TESL), measurement and evaluation, information technology, mathematics, computer, science, business, religious, sports, Arabic language, economics, literature, history, counselling, pre-school, religious, and special education as well as educational administration, psychology, and sociology.

The Advanced Research Methodology is a compulsory for the Master of Education program. The course is aimed to equip students with skills in conducting research that will enable them to understand research methodologies, evaluate reports, and conduct comprehensive research. Through this course, students studied on inferential statistics, and were exposed to various types of research, methods and approaches for specific problems, research planning, sampling data techniques, data collection and analysis approaches, and systematic research report writing. Among the statistical techniques in the course, were research design, parametric, and non-parametric inferential statistics.

Distance Instruction

There were two modes of learning implemented, which were on-campus and distance learning modes. The on-campus mode of learning was conducted in a 14-week period while the distance mode was conducted with face-to-face sessions (held during school holidays) and online learning sessions. In maintaining consistency, the face-to-face and distance students are taught by the same professors. Similar assignments, quizzes, tests, and final examinations are assigned to both sets of students. They can also access their learning materials, tests, reports and other materials on a centralized learning management system. On completion of the programme, both on-campus and distance students are awarded the same Master's degrees. In short, the course for both on-campus and distance learning are similar and comparable. The only difference is the mode of delivery, and perhaps to a certain extent, the background characteristics of students in on-campus and distance learning programmes.

Data Collection and Analysis Method

This study was a comparative analysis design. Specifically, the objective of this study is to answer the research question, "Is there a mean difference in Advanced Research Methodology score between on-campus and distance postgraduate learners?" In this study, samples of 70 on-campus students and 51 distance students were randomly and independently sampled from the populations of on-campus and distance students, respectively. Each student was given an score

through a mid-term examination. The data was collected through a survey that was distributed to the postgraduates taking the course and analyzed via independent t test analysis.

Results

The null hypothesis was tested that on-campus students and distance students have equal Advanced Research Methodology scores. The alternative hypothesis was on-campus students and distance students will not have equal Advanced Research Methodology scores, thus necessitating a non-directional or two-tailed test. The test was conducted using an alpha level of 0.05. The raw data and summary statistics for on-campus students and distance students are presented in Table 1 and Table 2, respectively. For the on-campus student sample, the mean and variance were 15.400 and 34.939, respectively, and for the distance student sample, the mean and variance were 17.539 and 38.128, respectively.

Table 1: Advanced Research Methodology data for On-Campus Student Sample

Data		Statistic	Std. Error
	Mean	15.400	.7065
	95% Confidence Interval for Mean	Lower Bound	13.991
		Upper Bound	16.809
	5% Trimmed Mean	15.385	
	Median	15.250	
	Variance	34.939	
	Std. Deviation	5.9109	
	Minimum	2.0	
	Maximum	29.0	
	Range	27.0	
	Interquartile Range	9.5	
	Skewness	.099	.287
	Kurtosis	-.406	.566

Table 2: Advanced Research Methodology data for Distance Student Sample

Data		Statistic	Std. Error
	Mean	17.539	.8646
	95% Confidence Interval for Mean	Lower Bound	15.803
		Upper Bound	19.276
	5% Trimmed Mean	17.510	
	Median	18.000	
	Variance	38.128	
	Std. Deviation	6.1748	
	Minimum	5.5	
	Maximum	29.5	
	Range	24.0	
	Interquartile Range	9.5	
	Skewness	.031	.333
	Kurtosis	-.784	.656

An independent sample t test was conducted to determine if the mean Advanced Research Methodology score of on-campus learners differed from distance learners. As shown in Table 3, Advanced Research Methodology data were gathered from sample of 70 on-campus learners and 51 distance learners, with an on-campus sample mean of 15.400 ($SD = 5.9109$) and a distance sample mean of 17.539 ($SD = 6.1748$). The independent t -test indicated that the Advanced Research Methodology score means were not statistically significantly different for on-campus and distance learners ($t = -1.929$, $df = 119$, $p = 0.056$). Thus, the null hypothesis that the Advanced Research Methodology score means were the same by learning mode was failed to reject at the 0.05 level of significance. The results provide evidence to support the conclusion that on-campus and distance learners not differ in Advanced Research Methodology scores,

on average.

Table 3: Descriptive Analysis Results for Group Statistics

	Mode	N	Mean	Std. Deviation	Std. Error Mean
Score	On-campus	70	15.400	5.9109	.7065
	Distance	51	17.539	6.1748	.8646

Table 4: Descriptive Analysis Results for Independent Samples via *t*-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower		Upper
Score	Equal variances assumed	.261	.610	-1.929	119	.056	-2.1392	1.1089	-4.3349	.0565
	Equal variances not assumed			-1.916	105.102	.058	-2.1392	1.1166	-4.3532	.0747

Discussion

(i) No significance difference between on-campus and distance learning

The study's findings reported no significant differences in terms of the academic performance between on-campus students and distance students in educational statistical analysis. This could be linked to the studies of Joksimovic et al. (2015) and Cho and Heron (2015). Joksimovic and colleagues (2015) studied on the frequency and duration of interactions of student-system, student-content, and student-student had an effect on learning outcomes measure in terms of final course grades. They discovered that student-student interaction had the most significant effect on final achievement in which student-student interaction had a 10-fold increase on academic performances. Interestingly, their study also revealed that student-content had a reverse effect on learning achievements.

In relation to this study, as there were no significant differences between distance and on-campus learning, this could have been caused by both student-student and student-content interactions. Here, as student-student interactions had a positive effect on learning performance, the distance learners could have had a higher level of online interactions that were meaningful for their learning. On the contrary, the levels of student-student interaction could have been low for on-campus students. As for student-content interactions, a reverse scenario was identified, showing that high levels of student-content rather than student-student interactions could have caused to the negative learning performances.

(ii) Age differences between on-campus and distance learners

Findings also indicated that the two groups of students differed significantly in terms of their age composition as distance learning students comprised the majority of mature working students (25 years or older) relative to their counterparts in the on-campus program. This could be related to the studies of Simonds and Brock (2014) as well as Kibelloh and Bao (2014). For the study of Simonds and Brock (2014), the study investigated between student age and their preferences for types of online learning activities. The study discovered that older students have a higher preference for video lectures that consists of professors' talking heads, while younger ones to be prone to more to interactive learning strategies and tools. In terms of the study of Kibelloh and Bao (2014), they found out that professional working mothers had difficulties in balancing between work and family in China. These were caused by conflicts of demanding work schedules that were family obligations, studies, and caring for children as well as the elderly.

CONCLUSION

The study has investigated on academic performances of on-campus and distance learning on educational statistics for postgraduate education. The study revealed that there are no significant differences in terms of the academic performance between the two groups of students. However, the two groups of students differed significantly in terms of their age composition as distance learning students comprised the majority of mature working students (25 years or older) relative to their counterparts in the on-campus program. Further, the study showed that on-campus and distance students were indistinguishable from each other, in terms of their grade point average scores and passing rates.

Although this suggest that there is no significant difference found between on-campus and distance postgraduate education for learning about educational statistics, some limitations have to be considered. First, the course was conducted for learning about advanced statistics in educational settings. It would be interesting to look into a course on basic statistical analysis in postgraduate education and how it would affect learning in both on-campus and distance educational settings. Second, the academic performances of the students were measured via a mid-term

test. Changing the assessment to a final examination using online tests or real-time learning analytics for formative assessments (see Norman et al., 2015) would also be beneficial, in terms of studying summative performances of students learning about this subject. Third, the university's learning management system was used as a learning platform for both on-campus and distance learners. Using an alternative learning environment such as massive open online courses (see Nordin et al., 2016) could be interesting. Finally, certain geographical and cultural factors may have affected the results. It would be interesting to have focus on different settings and seeing how such settings affects students' performance. In sum, the findings of the study can potentially be applied to higher education institutions that are considering offering distance learning as a studying mode in determining whether distance learning can be as effective as on-campus learning.

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