

Newspaper Literacy: A Practical Model Of Augmenting The Student's Mathematical Skills In The Business Mathematics Learning In Higher Education

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Abstract: Economic and business problems in daily life can be found in the newspaper. Economic and business neared within mathematics. Business Mathematics is one of the basic subjects taught in tertiary institutions in economics. Mathematics learning in tertiary institutions must be contextualized and linked to the environment and real-world examples. This research is a follow-up of the results of previous research on the development of newspaper literacy-based business learning models in universities. The development of a newspaper literacy-based business mathematics learning model is carried out using the Plomp model. In the previous research, the validity test was done through expert assessment and practicality of the one to one and small group stages. Beside of the field test, results of lecturers respons 80.90, and classified as practical. Result of student's respons 90.94 and classified as very practical. On the assessment phase, different test results on student's mathematical abilities (understanding concepts, problem-solving and mathematical connections) show significant differences, where p value or significancy 0,000 for all of the test, and it is effective.

Keywords: practicality, effectiveness, mathematical learning model, newspaper literacy, mathematical skills

1. INTRODUCTION

The world of work requires scholars to possess applicative skills. For this reason, students are not only prepared to understand textual problems but also need to understand real-world problems that are relevant to the field of science being studied. Mathematics is used in all fields of science and is an instrument for solving real-life problems, including economic and business problems. Therefore, mathematics learning needs to be continuously developed and mathematics teachers should have a strong mission to bring students closer to using inofective learning models. Newspaper is a critical source of information in life. Newspaper presents various events of daily life including economic and business activities. Newspaper can be involved in learning mathematics to get students used to understanding real-life problems related to economic and business topics being studied. To involve the newspaper in learning, a way is needed to support students to be able to understand and interpret the lessons contained in the news in the newspaper. The literacy approaches through mass media is closely related to the literacy view that refers to the real world. The steps to understanding the economic and business problems presented in the newspaper need to be done in a systematic way called the newspaper literacy cycle. To carry out the Newspaper Literacy cycle, there are several things that must be done, including giving different role models to students in a small group; the roles given are leader discussion as well as presenter, quote person, time tracker, counter, summarizer. Mathematical learning involving newspapers must be well designed so that learning objectives are achieved. The ability of lecturers to apply the right learning model is needed so that students have good mathematical abilities. One learning model based on real-life problems is Problem Based Learning (PBL). Researchers have developed the PBL model into a newspaper literacy-based learning model, and have gone through a process of validation and practicality testing for the small group stage. This article contains a test of the practicality of the learning model at the field test stage and the effectiveness of the model developed.

1.1. Business Mathematics Learning

Mathematics learning in tertiary institutions must be contextualized and linked to the environment and real-world examples. In learning mathematics, students are trained to construct related ideas and integrate them with their understanding. Abdul Wahed, et. al (2012) Treffers, De Moor and Feijs (1989) (Cox, 2007).

Business Mathematics is one of the basic subjects taught in tertiary institutions in economics. This subject is a prerequisite for other subjects such as economic statistics and microeconomics. Learning business mathematics aims to improve students' understanding of basic mathematical concepts so that they can be used as provisions in solving business problems and students are expected to be able to connect mathematical concepts with economics and business. Kuswanto and Ardiani. (2015), Liang, H. N. (2011) and Shaw. D. (2004)

1.2. Mathematical ability

Ability is the potential to master a skill to do something. Mathematical learning is carried out so that students have some abilities mathematics such as understanding mathematical concepts, solving problems, compiling reasoning and compiling evidence, explaining the interrelationships between concepts, presenting mathematical ideas in the form of symbols, tables or other media. Education (BSNP) 2006 NCTM (2000). (Eggen, P, Don Kauchak, 2009). The ability to understand mathematical concepts is the ability of students to write, identify concepts, recognize procedures and describe concepts clearly. Problem-solving is a systematic activity that contains strategies to obtain solutions in the mathematics learning process. The ability to solve problems is seen from identifying, anticipating problems, solving problems according to procedures and solvingproblems with different strategies. The mathematical connection is the ability of students to associate concepts in mathematics, as well as mathematical concepts with problems that occur in life. Mathematical connections are an inseparable part of other mathematical abilities. NCTM

(2000).Polya (1973), Siagianet. al (2019), Saragih&Hutahean (2014).

1.3. Newspaper Literacy

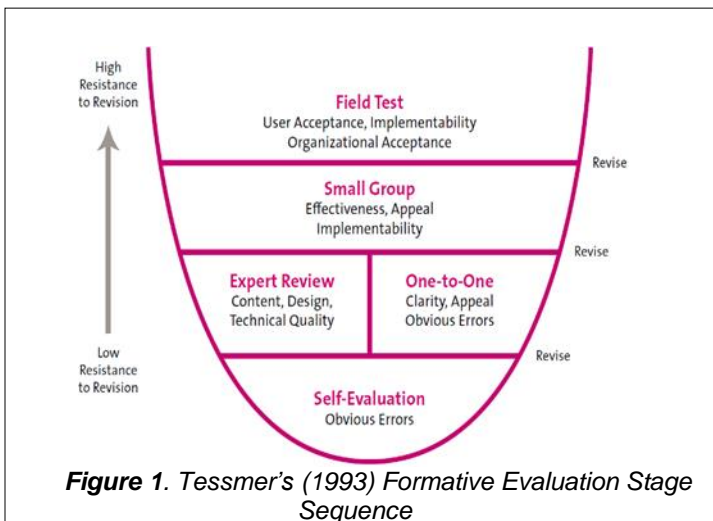
Within the scope of media literacy, there are news literacy and newspaper literacy. Media literacy is the ability to access, analyze, evaluate and produce communication and information in various media. News literacy is the ability to use critical thinking skills to assess the reliability and credibility of news reports, both print media, TV, or the Internet. While newspaper literacy is the ability to understand the news, analyze the meaning of news contained in the newspaper. Press (2015, Fleming (2013), Ashley (2013).Panagiotou and Theodosadou (2014), (Tully &Vraga: 2017). Newspaper can be involved in learning to give students an understanding of what is happening in real life. Knowledge about world events is very important to know to help students solve real-life problems, one of which is economic and business problems. Bernadowski (2011) said that at school, the newspaper gives students an understanding that what happens in the world is important for life and family. World events can affect the economy, gas prices or how much milk costs. In essence, the newspaper affects students and the way students look at themselves and the world around them. Sanderson (1999) put forward strong arguments in favour of the use of newspapers in the classroom because using newspapers in the classroom encourages extensive reading by giving students confidence, motivation and the ability to continue their reading outside the classroom. Newspapers also provide information to students about what is happening in the world, thereby broadening their knowledge and deepening their understanding. For this reason, they have general educational value and importance for students. One researcher in Uganda, Namata (2010) in his research entitled Newspaper as tools of Literacy in Uganda case study of the Newspaper in Education (NiE) program revealed that in NiE, the use of newspapers as a source of education for any subject. The newspaper can be used to provide lessons in reading, mathematics, politics, science, social studies, geography and critical thinking. NiE can be done at all levels of education and lessons can be designed to be adapted to the national school curriculum. Patterson (2007) said news in class is one of the best ways to prepare students for their citizen roles. Newspaper can even function as a tool for teaching. Newspapers in education are a collaborative effort between newspapers and the local school system to use newspapers as a tool for teaching. The Newspaper Company provides copies to schools, usually at low rates, for use in class. Worth, in his presentation at the Arkansas Teaching Conference (Little Rock Arkansas, 2002), discussed the use of various media sources as examples of daily mathematics use classes. West (1991) suggested that Newspaper could be a valuable tool for mathematics teachers in convincing students that basic and basic consumer mathematical skills are essential in everyday life. The use of newspaper literacy in learning is gathered in the newspaper literacy cycle. There are several things that must be done, including giving different role models to students in a small group. According to Shaw (2014), the roles include as a discussion leader, presenter, quote person, time tracker, counter and summarizer.

1.4. Model of Problem Based Learning (PBL)

The teaching model is a way to build care and stimulate the ecosystem in which students learn by interacting with its components. There are four groups of teaching models including the Information Processing Teaching Model, Social Teaching Model, Personal Teaching Model and Behavior System Teaching Model Group. Joyce, et al (2016). The teaching model is designed to help students develop thinking skills and gain an understanding of a particular form or in a specific form of material Jacobsen et.al (2012). The known learning model that aims to actively involve students in learning and is problem-oriented is the Problem Based Learning (PBL) model. Barrows (1986) revealed that PBL is an active learning model based on the use of unstructured problems as a stimulus for learning. PBL is a model that can help students to be able to build knowledge and problem-solving abilities and help students to be able to master important knowledge (Delisle, 1997: 6). The problems presented in problem-based learning are contextual and close to everyday life, Delisle (1997: 8). Tan (2004: 7) defines PBL as an approach to active learning and progressive learning, which starts with unstructured problems or real-world problems. Arends (2007: 49) states that the essence of problem-based learning is to present an authentic and meaningful problem for students so as to enable students to be able to carry out investigations and discoveries of solutions to these problems. PBL provides opportunities for students to be more active in learning, that is, students have greater opportunities to learn the mathematical process, which is related to communication, representation, modelling and reasoning. In PBL, the teacher's role in addition to presenting and explaining things to students is to be more directed as a guide and facilitator so that students can think and solve problems in their own way. There are five stages of problem-based learning activities including student orientation to problems, organizing students to study, guiding individual and group investigations, developing and presenting work, analyzing and evaluating problem-solving processes. Arends (2007: 57) Kyeong Ha (2002). Based on the various expert opinions that have been stated above, it can be concluded that PBL is a learning model that gives students opportunities to learn actively in solving problems, where unstructured problems are given at the beginning of learning.

2. METHODOLOGY

The model used in the development of newspaper literacy-based mathematics learning models is the Plomp development model. Plomp (2013: 41) stated, in general, there are three stages in the development of learning models, namely the preliminary research phase (initial research phase), prototyping phase (phase of making prototypes) and assessment phase (assessment phase). This research only covers the prototyping phase which includes field test to obtain the fourth prototype, and the assessment stage, as a continuation of previous research. At the prototype preparation stage, researchers design and develop prototype learning devices iteratively. At each iteration, a formative evaluation is carried out by adopting the formative evaluation proposed by Tessmer (1994).



Prototype 1 is the result of the initial design. Based on the results of the validation, a revision or improvement to prototype 1 is made, and the revised product is called prototype 2. Prototype 2 is evaluated one by one, and the results of the evaluation are revised and the results of the revision are called prototype 3. After the prototype is obtained 3, then an evaluation of a small group (small group). After a revision of the results obtained in the small group test, then what is done next is a field test in one class. The purpose of this field trial is to evaluate all material contained in product development, paying special attention to changes made based on small group evaluations. At this stage, data collection was carried out in the form of observations, lecturer response questionnaires and student response questionnaires. After the field test is carried out, a revision is made in accordance with the results of observations and responses obtained in the field test. Student and lecturer responses to the learning model are recapitulated and practicality analysis is done. Practicality tests include the implementation of learning, ease of use of the product, time efficiency, user acceptance, readability, clarity of instructions and product attractiveness.

Practicality = Mean Score : Max Score X100

Table 1. Practicality Criteria

Practicality(%)	Criteria
90 <tp≤ 100	Very easy to use
80 <tp≤ 89	Easy
65 <tp≤ 79	Quite easy
55 <tp≤ 64	Difficult to use & understand
0 <tp≤ 54	Very difficult to use & understand

At the stage of product effectiveness investigation, different tests are carried out on models that meet valid and practical criteria. Assessment of students' mathematical abilities is done using analytic rubrics.

Table 2. Student's Mathematical Ability Rubric

No	Mathematical Ability Criteria	Score			
		4	3	2	1
1	Concept Understanding Ability a. Define the concept 1) Write the concepts in sentences				

	that are clear and easy to understand b. Identifying concepts 1) Explain the characteristics of concepts c. Recognize the procedure 1) Recognize the correct sequence of calculations 2) Recognize errors in calculations d. Draw a conclusion 1) Describe clearly the concept of lecture material that covers all sub-subjects			
2	Problem-solving skill a. Identify the problem 1) Detailing the problem to be solved b. Expect problems 1) Describe the problem with the sentence itself c. Solve problems according to procedures 1) Perform problem-solving with the right steps 2) Perform the correct calculation 3) Correcting the results of problem-solving d. Resolve problems with different strategies 1) Uncover alternative solutions in problem-solving			
3	Connection a. Linking the concepts/topics of one material to other materials in daily life 1) Interpret the problems in the news into economic and business topics b. Linking mathematical concepts with other material in everyday life 1) Identifying mathematical concepts related to economic and business problems 2) Interpreting the results of solving mathematical problems in economics and business			

Appraisal Remarks:

- 4 = Very good (Structured, complete and correct answers)
- 3 = good (Structured answer, incomplete and correct)
- 2 = Good enough (Structured answer, incomplete or only slightly correct)
- 1 = Not good (Answers are not structured, incomplete and incorrect)

Scoring / Assessment Criteria

- Problem solving skill
A = Very good, if the total score = 12
B = Good, if 9 ≤ total score <12
C = Good enough, if 6 ≤ total score <9
D = Not good, if the total score is <6
- Reasoning Ability
A = Very good, if the total score = 8
B = Good, if 6 ≤ total score <8
C = Good enough, if 4 ≤ total score <6
D = Not good, if the total score is <4

Connection Ability

- A = Very good, if the total score = 12
B = Good, if 9 ≤ total score <12
C = Good enough, if 6 ≤ total score <9
D = Not good, if the total score is <6

Analysis of the effectiveness of the different tests of mathematical abilities of students. Before testing the differences in learning outcomes of students' mathematical abilities, the first requirement test is the normality test.

3. RESULT AND DISCUSSION

Field tests were conducted on accounting students at the STIE Bangkinang Accounting program. At this stage, based on a practicality questionnaire given to two lecturers in Business Mathematics, a business learning model based on newspaper literacy was classified as practical.

Table 3. Results of Lecturers Respons at Practicality of Model

No	Rated of Aspects	Item	Lecturers Respons		%	Category
			1	2		
1	A clue	1	4	4	80	Practical
2	Oriented	2	4	4	80	Practical
		3	3	3	60	Quite practical
		4	4	4	80	Practical
		5	3	3	60	Quite practical
3	Syntax	6	5	5	100	Very Practical
		7	5	5	100	Very Practical
4	Materi	8	4	4	80	Practical
		9	4	4	80	Practical
5	Newspaper Literacy note sheet	10	4	4	80	Practical
		11	3	3	60	Quite practical
		12	3	3	60	Quite practical
		13	4	4	80	Practical
		14	3	3	60	Quite practical
6	Assessment technique	15	4	4	80	Practical
7	Language	16	5	5	100	Very Practical
		17	4	4	80	Practical
		18	4	4	80	Practical
8	Graphic	19	5	5	100	Very Practical
		20	5	5	100	Very Practical
		21	5	5	100	Very Practical
9	The benefits	22	4	4	80	Practical
Average					80,90	Practical

The practicality questionnaire of the PMB-BNL model filled with 20 students also showed very practical results. The average practicality test results for the PMB-BNL model is 90.94% with very practical criteria. This implies that the newspaper literacy-based business learning model of mathematics can be easily implemented.

Table 4. Results of Students Respons at Praticality of Model

Item Number	Percentage	Category
1	83,75	Practical
2	96,25	Very Practical
3	96,25	Very Practical
4	88,75	Very Practical

5	93,75	Very Practical
6	93,75	Very Practical
7	83,75	Practical
8	96,25	Very Practical
9	86,25	Very Practical
10	88,75	Very Practical
11	93,75	Very Practical
12	90	Very Practical
Average	90,94	Very Practical

In the assessment phase or assessment phase, researchers conduct trials on the STIE Bangkinang Management study program to see the effectiveness of the model. A total of 20 students were involved in the assessment phase process. Assessment of student learning test results is taken at each meeting through individual assignments. Wilcoxon test results show that there are differences between student's understanding of concepts before and after PMB-BNL, where the significance value of 0,000 < 0.05. The paired t-test parametric test results on the ability to solve problems and the ability of mathematical connections show that there are differences in the ability to solve problems before and after PMB-BNL are classified as significant.

Table 5. Mathematical Ability Effectiveness Test Results

No	Type of Statistics	Variables	P Value		Conclusions	
			Pre Test	Post Test	Pre Test	Post Test
1	Normality Test	Understanding Concepts	0,043	0,674	Not normal	Normal
			0,645	0,251	Normal	Normal
		Problem Solving	0,175	0,194	Normal	Normal
			0,175	0,194	Normal	Normal
2	Comparis on test	Understanding Concepts	0,000		Significant	
			Problem Solving	0,000		Significant
		Connection Mathematics		0,000		Significant

Based on calculations using different tests, it is known that there is an increase in understanding of concepts, problem-solving and significant mathematical connections in students after the application of the PMB-BNL model compared to before the application of the PMB-BNL model. Mathematical understanding (mathematical understanding) in this case is different from the understanding found in bloom taxonomy. Mathematical understanding has a different level of cognitive swing depth. In addition to knowing a theorem, mathematical understanding will also provide the ability to master aspects in proving and applying the theorem, Sumarmo (1987). Understanding the concepts measured in this study is a combination of several expert opinions such as Polya, Pollatsek, Skemp and Copeland. Mathematical problem solving is a process of solving problems not directly but must go through other means first. Sumarmo (2002) suggests steps solve problems starting from understanding the problem, planning or designing a problem-solving strategy, carrying out calculations and checking the truth of the results or solutions. The importance of having mathematical correction capabilities (NCTM, 1989): understanding mathematical concepts, explaining inter-concept interrelations and applying concepts or algorithms flexibly, accurately, efficiently and precisely in solving problems.

4. CONCLUSION

From the discussion of this study, it can be concluded the following matters:

1. Results of lecturers responses 80.90, and classified as practical. Result of students responses 90.94 and classified as very practical.
2. Different test results on student's mathematical abilities (understanding concepts, problem-solving and mathematical connections) show significant differences, where p value or significance 0,000 for all of the test, and it is effective.

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