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Modeling the Influence of Bridging Course on the Accounting Performance of the University Students using Educational Data Mining

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Abstract: Modelling the Influence of Bridging Course on the Accounting Performance of the University Students Using Educational Data Mining. Objectives: This study intends to determine the level of performance of the students in their Bridging Course (BC) and Accounting Education (AE) courses, and to model their significant influence. **Methods:** Descriptive and Predictive Correlation research design was used. The Educational Data Mining technique was utilized to extract data from the database of the university. Out of 331 datasets extracted, only 281 were included in the analysis, where datasets with no grades, and with dropped marks were excluded. The datasets are the grades of the students enrolled in BC and AE 113 and 114 for the school year, 2018–2019 and 2019–2020. **Findings:** Results showed a very good rating of the student's performance in all courses both bridging course and accounting education courses where it revealed a positive and linear relationship. Moreover, the model shows that an increase in the performance in the BC is an increase also in their performance in their AE courses. **Conclusion:** The study proved that the curriculum is serving its purpose in rendering the highest possible opportunity for students to learn basic and even advanced accounting education.

Keywords: accounting performance, bridging course, educational data mining, modelling.

Abstrak: Pemodelan Pengaruh Bridging Course Terhadap Kinerja Akuntansi Mahasiswa Menggunakan Educational Data Mining*. *Tujuan: *Penelitian ini bertujuan untuk mengetahui tingkat kinerja mahasiswa pada mata kuliah Bridging Course (BC) dan Accounting Education (AE), serta memodelkan pengaruh signifikan mereka.* ***Metode:*** *Desain penelitian yang digunakan adalah Deskriptif dan Korelasi Prediktif. Teknik Educational Data Mining digunakan untuk mengekstrak data dari database universitas. Dari 331 kumpulan data yang diekstraksi, hanya 281 yang dimasukkan dalam analisis, di mana kumpulan data tanpa nilai, dan dengan nilai yang dihapus dikeluarkan. Dataset adalah nilai siswa yang terdaftar di BC dan AE 113 dan 114 untuk tahun ajaran 2018–2019 dan 2019–2020.* ***Temuan:*** *Hasil menunjukkan penilaian kinerja siswa yang sangat baik di semua mata kuliah baik mata kuliah bridging maupun pendidikan akuntansi kursus di mana ia mengungkapkan hubungan positif dan linier. Selain itu, model menunjukkan bahwa peningkatan kinerja di BC adalah peningkatan juga dalam kinerja mereka dalam kursus AE mereka.* ***Kesimpulan:*** *Studi ini membuktikan bahwa kurikulum melayani tujuannya dalam memberikan kesempatan setinggi mungkin bagi siswa untuk belajar pendidikan akuntansi dasar dan bahkan lanjutan.*

Kata kunci: *kinerja akuntansi, bridging course, educational data mining, pemodelan.*

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INTRODUCTION

Students commencing to higher education come from an increasingly diverse range of backgrounds in terms of their senior high school strand, their experiences in studying, and life in general (Schmid et al., 2012). Universities address this issue by providing a bridging course to students for the value of semester-length courses. Bridging courses are designed to enhance the prior knowledge and prepare the students for more advanced concepts in their domain of study (Wachen et al., 2018). Previous studies asserted that requiring the students to enroll in a bridging program contributes to their academic success and the course provided additional benefits of improving students' academic competence and confidence (Wachen et al., 2018; Schmid et al., 2012; Newman-Ford et al., 2007).

The recent paradigm shift of education on the new K to 12 curricula in basic education inevitably impacted higher education in the Philippines. K to 12 makes it necessary to adjust the college curriculum, to make sure that college subjects build upon it in the best way. Part of the curriculum revision particularly in the accounting program is the incorporating of bridging courses to prepare the students especially those from non-accounting senior high school strands. In Eastern Visayas State University – Tanauan Campus, the current curriculum of the BS Accountancy, BS Office Administration, and BS Entrepreneurship requires the students to take the bridging course as a pre-requisite subject to Financial Accounting and Reporting and Conceptual Framework and Accounting Standards. The purpose of this study is to evaluate and model the influence of the bridging course on the accounting performance of university students across the three programs using educational data mining techniques.

Academic superiority among students is demonstrated on the level of their aptitude in the theoretical and technical skills in accounting and business programs. Experts reasoned that bridging courses impact students' academic performance in their chosen course of study at the university. Experts (Musso et al., 2019) mentioned students' prior knowledge of self-regulated learning models influenced students' drive and passion to learn. Various studies conducted on bridging courses (Yang & Farley, 2019; Muda et al., 2013) revealed that students' cognitive abilities are established in achieving interdisciplinary academic tasks such as language proficiency (English) and numerical literacy (Mathematics). A similar study on bridging courses (Darlington & Bowyer, 2016) progresses students' financial data analysis as entry requirements for business management and accounting programs. (Engel, 2018) revealed a positive correlation between prior accounting courses on students' academic performance. These studies presented different academic implications on the importance of bridging courses for business and accounting programs in the university.

In universities, data mining has been in the realm of educational research and is termed Educational Data Mining (EDM). EDM is beneficial in the education setting where it helps identify patterns in the available data to determine the academic performance of the students (Las Johansen, 2018). It also provides decision-making for university professors and administrators for an effective teaching-learning experience based on the patterns from the extracted data (Cornillez et al., 2020). As an emerging field in the area of data mining, EDM is used to explore students' records in a database and analyze their performance, predict their results to prevent dropout, and provide visualization of the data for better decision-making beneficial to everyone. EDM is a useful tool for improvements in the quality of education (Hussain et al., 2018).

A recent study utilized student data sets using the Mendeley data repository to evaluate

academic efficiency among students. Machine learning algorithms were utilized to perform predictive analytics of students' academic performance. Several classification models such as Naïve Bayes classifier (13), ID3 (Iterative Dichotomizer 3), C4.5, J48, KNN, Random tree, Bootstrap aggregating, neural networks, and decision trees were employed to predict students' academic performance (Czibula, Mihai, & Crivei, 2019; Costa, Fonseca, Santana, Araújo, & Rego, 2017; Ashraf, Zaman, Ahmed, 2020; Cornillez et al., 2020). These studies have presented that EDM is useful in analyzing the academic performance of students.

The potential of the bridging course to prepare the students in their accounting courses, and its growing application in the higher education because of the new K to 12 implementations in the Philippines and concomitant to the lack of evidence demonstrating the effectiveness, shows a significant need for further evaluation of the said program. A review of the literature reveals that the majority of the studies are foreign and limited studies conducted on modeling the influence of bridging courses on the accounting performance of the students, particularly, in the Philippines. The thoughtful application of educational data mining also helped in the analysis of students' performance.

In figure 1, all the variables presented in the framework were categorically treated as the continuous level of variable measurements. Grades for each subject were used in the study to measure the significant influence of the Bridging Course in Accounting (BCA) subject on the level of student's performance towards Accounting Education 113 (AE 113) and Accounting Education 114 (AE 114). The regression analysis was utilized to obtain the objective. Besides, descriptive statistics were computed to describe each data set.

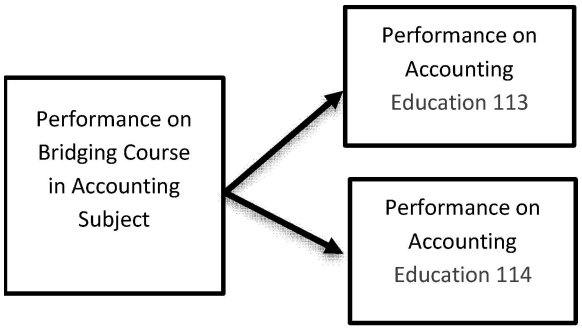

Figure 1. Conceptual Framework of the Study

Several studies conducted by academic researchers and experts on students' academic performance to assess students readiness towards a chosen course (Joseph et al., 2018), assist program coordinators in evaluating and designing course curriculum (Todd P & Wolpin KI., 2018; Engel, 2018), adapt and improve teaching-learning strategies of university professors, thus providing quality education to students (Cornillez, 2019). However, a limited study was conducted applying educational data mining to explore the influence of the bridging course on the accounting performance of the students. This study aimed to determine the level of performance of the students in their bridging course and their accounting education courses. Moreover, this study also intended to model the significant influence of the performance of the students in the Bridging Course on the Accounting Education Courses.

METHODS

The study was a quantitative approach utilizing the descriptive and predictive correlational research design (Cox, 2019; Driessnack et al., 2007) to possibly describe, discover, and explore the relationships between variables under study. Likewise, to predict the variance of the dependent variable based on the variance of another variable. Student's level of performance on the Bridging Course in Accounting was identified as an independent variable in the study, whereas the

level of performance in Accounting Education (AE 113 and AE 114) subjects were dependent variables.

The source of the data was from the electronic management system database of the university consisting of grades in Accounting Education 113 and 114 from the undergraduate business students of the Eastern Visayas State University – Tanauan Campus, Philippines. Total enumeration of samples was taken, however, those sample respondents with no grades and drop remarks in the courses covered were excluded in the study. Hence, out of 331 in total target samples, only 281 were selected to be included in the study.

Table 1. Sample characteristics according to profile

Variable	Frequency	Percent
Gender		
Male	54	19.2
Female	227	80.8
Study Program		
BSA	87	31.0
BSE	103	36.7
BSOA	91	32.4

BSA – Bachelor of Science in Accountancy; BSE – Bachelor of Science in Entrepreneurship; BSOA – Bachelor of Science in Office Administration

Students' ratings on the Accounting Bridging course, Accounting Education 113 and 114 were interpreted using the university grading system, which ranges from 3.0 (passed) through 1.0-1.4 (Excellent), (Eastern Visayas State University, 2017).

In the treatment of data, the researchers hypothesized that students' performance on Bridging Course has a statistically significant influence on the Accounting Education courses. Linear Regression analysis was performed to test the hypothesis. This method of analysis can be used to estimate the effect, explanatory power, linear relationship, or the predictability power of one independent continuous variable to one dependent continuous variable (Hair et al., 2009; Thompson, 2005). Moreover, the following descriptive measurements were computed to describe and explain the data set characteristics – mean(M), percentage, standard deviation (SD), and coefficient of variation (MacRae, 2019). Researchers utilized Microsoft Excel and IBM SPSS for all the data calculations, and the level of significance alpha was set at 0.05.

■ RESULT AND DISCUSSIONS

The order of analyses covered the following: the descriptive statistics measurements of data sets showing the level of students' performances on the three subjects and the regression analysis results.

Bridging Course in Accounting and Accounting Education Performance

Table 2. Performance of Students on Bridging Course in Accounting

Rating	Frequency	Percentage	Qualitative Description
1.0 – 1.4	53	18.9	Excellent
1.5 – 1.9	41	14.5	Superior
2.0 – 2.4	89	31.7	Very Good
2.5 – 2.9	77	27.4	Good
3.0	21	7.5	Passed
Total	281	100	

M = 2.07; SD = 0.60; & CV = 28.9%

Notes: 1.0-1.4 – Excellent; 1.5-1.9 – Superior; 2.0-2.4 – Very Good; 2.5-2.9 – Good; 3.0 - Passed

As shown in Table 2, most students at 31.7% obtained a very good rating performance towards the subject, while almost 19% of students were able to perform excellently. On the other hand, there is a 28.9% variation of performance on the average was calculated implying a high degree of students' variability performance (M = 2.07, SD = 0.60).

Table 3. Performance of students on Accounting Education 113

Rating	Frequency	Percentage	Qualitative Description
1.0 – 1.4	7	2.5	Excellent
1.5 – 1.9	43	15.3	Superior
2.0 – 2.4	131	46.6	Very Good
2.5 – 2.9	91	32.4	Good
3.0	9	3.2	Passed
Total	281	100	
M = 2.27; SD = 0.37; & CV = 16.3 %			

Notes: 1.0-1.4 – Excellent; 1.5-1.9 – Superior; 2.0-2.4 – Very Good; 2.5-2.9 – Good; 3.0 - Passed

Table 3 shows that the student's overall performance towards Accounting in Education 113 is 2.27 (SD = 0.37), interpreted as very good. At most 47% of students yielded a performance rating of 2.0 to 2.4. The result indicates only 16.3% of students' performance variation as a whole.

Table 4. Performance of students on Accounting Education 114

Rating	Frequency	Percentage	Qualitative Description
1.0 – 1.4	19	6.8	Excellent
1.5 – 1.9	77	27.4	Superior
2.0 – 2.4	164	58.3	Very Good
2.5 – 2.9	19	6.8	Good
3.0	2	0.7	Passed
Total	281	100	
M = 2.0; SD = 0.33; & CV = 16.5%			

Notes: 1.0-1.4 – Excellent; 1.5-1.9 – Superior; 2.0-2.4 – Very Good; 2.5-2.9 – Good; 3.0 - Passed

In Table 4, a similar result was found that students on average performed very well on Accounting Education 114 (M = 2.0, SD = 0.33). The performance variability percentage as a whole was recorded at 16.5% indicating a low degree of variability performance of students from the mean.

Influence of Bridging Course on Accounting Education Courses

Students' performance on BCA significantly influences their level of performance on accounting education subjects, AE 113 ($F = 35.757$, $p<0.001$) and AE 114 ($F = 73.683$, $p<0.001$). There is an 11.4% variability in AE 113 ($R2 = 0.114$) that can be explained by the model, whereas a higher percentage of performance variation on AE114 was explained by the model ($R2 = 0.209$). Both students' performances on AE113 and 114 subjects have a moderately positive and linear relationship to BCA.

Table 5. Influence of bridging course in accounting education 113

Variable	B	Std. Error	Beta	t-value	p-value
BCA	0.208	0.035	0.337	5.980	0.001

$R = 0.337$; $R^2 = 0.114$; std. Error = 0.3528;
$F = 35.757$, $p<0.001$; Constant = 1.836
BCA = Bridging Course in Accounting
Dependent Variable: Accounting in Education 113

Table 6. Influence of accounting bridging course on accounting education 114

Variable	B	Std. Error	Beta	t-value	p-value
BCA	0.277	0.032	0.457	8.584	0.001

$R = 0.457$; $R^2 = 0.209$; Std. Error = 0.3260; $F = 73.683$, $p<0.001$; Constant = 1.422
BCA = Bridging Course in Accounting
Dependent Variable: Accounting in Education 114

The estimated regression models are AE 113 rating = 1.836 + 0.208*BCA rating and AE 114 rating = 1.422 + 0.277*BCA rating. Hence, for every one-unit increase in the performance of students in BCA the AE 113 and AE 114 will increase by approximately 0.208 and 0.227 units, respectively.

The present study investigated the level of students' academic performance and the influence of the Bridging Course on the different Accounting Education Courses. The results of the study revealed a significant association with students' academic performance on their bridging course towards accounting education. Because majority

of the students (31.7%) obtained a very good rating in their Bridging Course. Similarly, a number of students performed well in both Accounting Education 113 and Accounting Education 114 course having a very good rating, counting to 46.6% and 58.3%, respectively. Students' performance in BCA influences the performance in AE 113 and 114 subjects with the *p*-value of both 0.001. Both performances in AE 113 and 114 give a moderately positive and linear relationship towards their bridging course. These results were supported by recent studies on bridging courses that help students improve their academic performance in their chosen course or career (Garkaz et al., 2011; Musso et al., 2019; Todd & Wolpin, 2018). Students' prior academic engagement allows them to gain academic dexterity and self-efficacy towards accounting education in the university (Joseph et al., 2018; Roick & Ringeisen, 2018).

Similar studies establish that students' cognitive and metacognitive abilities are developed on interdisciplinary academic tasks on different bridging courses associated with accounting education (Joseph et al., 2018). Researchers mentioned a positive relationship between students' prior academic achievement and academic performance regardless of the observed variance on the different factors in accounting education (Arquero et al., 2009). The 16.3% variance of students' academic performance in bridging courses indicates their level of academic preparation. The level of students' academic preparation (bridging course) directs their academic performance in accounting education (Muda et al., 2013). However, studies on quality teaching and learning strategies help students improve their academic performance (Cornillez, 2019).

The stated goal of the bridging course is to be able for the students to demonstrate the required competencies of a graduate of the ABM strand in senior high school aligned with the course taken in higher education. The results of the study revealed a positive and linear relationship between the BCA and both AE courses. It appears that the bridging course meaningfully prepared the students to more effectively perform better on the demands of their AE courses. Thus, it is substantial that students should take additional credit hours for a bridging course because the development of the skills of the students is significantly beneficial (Kallison Jr. & Stader, 2012).

A review of the literature on the importance and effectiveness of bridging courses in preparing the students indicated a need for more rigorous mentoring and evaluation of such programs. According to the study of Yingling (2018), peer and professional mentoring is helpful for the students in their academic performance particularly for those who need to enroll in the bridging course as it also promotes meaningful relationships and retention of the students. Much more research is needed to establish the effectiveness of bridging courses and to determine factors that are most important in enhancing the accounting skills of the students.

CONCLUSIONS

The present study aimed to determine the level of performance of the students in their bridging course and their accounting education courses. This study also intended to model the significant influence of the performance of the students in the Bridging Course on the Accounting Education Courses.

With the result of the study, it is expected that this will enhance the accounting education of the institution where the study was conducted. Moreover, this will help strengthen the weight of the bridging course in the pursuit of attaining favorable students performance in the higher accounting subjects. Lastly, the study proved that the curriculum is serving its purpose of rendering the highest possible opportunity for students to

learn basic and even advanced accounting education.

The following limitations apply to the current study: the geographical setting was limited to one university; the study focused only on two accounting courses, and the respondents who received a drop or failing grade in the courses covered in the study were not included. The researchers suggest that the study be expanded to include more universities to further validate the findings. Other accounting courses will be used as dependent variables to determine the extent to which bridging course performance influences students' performance in other accounting major courses. Other variables, such as gender, could be used to improve the model's predictive power, as well as increase the number of samples.

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