The Interactive Whiteboard Promethean Attracts the Interest to Study of Millennial Accounting Students

Danar Irianto
Business Management
Batam State Polytechnic
Batam, Indonesia
danar@polibatam.ac.id

Pradipta Eva Trudiyanti
Business Management
Batam State Polytechnic
Batam, Indonesia
pradiptakertia@gmail.com

Yunestia
Business Management
Batam State Polytechnic
Batam, Indonesia
yunestia81@gmail.com

Kurnia Wulan Widaningsih
Business Management
Batam State Polytechnic
Batam, Indonesia
wulannwidaningsih@gmail.com

Abstract—**Entering the era of 4.0 requires all educational institutions to be ready to face the digital world. The digitization system requires mental preparation and media to be used in education. Higher education institutions such as Batam State Polytechnic has digitalized learning media, the Promethean interactive board. The purpose of this study is to find out how the use of interactive boards and how interactive boards can increase the learning interest of accounting students. This goal can be achieved by using research methods in the form of in-depth interviews of the 4 components of the question such as pedagogy, psychology, group interaction and the availability of promethean use to be proposed. The interview results showed that pedagogical components gained 77 percent, psychological 75 percent, group interactions gained 80 percent and the availability of promethean use was 83 percent. The interpretation of the results found that all components were in the very interested category with a percentage of 79 percent for accounting students learning to use the Promethean interactive board. Some negative reasons were obtained during the interview regarding technical errors and the lack of understanding of the teaching staff on the media. Batam State Polytechnic needs to conduct routine checks on 'Promethean' interactive board media.**

Keywords—interactive whiteboard, interactive learning system, industrial revolution 4.0, active role of students, interest in studying accounting

I. INTRODUCTION

A. Background

The industrial revolution that took place in the mid-18th century in England, has had a major influence on human life, especially related to the role of humans which began to be replaced by technology. This is based on ongoing technological advances in the era of factory systems and steam engines and trends related to patents in the 1760s [1]. Since the early round of the industrial revolution in stage 1.0, human involvement in a production process is no longer dominant because of the use of steam engines that drive mechanization in industrial processes. Then the discovery of electricity which opened the era of industrialization in stage 2.0 and an era that had adopted computers in the process so that it was called the technological revolution in stage 3.0, had also cut down most of the production process.

Currently the world has entered stage 4.0 which is the integration of Cyber Physical System (CPS) and Internet of Things and Services (IoT and IoS) into industrial processes including manufacturing and logistics and other processes [2]. This results in the computer being able to control the physical process of production, display it virtually and make decentralized decision making [3]. This amalgamation of the real world (physics) and cyberspace (cyber) not only minimizes the role of humans, but also shifts the position of humans who were originally active subjects into passive subjects.

This shift in roles does not only occur in the industrial sector, but also influences various aspects of life, including in the field of education. Technology changes the way people learn and get information. Students who previously only received one-way knowledge from teachers, can now access information themselves and get knowledge from various sources on the internet. In this era students have been able to contribute to the learning process so that the flow of information goes both ways. This is referred to as an interactive learning system. In this digital era 4.0, the interactive learning system should only make the instructor a facilitator in the classroom.

This research is relevant to the start of the 4.0 industrial revolution which involved digitizing each process. Therefore, to be able to keep up with the dynamics of the times, digitalization needs to be implemented in all aspects, especially in the learning process in educational institutions. The digitization case was realized through whiteboard media supported by devices and interactive features. Interactive whiteboards can have a positive impact on the learning process and provide opportunities for students to be more active during the process. Student's perceptions of IWB have become an important problem in utilizing the IWB features [4]. The presence of boards that support the interactive learning system is expected to be able to attract the attention of students so that they can absorb teaching materials that are well presented.

A study of a case of interactive whiteboard learning proved by Hillier, Beauchamp, & Whyte conducted research with participants from several countries [5]. The results of the study stated that participants from Turkey were the least confident according to their responses to the questionnaire given. These results and statements imply that teaching skills using interactive whiteboards are not good enough. Students must train their own problems. This is what makes researchers interested in researching similar things at Batam State Polytechnic especially in the Accounting Study Program to see how the interactive whiteboard can increase interest in participation in learning and students' understanding of accounting for the material presented.

Previous research conducted by Wall, Higgins & Smith aims to collect information about students' views on IWBs (interactive whiteboards) and the impact of these tools on teaching and learning [6]. Furthermore, Warwick & Kershner also proved this in his research which aims to see how teachers participate in courses with faculty staff, which focus on collaborative knowledge related to classroom learning and research based on values and principles socio-cultural theoretical principles, support changes in pedagogic practice [7]. The results show that the IWB can empower students to be more effective and consciously participate in collaborative reasoning.

Redman & Vincent study aims to test the opportunities for IWB (interactive boards) in pedagogical decisions [8]. The results of his research show that teachers use IWB (interactive boards) to maintain conversations that improve and solve questions to present challenges to students and be more interactive in learning.

Mata, Lazar & Laza conducted a study aimed at examining students' attitudes towards interactive whiteboards (IWB) in higher education [9]. The results revealed revealed the fact that there were relevant differences between students at different study levels regarding their attitudes toward certain factors that defined pedagogical, psychological, group interactions and the availability of IWB factors.

This research is important because in a previous similar study by Wall, Higgins & Smith used 80 samples and online interviews on bubble dialogue, while this study used 17 samples but in-depth interviews to get a clearer picture of reaction (gesture) and verbal response given by the speaker [10].

B. The Aim of Study

The aim of this study was to find out how the practice of using interactive board technology in the Accounting Study Program at Batam State Polytechnic. In addition, to find out how the 'Promethean' interactive board can increase the learning interest of accounting students.

C. Problem Identification

Based on the background described above, then the problem solving plan that will be formulated in this study consists of two things. First, how is the practice of using interactive board technology in the Accounting Study Program at Batam State Polytechnic. Second, how to use the 'Promethean' interactive board in order to increase the learning interest of accounting students.

D. Theoretical Framework

The theory of planned behavior, better known as the theory of planned behavior (TPB), is a theory that emphasizes the rationality of human behavior as well as the belief that behavioral targets are under the control of individual consciousness [11]. Attitudes toward behavior is a tendency to respond to things that are liked or not liked on an object, person, institution or event [12].

The Technology Acceptance Model (TAM) theory was developed by Davis and tried to explain user behavior towards the use or acceptance of technology [13]. This model tries to explain the influence of the user's beliefs and attitudes towards the use or acceptance of technology on the wishes of the user.

The Social Cognitive (SCT) theory or often referred to as the theory of modeling learning, comes from Albert Bandura [14]. The learning process is in this theory by observing one's behavior both directly and indirectly. Modeling is a learning process by observing the behavior or behavior of other people around us either directly or through the media.

II. LITERATURE REVIEW

Based on Wall, Higgins & Smith aims to gather information about students' views on the IWB (interactive whiteboard) and the impact of the tool on teaching and learning [15]. The study used 80 samples and online interviews in the bubble dialogue, while this study used 17 samples but with in-depth interviews to get a clearer picture of the reaction (gesture) and verbal responses provided by the speakers. The results of the study show positive results that the IWB (interactive whiteboard) can facilitate and begin learning and have an impact on the preferred approach to learning. Students explain how various elements of software and hardware can motivate, help concentrate, and maintain their attention.

The Warwick & Kershner study aims to find out how teachers participate in courses with faculty staff, which focus on collaborative collaborative knowledge relating to classroom learning and research based on the values and principles of socio-cultural theory, supporting change in pedagogic training [16]. These results show that IWB can empower students to be more effective and consciously participate in collaborative reasoning.

Redman & Vincent's study uses a sample of three teachers with different subjects to give questions to students during lessons and when video playback takes place [17]. The purpose of the study was to test the opportunities for IWB (interactive boards) in pedagogical decisions. The results of his research show that the teacher uses an IWB (interactive board) to maintain conversations that improve and solve questions to present challenges to students and be more interactive in learning.

Mata, Lazar & Laza uses a sample of 210 students who have undergraduate studies, 24 master studies and 12 in doctoral studies have responded to the survey [18]. The use of the questionnaire has 4 parts, which focus on the availability of IWB use and components of pedagogy, psychology and group interaction. The methodology used involves the format of a series of multiple responses to identify the percentage of choices for each category of

problems. The research aims to examine students' attitudes towards interactive whiteboards (IWB) in higher education. The results revealed the fact that there were relevant differences between students at different study levels regarding their attitudes toward certain factors that defined pedagogical, psychological, group interactions and the availability of IWB factors. The greatest effect caused by higher levels of study was observed in the availability of use of IWB factors, each in the perception of the use of IWB in the education process.

III. RESEARCH METHODS

A. Research Design

This study uses a single (holistic) case study aims to capture various events and conditions for situations that occur every day. This study uses a single (holistic) case study strategy because this case study only describes the overall nature of an organization or program [19].

Using a descriptive qualitative approach to get an overview of the effectiveness of interactive learning systems with interactive whiteboard media in the Accounting Study Program related to the implementation of industry 4.0 in the context of Batam State Polytechnic, and to propose new roles and practices for Batam State Polytechnic in order to realize Indonesia 4.0. This study uses two main research methods, namely, in-depth interviews and observation.

B. Object of Research

The object of this study was the Batam State Polytechnic Accounting Student when using the 'promethean' interactive whiteboard as a medium of learning in the classroom.

C. Research Materials and Tools

This study uses a purposive sampling technique. The sample in this study uses the Gay and Diehl method approach that the more samples used will produce results that can be generalized [20]. This research is descriptive narrative with the provision of a minimum sample of 10% of the population. This study uses supporting instruments in the form of interview guidelines for conducting in-depth interviews. Whereas to help the observations that will be carried out, we use supporting instruments in the form of an observation checklist.

D. Data Collection Technique

This study uses data collection techniques as follows:

- Techniques, for collecting data from literature reviews and continued in-depth interviews.
- Observation, techniques are carried out to observe teaching and learning activities.

The primary data type is related to the certainty of the population to determine the number of samples.

TABLE I.   POPULATION DATA

Class	Population
AK2A	29
AK2B	29
AK4A	26
AK4B	29
AK6A	27
AK6B	29
Total	**169**

E. Research Variable

Measuring the interest of the millennial generation of accounting students in understanding the material with the development of learning systems towards the era of digitalization.

F. Data Analysis Technique

The data analysis technique in qualitative research is the analysis of inductive interactive data. Stages of analysis consist of 3 paths, namely, data reduction, data presentation, and conclusion [21]. Processing data in this study using a formula by Dean J. Champion [22].

Champion's Formula:

$$\sum \frac{Yes\ Answers}{Answers} \times \ 100\% \tag{1}$$

Percentage calculations by Dean J. Champion put it as follows:

TABLE II.   ASSESSMENT PERCENTAGE CRITERION

Range	Information
0% - 25%	Not Interested
25% - 50%	Quite Interested
50% - 75%	Interested
75% - 100%	Very Interested

IV. RESULT AND DISCUSSIONS

The researcher proposed two research questions that could be completed with the results of the interviews that had been conducted. It consists of four components in the interview guide, namely pedagogy, psychology, group interaction and the availability of promethean use.

A. Pedagogy
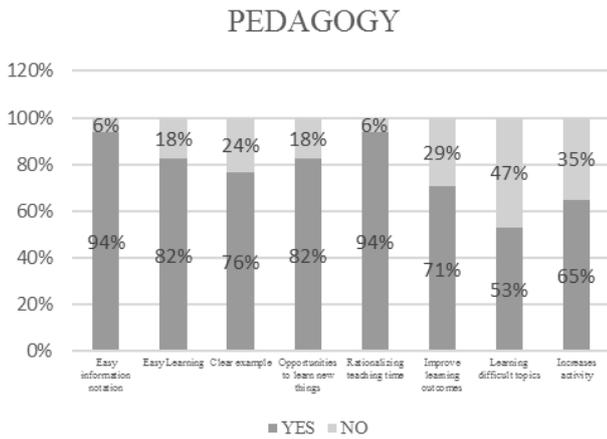
PEDAGOGY

Fig. 1. Component of pedagogy.

Generally, from the aspect of pedagogy, the correspondent agreed on the practice of using Promethean is very good and utilization of promethean very interesting interest in learning accounting students. Pedagogy has 8 poin and the lower percentage in Learning difficult topic. It can be that because that promethean does not help them in understanding difficult topics and sometimes distracts their concentration through a dynamic display so that they have difficulty focusing on capturing the meaning of a difficult topic. In this case, material screening still needs to be effective and not excessive in its presentation.

B. Psychology
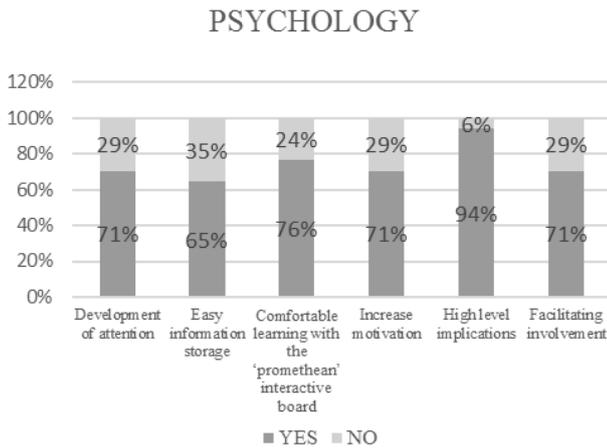
PSYCHOLOGY

Fig. 2. Component of psychology.

Generally, from the aspect of psychology, the opinion in the use of promethean during the learning process is quite interesting accounting student. Psychology has 6 poin to describe this question. 5 of 6 poin has percentage in range 71-94%, but there is a 65% in Easy information storage. It can be that, because They argue, an attractive appearance actually makes their attention distracted and difficult to remember well the material presented.

C. Group Interaction
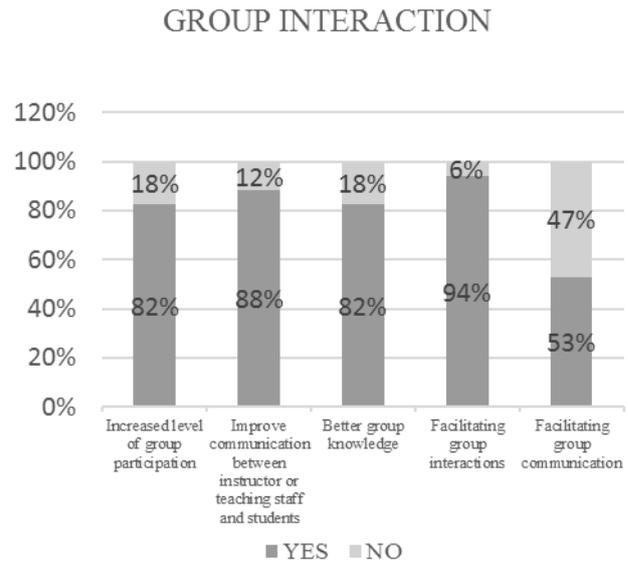
GROUP INTERACTION

Fig. 3. Component of group interaction.

Group interaction has 5 poin to answer this question. Generally, the practice of using promethean is very good and the use of promethean during the learning process is very interesting to learn. There is a low percentage in Facilitating group communication, because the media cannot influence group communication both in enthusiasm and initiative. The description is related to if there is already a presentation file, do students intend to see and study it back at home then discuss it with their group members, all depends on the students.

## D. Avaibility Use Of Promethean.

AVAILABILITY OF USE
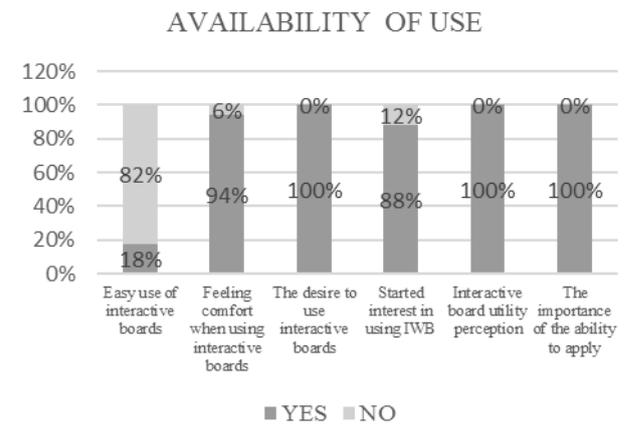
Fig. 4. Component of avaibility use of promethean.

This component has 6 poin. 1 of 6 has a low percentage. This is Easy use of interactive boards, it can be that because an internet connection disruption, an erroneous pen and an unclear display. Other disturbances such as error output cables, sudden death and non-lit computers are also complained. The function of the speaker is not functioning and the role of teaching staff who do not understand the method of promethean work. This can be illustrated when the instructor asks students to do a calibration before promethean

can be used. For example the teaching staff is explaining the cost accounting scheme through video, but the speaker on the device is not functioning and the display is less clear because the cable is less strong and finally sometimes what is desired is not in accordance with the reality that occurs. Generally, from the aspect of Availability of Use. Using practices very good and the use of promethean during the learning process is very interesting learning interest.

V. CONCLUSION

The results of the overall components above, we conclude that the practice of using interactive boards in Batam State Polytechnic is very good, but development is still needed in several sub-components. The sub-component is related to the use of an easy interactive board that is caused by technical errors that still often occur out of control and facilitate group communication related to the personalities of each individual.

Furthermore, in general the use of interactive boards in Batam State Polytechnic has attracted interest in accounting students, and most of the opinions that it is supported by the presence of sophisticated features that facilitate them in learning. In the end, accounting is not a field that is easily disrupted by the times, the ability to adapt and use this technology is very necessary and needs to be fostered as early as possible for prospective accounting technicians. One of them is by applying technology in the learning process so that accounting students are accustomed to interacting with technology and preparing them to compete in the competitive industrial revolution era 4.0.

Future research related to this is expected to be able to expand the range of samples and populations to find out its application in other departments besides Accounting. Furthermore, recommendations for agencies, Batam State Polytechnic should need to carry out maintenance and checking of learning media facilities that are owned whether they are still in normal conditions or not.

REFERENCES

[1] R. J. Sullivan, "England's 'Age of Invention': the Acceleration of Patents and Patentable Invention during the Industrial Revolution," Explorations in Economic History, vol. 26, pp. 424-452, 1989.

[2] H. Kagermann, W. Wahlster, and J. Helbig, Securing the Future of German Manufacturing Industry: Recommendations for Implementing the Strategic Initiative Industrie 4.0, Final Report of the Industrie 4.0 Working Group. Frankfurt: Germany Forschungsunion, 2013.

[3] M. Hermann, T. Pentek, and B. Otto, "Design Principles for Industrie 4.0 Scenarios," Proceedings of 49th Hawaii International Conference on System Sciences HICSS, Koloa, pp. 5-8, 2016.

[4] E. Kilic, C. Guler, H. E. Celik, and C. Tatli, "Learning with interactive whiteboards: determining the factors on promoting interactive whiteboards to students by technology acceptance model," Interactive Technology and Smart Education, vol. 12, no. 4, pp. 285 – 297, 2015.

[5] E. Hillier, G. Beauchamp, and S. Whyte, "A study of self-efficacy in the use of interactive whiteboards across educational settings: a European perspective from the iTILT project," Educational Futures, vol. 5, no. 2, 2013.

[6] K. Wall, S. Higgins, amd H. Smith, "The Visual helps me understand the complicated things: pupil view of teaching and learning with interactive whiteboards," British Journal of Educational Technology, pp. 851-867, 2005.

[7] P. Warwick, and R. Kershner, Primary teachers' understanding of the interactive whiteboard as a tool for children's collaborative learning and knowledge building, Learning, Media and Technology, 2008, pp. 269-287.

[8] C. Redman, and J. Vincent, "Shared cognition facilitated by teacher use of interactive whiteboard technologies," Interactive Technology and Smart Education, pp. 74-89, 2015.

[9] L. Mata, G. Lazar, and L. Lazar, "Effects of study levels on students' attitudes towards interactive whiteboards in higher education," Computers in Human Behavior, pp. 278-289, 2016.

[10] K. Wall, S. Higgins, and H. Smith, "The visual helps me understand the complicated things: pupil view of teaching and learning with interactive whiteboards," British Journal of Educational Technology, pp. 851-867, 2005.

[11] I. Ajzen, "The theory of planned behavior is alive and well and no ready to retire: A commentary on Sniehotta, Presseau, and Araujo-Soares," Health Psychology, vol. 9, no. 2, pp. 131-137, 2015.

[12] I. Ajzen, "The theory of planned behavior," Organizational Behavior and Human Decision Process, vol. 50, no. 2, pp. 179-211, 1991.

[13] F. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," MIS Quarterly, pp. 319-340, 1989.

[14] A. Bandura, Social Foundations of Thought and Action, A Social Cognitive Theory. New Jersey: Prentice Hall, 1986.

[15] K. Wall, S. Higgins, and H. Smith, "The Visual helps me understand the complicated things: pupil view of teaching and learning with interactive whiteboards," British Journal of Educational Technology, pp. 851-867, 2005.

[16] P. Warwick, and R. Kershner, Primary Teachers' Understanding of The Interactive Whiteboard as A Tool for Children's Collaborative Learning and Knowledge Building, Learning, Media and Technology, 2008, pp. 269-287.

[17] C. Redman and J. Vincent, Shared Cognition Facilitated by Teacher Use of Interactive Whiteboard Technologies, Interactive Technology and Smart Education, pp. 74-89, 2015.

[18] L. Mata, G. Lazar, and L. Lazar, "Effects of study levels on students' attitudes towards interactive whiteboards in higher education," Computers in Human Behavior, pp. 278-289, 2016.

[19] R. K. Yin, Case Study Research Design and Methods. Thousand Oaks, CA: Sage, 2014.

[20] L. Gay, and P. Diehl, Research Methods for Business and Management, New York: Mc. Millan Publishing Company, 1992.

[21] M. B. Miles, and A. M. Huberman, Analisis Data Kualitatif Buku Sumber Tentang Metode-Metode Baru, Jakarta: UI Press, 2009.

[22] D. J. Champion, Basic Statistic for social Research, New York: Macmillan Publisher. Co. Inc, 1981.