

Persuasiveness of Web 2.0 Technologies in an Educational Context

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Abstract—The use of the application of web 2.0 technologies such as social media, blogs, youtube, and line in everyday communication is commonplace. The use of these technologies in communication can bring persuasiveness aspect for users. Therefore, feasibility and suitability of the web 2.0 technologies as persuasive technologies need to be prepared and analyzed. This study focuses on aspects of the web 2.0 technology acceptance as persuasive on students in an education system. Higher education students were selected as the participants of this study. A PLS-SEM analysis was conducted to measure the potential effect of the web 2.0 technologies as persuasive technology using TAM, UTAUT and Persuasive Potential Questionnaire. This study found that the dimensions of Perceived Persuasive Individual Potential and Intention to Use the System affects the user's intention leading to changes in students' behavior.

Index Terms—Higher Education; Persuasive System; Persuasiveness; Technology Web 2.0.

I. INTRODUCTION

Changes in human behavior can be influenced by many things. Human behavior is shaped and changed by the influence of the environment and the things that are used in the human life. It also includes the use of information technology as a tool for work and communication. One application of the Web 2.0 technology that offers a lot of interesting facilities and popular is Google [1]. Information technology does not only serves as a tool in work, but it can also act as a social actor [2]. The use of the information technology as means to influence or change behavior and attitudes make it serve as a persuasive technology [3]. Persuasion in a concept can occur when there are connections and communications between two or more people. Communications made between two or more people are not only of information, but they are also values, attitudes, and behaviors. Today technology takes part in the communications made by human to human.

The Web 2.0 technology is the second generation of web technologies that is more active and participative [4]. It can be construed as a technology that allows users to communicate, create content and share information with one another through communities, social networks and virtual worlds in a way that is easier than ever. The developments of Web 2.0 applications in a variety of forms also bring some impacts on the environment use. Information technology evolving the Web 2.0 has opened up a new way to make a persuasive. The Web 2.0 users can easy to use and can be combined with the method of personal communication and social communication in general.

In general persuasive systems related to information technology can be a combination of computer-human persuasion and persuasion of computer-mediated [2][5]. The big idea of behavior change support system (BCSS) defines that information technology brings persuasive. The BCSS has the ability to form, change or alter, amplify or reinforce attitudes, behaviors, and measures to comply with the objective (act to complying), but it does not use deception, coercion, or inducements to achieve these objectives.

The use of the Web 2.0 technology in a specific environment requires a compliance analysis to achieve the desired target behavior. The Web 2.0 technologies to be used, are analyzed their levels of persuasiveness to maximize their use in persuasion. Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) which have been expanded in the development of Persuasive Potential Questionnaire (PPQ) were used as tools for the analyses.

This paper is ordered as follows Section 1 presents Introduction, Section 2 presents Literature Review in Technology Persuasive, Section 3 presents Research Design and Methodology, Section 4 presents Result, and finally, Section 5 presents Conclusions..

II. PERSUASIVE CONCEPTS

This section explains the underlying concepts of persuasive technology weapons, what the Web 2.0 is about and the Web 2.0 features that can support the process of persuasion describing the construct used in the present study.

A. Technology Persuasive

Persuasive technology refers to technology that is intentionally designed to change attitudes, or behaviors [6] Persuasion is human communication designed to influence the vote and other actions autonomously. Persuasion is a human communication designed to influence independent judgments and actions of others [3]. The Web, the Internet, mobile application and other medium technologies generate opportunities for persuasive interaction because users can be reached easily and the technologies can combine the positive attributes of interpersonal and mass communications. Persuasive technology is all about computerization, software systems or information designed to strengthen, change or shape attitudes or behaviors or both without the use of coercion or fraud.

B. Technology Web 2.0

Increased competitiveness of the organization guide, the team, continues to make improvements. Leaders of

organization need to encourage and emphasize the organization's objectives and targets for the organization to realize the networked enterprise. It also occurs in the learning process. Teachers and students are expected to use information technology to achieve the goal of the learning process or to improve behavior in the context of persons and groups. The integration of the use of the Web 2.0 in the daily activities of students, continues to stimulate the adoption and use of this technology. The use of the Web 2.0 also describes the challenges that arise in organizational change [7]. The Web 2.0 technologies can be utilized in work together with the conventional means of communication such as telephone and fax. The Internet can bridge existing stakeholder and also reach out to new stakeholders who previously have not seen and yet accessible [8].

The Web 2.0 technologies are introduced in the workgroup, requiring a review of the social and cultural factors of the workgroup. Involvements in a top down or bottom up approach needs to be evaluated to see an effective rate of adoption of the Web 2.0 technologies in the working group [9]. Adoption of the Web 2.0 technologies can make the member of the group more efficient due to the increase in the process of collaboration, knowledge sharing, and foster innovation.

The process of adoption of the Web 2.0 technology members to be critical in the implementation of the web 2.0 application. Implementation of the Web 2.0 application is a technology-based social system or social community. The Web 2.0 technology is not just a system of informatics, but also a social technology, which is still being debated the factors that can influence [10].

According to [11], the Web 2.0 technology is a social software platform that can drive the group in achieving its goals. The use of the Web 2.0 is influenced by internal groups such as infrastructure and organization culture. In general, there are three aspects of corporate strategies that affect the introduction and use of the Web 2.0 on members that form groups, technical and social. Elements of the group can be shown to the mission and vision of the organization, or the team that is different. This different is also supported by the fact that the group or organization is a unique shape, both regarding size, type of industry or group, and organizational or group culture [9].

The role of the Web 2.0 in some literature, among others, to encourage technology adoption [7], as a communication tool and change the way we communicate [8] [12], can have a positive impact on the learning of individuals, groups, and organizations [13-16]. The Web 2.0 technology also encourages the emergence of the idea of innovation [17], increases the ability to communicate, collaborate and share [18].

Several factors influence the use of the Web 2.0 technologies. A social and cultural factor working environment become one of the influences that need to be considered [19]. The process of adoption and user acceptance of the technology need to be considered [10]. The factors and the influence of the internal organization which uses mainly related to the cultural infrastructure of the organization itself [11]. Internal factors of the organization that can affect the adoption and acceptance process are the uniqueness, size, and type of organization [9, 20].

Some models and frameworks to explain those cultural elements, technical and organization required by management in applying the Web 2.0 technologies. The Web

2.0 allows to bamboozle users to contribute content and collaborate with other users of the Web 2.0 technologies which differ from traditional techniques that organization. The Web 2.0 technology is a technology that is social, uses the concept of interactive, dynamic and has a structure which is irregular regarding content as well as provides full control to the user [20]. There are opportunities to further explore this phenomenon, including sustainability and issues of critical mass, start networking and effective methods of early intervention, and evaluation and assessment of the Web 2.0 initiatives.

Some researchers explain that the Web 2.0 technologies have a positive effect on some aspects of individual, group and organizational learning (organizational learning), and build knowledge that is accessible and always available for the organization [13-16]. The Web 2.0 technologies to support collaboration, communication, and participation. Groups affect innovation made by its members by helping individuals within the group to share ideas through the web 2.0 technologies, to build their knowledge database or structure in the repository [17].

Social networking can bring value to the organization in various ways. Social networking can improve the ability to communicate, collaborate and share information without being limited by time, space and distance [18]. For an organization, building and defining the strategy of the Web 2.0 applications more than just adopting new technology applications. This strategy is needed because the many changes in communication at the level of the organization include the process of building a relationship with the customer if necessary in examples [12].

Some models of the Web 2.0 technologies including social software can build relationships and cause persuasive among its members. Persuasive aspects that always arise include affiliation, access (social comparison, social learning, and normative influence) [21]. The Web 2.0 is the second form of the resolution of web type that allows users to build and publish content as well as do the collective intelligence of users. The Web 2.0 leadings to the generation of the web is the social website [22]. Aspects of communication, collaboration, participation, and the connection are the characteristics of the Web 2.0 that will be used to influence in the workings of the organization.

C. Technology Web 2.0 as Persuasive Technology

Some models of the Web 2.0 technology is social software that has the ability to build relationships and cause persuasive among users. The persuasive aspects that may arise in this relationship are affiliation and access (social comparison, social learning, and normative influence) [21]. The web 2.0 technology that is used as a persuasive software is focusing on the construct of social influence behavior change. Alignment of the Web 2.0 technologies as a social influence on persuasive software is described by connecting the characteristics of the type the Web 2.0 with the kind of social influence.

The Web 2.0 technology has several features, among others, using the web as a platform. These characteristics enable the services or applications can be run anywhere and anytime without having to do the installation. Applications and services built on the Web 2.0 platform will make the application or services operate on different operating systems. This condition also does not require particular

hardware specifications. This capability can help to facilitate users in making social learning.

The second or subsequent characteristic of the Web 2.0 technology is its ability to collect and harness the collective intelligence. This capability allows users to perform social learning, social comparison, normative influences, social facilitation, and cooperation. The concept of hyperlinking as a basis for gathering knowledge. The Web 2.0 characteristics that focus on data as the central controller also help social learning as much data and information used.

Another hallmark of the Web 2.0 applications is not released periodically, but it is always improved continuously because it is no longer a physical product, but it has a service or service. Services that combine services from other applications, known as mashups. Web 2.0 applications can be run in an integrated manner through various forms of technology or device. The Web 2.0 is a rich user experience.

III. HYPOTHESIS AND METHODOLOGY

This section describes the proposed premise and the methodology used in the study.

A. Hypothesis

This study deploys the Technology Acceptance Model (TAM) for the acceptance, and the use of technology that identifies specific recognition [23, 24]. The model explains that the perceived useful and ease of use of technology would affect user attitudes toward technology and then could generate a user wishes to use the technology. The Use of Unified Theory of Acceptance and Use of Technology (UTAUT) on the use of which has a difference in user experience and volunteerism in its use. Potential Persuasive concept Questionnaire (PPQ) is used to simplify the actual dimension.

At PPQ there are 5-dimensional measurements [25]. Dimensions Persuasive Attitude (PA) is an independent variable used to measure the level of a person's susceptibility, his/her attitude on something or person attitude of the persuasive efforts in general. This assumption is taken by noting that the degree of a person to be affected will vary.

Perceived Persuasive Dimensions System Potential (PPSP) is based on the assumption that users of the system persuasive experienced and familiarity with the use of persuasive strategies. The level of user habits in the form of persuasive system that user build through technology to be used. Therefore the persuasive potential of the system in a user's perspective needs to be analyzed. Users will be involved to have potential as a persuasive if the system does not fit or does not meet their needs.

The dimension of Perceived Persuasive Individual Potential (PPIP) was used to measure the level of user participation in personal access to technology or assess the participation of the users' subjective standpoint. The analysis through indicators focuses on changing user behavior due to the use of the Web 2.0 technology [26]. The dimension of Intention to Use the System (IUS) is defined to measure the willingness and motivation of the user to continue to use persuasive technology, right fatherly in the short term or long term. This aspect is also a factor of many models of acceptance. The final dimensions Intention to Change Behavior (ICB) aims to get an idea of the effectiveness of the use of persuasive technology based on the desire of users to change their behavior as the effects of the use of persuasive

technology.

Based on the theory of Azjen about the theory of planned behavior, the researchers propose several hypotheses.

H1: Persuasion attitude on the web 2.0 technologies has a positive effect on Perceived Persuasive System Potential.

H2: Perceived Persuasive Individual Potential in the use of the Web technology has a positive effect on Perceived Persuasive System Potential.

H3: Perceived Persuasive System Potential in the use of web 2.0 technologies will have a positive effect on Intention to Use the System of users

H4: Perceived Persuasive Individual Potential user on the Web 2.0 technologies will have a positive effect on Intention to Use the System user itself.

H5: Perceived Persuasive Individual Potential user on the Web 2.0 technologies has a positive effect on the Intention to Change Behavior user.

H6: Intention to Use the System of the Web 2.0 technologies will have a positive effect on the Intention to Change Behavior.

The research model for this study is proposed in Figure 1.

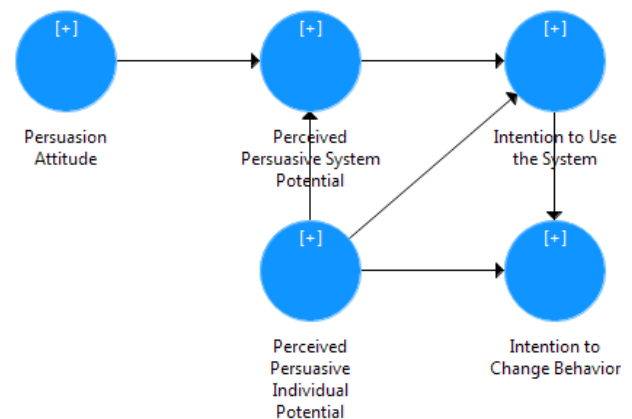


Figure 1: Model Hypothesis

B. Methodology

This research was conducted by taking data on higher education students that are minimally at different levels at the level of undergraduate education. The survey was conducted online and offline to speed up the amount of data obtained. An online survey of 100 students and 50 students of offline. The data that were returned in this study is a total of 112 data. However, only 99 data were valid that could be used. The data were processed using PLS-SEM. Each dimension or construct used consists of ten indicators. Indicators considered valid if it meets at least 0.7 [27]. Hypothesis testing is done using bootstrapping technique so that the hypothesis will significant or accepted if the path coefficient value above 1.96 with an error rate of 0:05 [27].

Each construct dimension uses ten indicators based on the persuasive potential questionnaire [21]. Distribution data analyzed were 99 participants consisting of those who filled out the questionnaire completely of 61 men and 38 women. Differences in gender and personal relationships in communications can increase or reduce the effectiveness of the process of persuasion [28]. The distribution of students in higher education based on their levels of education is described in Figure 2.

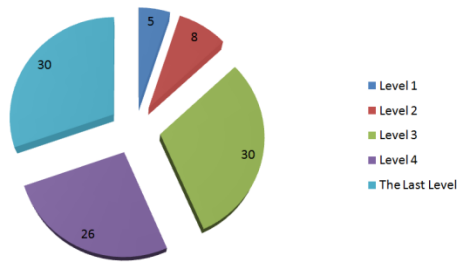


Figure 2: Data distribution of level education

IV. RESULT

Data processing was performed by first checking again whether the data contained a missing value. Data processing using SEM-PLS (Partial Least Squares Algorithm) produces a factor loading value of each contract. Loading factor would be invalid if a value above 0.7. Based on these criteria, in PA construct are only two indicators that can be used, meanwhile in the PPIP construct, there are three indicators. The indicator details for each construct used are illustrated in Figure 3: Partial Least Squares Algorithm. Reliability conditions using Cronbach's Alpha showed the reliability value of each construct, as shown in Table 1. Persuasion Attitude (PA) has the lowest value yet still reliable.

Table 1
Cronbach's Alfa

Constructs	Cronbach's Alpha
Persuasion Attitude	0.602
Perceived Persuasive System Potential	0.804
Perceived Persuasive Individual Potential	0.868
Intention to Use the System	0.880
Intention to Change Behavior	0.873

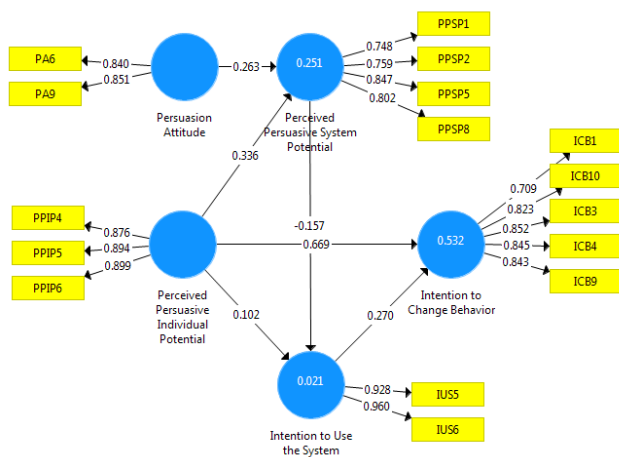


Figure 3: Partial Least Squares Algorithm

The nonparametric bootstrapping analysis is used to perform procedures to test the statistical significance of the results of PLS-SEM including the path coefficients, Cronbach's alpha, and R² values.

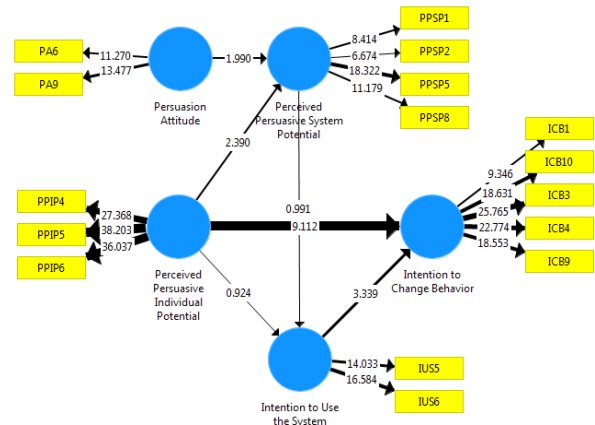


Figure 4: Bootstrapping Analysis

In bootstrapping analysis as shown in Figure 4: Bootstrapping Analysis, it is obtained acceptance rate hypothesis based on the value generated the coefficient path. The premise that can be accepted if a relationship has a T-Statistic value greater than 1.96 for the level of error 0.05. Results t-statistical data show the results in the following Table 2 T-Statistic Path Coefficient.

Based on the results of t-statistics in Table 2 can be obtained that:

H1: Persuasion attitude on web 2.0 technologies have a significant effect on Perceived Persuasive System Potential.

H2: Perceived Persuasive Individual Potential in the use of the Web technology has a significant effect on Perceived Persuasive System Potential.

H3: Perceived Persuasive System Potential in the use of web 2.0 technology has no significant effect on Intention to Use the System of users

H4: Perceived Persuasive Individual Potential user on web 2.0 technology has no significant effect on Intention to Use the System user itself.

H5: Perceived Persuasive Individual Potential user on web 2.0 technologies have a significant effect on the Intention to Change Behavior user.

H6: Intention to Use the System of web 2.0 technologies will have a significant effect on the Intention to Change Behavior

Table 2
T-Statistic Path Koefisien

Hypothesis	T-Statistic	P-Value	Result
Persuasion Attitude → Perceived Persuasive System Potential	1.990	0.047	Significant
Perceived Persuasive System Potential → Intention to Use the System	0.991	0.322	Not Significant
Perceived Persuasive Individual Potential → Perceived Persuasive System Potential	2.390	0.017	Significant
Perceived Persuasive Individual Potential → Intention to Use the System	0.924	0.356	Not Significant
Perceived Persuasive Individual Potential → Intention to Change Behavior	9.112	0.000	Significant
Intention to Use the System → Intention to Change Behavior	3.339	0.001	Significant

V. CONCLUSION

The persuasiveness of the Web 2.0 technology in this study is specifically related to the educational contexts, but it still focused on individual student subjectivity. This study shows that the potential of the individual persuasive influence on a person's intention to change. The individual aspect plays an important role because the collected data were done on students whose ages range from young to adulthood categories and at their levels of education.

The use of the web 2.0 technology in this analysis is voluntary, and the respondents were directed to focus on changing the way of learning independently. A larger scale and range of users can give more comprehensive picture needs to be explored further.

This study has not included different gender elements and personal relationships in communication. The process of persuasion is possible to give different results because it is caused by this element. Another limitation of this presents study is the only use social media, blogs, and youtube as persuasive tools. Further research development can be done using another web 2.0 technologies.

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