The influence of spreadsheet based modules implementation on statistics course achievement of Accounting Department students, Politeknik Negeri Bali

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Abstract. This research aims to know the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departmen students, Bali State Polytechnic and to know their perceptions to implementation of spreadsheet based statistics modules. This research consists of three steps: The first step includes curriculum analysis and initial validation, the second step includes validation of material expert and limited trials implementation. At the third steps includes preparing prototype of spreadsheet based statistics modules and field trials implementation in order to investigate the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departmen students, Bali State Polytechnic and to know their perceptions of implementation of spreadsheet based statistics modules. The results of the research show that spreadsheet based modules implementation influent statistics course achievement of Accounting Departemen students, Bali State Polytechnic. Students perceptions of implementation of spreadsheet based statistics modules for overall aspects are the majority of them said good (97.7%), very good (2.3%), pretty good (0%), less good (0%), and not good (0%) or score average of 4.2, maximum score of 4.5 and minimum score of 3.5 out of 5.

1. Introduction

Statistics course is provided at almost all study program due to supporting other fields. According to Guide Line Book of Bali State Polytechnic (BSP) 2013, nine of threeteen program study programs in BSP provide Statistics course including Accounting Study Program. Statistics course supports other courses at study programs in Accounting Department BSP. Many students feel that statistics is a difficult course. They need teaching materials to help in learning statistics such as modules. Benefits of using the module proposed by some practitioners of education. According Santyasa (2009), learning using modules will be able to change the conception of the students towards scientific concepts, so their learning outcomes can be improved optimally of both quality and quantity. Rizkiawan (2014) concluded that the use of the modules have a high influence on student learning outcomes. Similarly, Ali and Ghazi (2010) found that teaching with modules more effective than traditional methods, especially for biology because students are given the opportunity to learn according to their ability level and needs.

Generally, statistics course consist of long formulas. Many students, especially students of Accounting Department find difficulty to understand and to calculate these formulas. For simplicity, we need tables to elaborate the formulas and can be easily applied to a spreadsheet program package for example MS Excel. Parker (1987) states that an electronic spreadsheet first came to public in the late 1970s when a Harvard Business School student and a programmer friend produced a microcomputer

packed called Visical. In the begining 1980s a lot of spreadsheet software on the market such as Lotus, Symphony and others. Spreadsheet software is one of the software that strong ability in calculation based on tables. Nowadays, spreadsheet is widely used in many areas especcialy in education inclucing mathematics and statistics education. Calder (2010) mentioned that spreadsheets have given mathematicians and mathematics students a tool to extend the capacity and speed of computation. This has enabled students to better focus on the underlying mathematical ideas rather than on routine mathematical manipulation. Related to statistics education, Nash (2010) said there are some advantages of spreadsheets for teaching statistics such as: (1) Teachers can prepare templates in advance for students to follow and carry out particular computations (2). The spreadsheet calculation paradigm offers immediate updating of results when data are changed. (3) Spreadsheets are a fairly general computational tool, so they can often be "programmed" to perform nonstandard calculations. (4) Spreadsheet software now offers tools for many common statistical calculations. (5) Spreadsheets are a handy tool for data entry, editing, and manipulation prior to input to a standard statistics package for analysis.

In statistics education, spreadsheets can be used for all topics for example regresssion as described by Laviolette (1994). Martin and College (2010) are also developed tool for learning the multiple regression using spreadsheet. Futhermore, as demonstrated by Abramovich , Nikitina, and Romanenko (2010), a spreadsheet can be used as a medium for the development of three types of skills namely basic, professional, and advanced skills that are required for the STEM (science, technology, engineering, mathematics) workforce of the future. It showed how technology, in general, and a spreadsheet, in particular, can support the introduction of mathematical concepts through using basic skills in professionally-oriented computing applications.

Spreadsheets are also used to support teaching and learning in bussinees field as developed by Mays (2015). Therefore, it is necessary to develop spreadsheet-based especially for statistics course modules through this research. It is expected to be applied in the learning process in the Accounting Department of PNB as well as in other vocational colleges.

Based on the background above, then issue of concerns in this research are: (a) How does the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departemen students, Bali State Polytechnic? (b) How does Accounting Departemen students, Bali State Polytechnic's perceptions of implementation of spreadsheet based statistics modules? The purpose of this research are: (a) To know the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Departemen students, Bali State Polytechnic, and (b) To Know Accounting Departemen students, Bali State Polytechnic's perceptions of implementation of spreadsheet based statistics modules.

2. Methodology

This research is conducted to develope spreadsheet based modules for Accounting Departemen students, Bali State Polytechnic involving three steps. The first step has been implemented with the results as can be seen in Wijana and Suardani (2015, pp. 173-182). In the second step, the modules are revised before validated by statistics experts. The third phase is to create prototype of a spreadsheet-based statistics modules and followed by field trials implementation in order to investigate the influence of spreadsheet based modules implementation on statistics course achievement of Accounting Department students, Bali State Polytechnic and to know their perceptions to implementation of spreadsheet based statistics modules. In this study, the population is all of second semester students of Managerial Accounting Department, Bali State Polytechnic academic year 2016/2017. The population consist of 180 students that are divided into sixt classes. Samples are taken using cluster method by taking four classes randomly. Furthermore, from each chosen classes were taken 22 student as field trials participants. So total number of sample are 88 students. Samples of the first class (44 students) are called Group I where the modules are applied while the second is called Group II (44 students), where the modules are not applied. Data collected are the results of evaluation on each module. Firstly, the data is analyzed their statistics (average value and standard deviation) of each group in each module. Furthermore, means difference between the group I and group II are tested for all modules using t test. criteria that mean of group I greater siginificantly than mean of group II if tvalue greater than tTable atau $t(86, 5\%) = 1.645$.

Perception of mahasiswa terhadap penerapan modul-modul berbasis spreadsheet di Jurusan Akuntansi Politeknik Negeri Bali is collected from group I using quitioner consisting three aspects: easier, efficiency, and independent in learning statistics. Then, the data is desribed theri mean and standar deviation.

3. Result and discussion

Field trial is conducted using seven modules and their supplements. The result for Module I entitled "Statistics Data" based on Politeknik Negeri Bali (2016, pp. 1-146) is described in Table-1a dan Table-1b.

Table-1. Distribution of Module I

Result of Field Trial Group I

Category	Interval	Group I		Group II	
		Frequency	%	Frequency	%
A	81 and greater	9	20.5	11	25
AB	76 – 80	22	50	1	2,3
B	66 – 75	4	9.1	3	6,8
BC	61 -65	1	2.3	8	18,2
C	56 – 60	0	0	13	29,5
D	41 – 55	8	18.2	8	18,2
E	40 and less	0	0	0	0
	Total	44	100	44	100

By using the revised modules, field trials was implemented. As can be seen from Table1, the results for the first module entitled "Statistics Data", group I (where the modules are applied) got average value (1 = 75.41) is greater than the average value of group II (2 = 67.39) with standard deviation of 15.3 and 2.55. Mean difference test gives a value of t= 2.55 is greater than t table or t (86,5%)=1.645. It means that the average value of group I is significantly higher than the average value of group II (where the modules are not applied).

Similar to the result of Module I, the overall result of module I to module VII can be seen in Table-2a and Table-2b.

Table-2a. Field Trial Result

Module	Group I		Group II	
	$\overline{X}_1$	s_1	$\overline{X}_2$	s_2
I	75.41	14.09	67.39	15.36
II	79.55	15.36	72.73	12.87
III	88.34	11.65	72.73	18.63
IV	79.55	15.36	69.86	11.73
V	82.07	11.12	71.66	11.80
VI	82.75	12.76	0.00	16.40
VII	77.23	15.36	68.02	13.30
Overall	80.70	8.06	70.41	8.21

Table-2b. Field Trial Result

Module	T_{value}	T_{tablel}	Remark
I	2,55	1,65	Significant
II	2,26	1,65	Significant
III	4,71	1,65	Significant
IV	3,32	1,65	Significant
V	4,26	1,65	Significant
VI	3,91	1,65	Significant
VII	3,34	1,65	Significant
Overall	5,93	1,65	Significant

Table-2a and Table-2b show that mean of group I is greater than mean of group II for all module. Mean difference test give all value of t are greater than t table or t (86,5%)=1.645. It means that the average value of group I is significantly higher than the average value of group II (where the modules are not applied).

As can be seen from Table-2a and Table-2b, for the overall results, group I (where the modules are applied) got average value (1 = 80,70) is greater than the average value of group II (2 = 70.41) with standard deviation of 8.06 and 8.21. Mean difference test give a value of t= 5.93 is greater than t table or t (86,5%)=1.645. The overall average value of group I is significantly higher than the average value of group II (where the modules are not applied). It means that spreadsheet based modules implementation influent statistics course achievement of Accounting Departemen students, Bali State Polytechnic. The difference of group I and group II achievement is clearer showed their frequency distribution by Table- 3a , Table-3b and Figure-1 using category according to Politeknik Negeri Bali (2013, pp. 1-146).

Table-3a. Distribution of Overall Modules
Result of Field Trial Group I

Category	Interval	Frequency	%
A	81 and greater	9	20.5
AB	76 – 80	22	50
B	66 – 75	4	9.1
BC	61 -65	1	2.3
C	56 – 60	0	0
D	41 – 55	8	18.2
E	40 or less	0	0
	Total	44	100

Table-3b. Distribution of Overall Modules
Result of Field Trial Group II

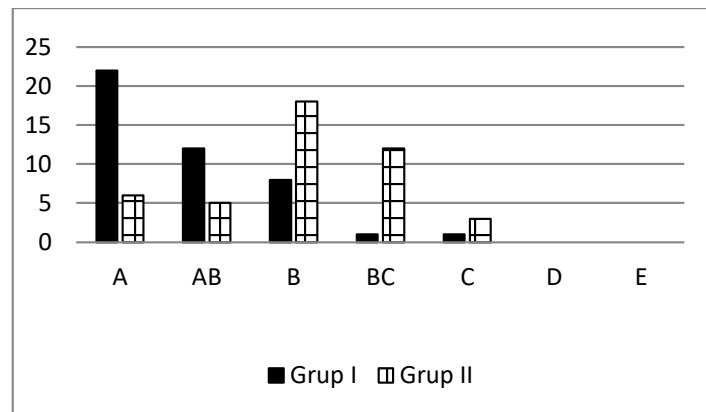| Category	Interval	Frequency	%
A	81 and greater	9	20.5
AB	76 – 80	22	50
B	66 – 75	4	9.1
BC	61 -65	1	2.3
C	56 – 60	0	0
D	41 – 55	8	18.2
E	40 or less	0	0
	Total	44	100

Figure-1. Distribution of Overall Modules

Furthermore, this research also investigate Accounting Departemen students' perceptions of implementation of spreadsheet based statistics modules. The results can be seen in Table-4a, Table-4b, Table-4c, and Table-4d

Table-4a. Aspect: Helps To Study Statistics

Aspect	Frequenc	%
Strongly	16	36,4
Agree	28	63,6
Quite Agree	0	0,0
Less Agree	0	0,0
Disagree	0	0,0
Total	44	100

Table-4b. Aspect: Efficient To Study Statistics

Aspect	Frequenc	%
Strongly	16	36,4
Agree	27	61,4
Quite Agree	1	2,3
Less Agree	0	0,0
Disagree	0	0,0
Total	44	100

Table-4c. Aspect: Independent To Study Statistics

Aspect	Frequenc	%
Strongly	0	0,0
Agree	41	93,2
Quite Agree	3	6,8
Less Agree	0	0,0
Disagree	0	0,0
Total	44	100

Table-4d. Aspect: Overall

Aspect	Frequenc	%
Strongly	1	2,3
Agree	43	97,7
Quite Agree	0	0,0
Less Agree	0	0,0
Disagree	0	0,0
Total	1	2,3

Using Likert scales with the maximum score of 5, the score average of student's perceptions of implementation of spreadsheet based statistics modules for overall aspects is 4.2, maximum score of 4.5 and minimum score of 3.5 out of 5.

4. Conclusion

Based on the results achieved previously, then the conclusion can be drawn as follows: (1) spreadsheet based modules implementation influent statistics course achievement of Accounting Department students, Bali State Polytechnic, and (2) Student's perceptions of implementation of spreadsheet based statistics modules are for overall aspects the majority the said good (97.7%), very good (2.3%), pretty good (0%), less good (0%), and not good (0%) or score average of 4.2, maximum score of 4.5 and minimum score of 3.5 out of 5.

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