

Exploring the Influence of Big Five Personality Traits towards Computer Based Learning (CBL) Adoption

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Abstract— It is widely accepted that the integration of modern Information and Communication Technologies (ICT) into the teaching-learning-process has enormous potentials especially after 4G technologies. Computer based learning (CBL) currently commonly used platforms to teach students not only in universities but also in the schools especially in developed countries. Underdeveloped countries are also trying to adopt CBL in their education system. Over the last decade most schools in developed countries around the world, ranging from pre to secondary schools have adopted the Computer Based Education systems (CBL) for their students. The purpose of this study is to develop a model based on previous studies done by other researchers, to find out the significant influence of personality over Technology Acceptance Model (TAM) in the area of technology adoption. This comprehensive study reviews previous research based on two basic categories technology adoption by teachers and students and personality in terms of technology adoption. Based on past studies a hypothesis has been developed to determine the influences between them. Perceived usefulness, perceived ease of use, attitude towards using and behavioral intention shows their influences over technology adoption. In addition, three personality items including openness, consciousness, and extraversion show strong influences over technology acceptance model.

Keywords – *Computer Based Learning (CBL); TAM; BIG 5 Theory; Personality Traits; Technology Adoptions.*

1. INTRODUCTION

Computer Based Learning covers all forms of electronically supported learning and teaching. The term e-learning is also used fairly often with technology-based Learning. It is also worth noting that Urdan and Weggen acknowledged e-learning as a subset of distance learning, online learning a subset of e-learning and computer-based learning as a subset of online learning [1]. It is widely accepted that the integration of modern Information and Communication Technologies into the teaching-learning-process has enormous potential.

Currently Computer Based Learning is used by almost every teacher in developed countries as a teaching tool. In underdeveloped countries, not all the teachers use Computer Based Learning as a teaching tool as it is still a new tool to them. Acceptance of new technology depends on an individual's attitude and, their personality which; plays a vital role in new adoptions especially technology adoption. Numerous studies have provided substantial evidence for the role of personality traits as predictors of beliefs and behavior, across a variety of contexts [2]. More recently, there has been a growing interest in personality as an explanatory tool in the IS literature [2]; [3]; [4]. The Big Five personality traits are the five broad domains of dimensions of human personality. The theory based on the Big Five factors is called the five-factor-model (FFM) [5].

As mentioned earlier recently, many studies have been made in the Information System field on personality for technology adoptions but not particularly in the context of Computer Based Learning adoption for teachers in underdeveloped countries. Due to the growing interests in underdeveloped countries for Computer Based Learning adoption, this study can be considered as a starter for teachers especially school teachers in the use of this tool. This paper is a comprehensive review of different factors of Technology Acceptance Model and Big Five personality traits which also illustrate how these factors influence the adoption of Computer Based Learning. This research has two big contributions. First, it will examine the impact of the Big Five personality traits on Computer Based Learning adoptions and second, a model will be developed based on previous research to examine the future of Computer Based Learning adoption especially for teachers.

2. LITERATURE REVIEW

Many factors influence the adoption of new technologies. These factors vary from a spotlight on technology itself to the attitude and characteristics of users [6]. Due to the importance and complexity of why a user adopts or rejects a new technology, several models and theories have been used for a better understanding of user adoption, especially in the

educational environment [7]. Technology Acceptance Model is one of the finest and most familiar adoption models which can be used to interpret the adoption of new technologies [6].

The big five personality factor model was designed by Goldberg in 1982 who later confirmed the model in 1990. The theory, which became the basis of the big five factor, proposes that individual characteristics, patterns of thinking, feelings, behavior, and response to environmental demands can be described in terms of their scores on five personality domains which are extraversion, neuroticism, agreeableness, conscientiousness, and openness [8].

The current study is extended by examine the relation of personality traits and Technology Acceptance Model. The main aim of the study is to find out the significant presence of personality factors over Technology Acceptance Model for Computer Based Learning adoption in the context of school teachers especially in underdeveloped countries. The literature can be separated into two divisions one is technology adoption (TAM) model for teachers and students and the other for Personality over Technology Acceptance Model. Some attempts already have been made to investigate how personality could influence adoption of new technologies and innovations [9].

3. RESEARCH METHODOLOGY

The research reviewed more than thirty papers based on technology adoption in the range of teachers, students and users of technologies to identify the factors of Technology Acceptance Model and Big Five variables for the proposed model. First the research reviewed papers in two different areas: Technology Acceptance Model and Big Five personality traits integrated with Technology Acceptance Model. Technology Acceptance Model based papers were reviewed to select the most used Technology Acceptance Model factors for technology adoption. Technology Acceptance Model with Big Five papers were reviewed to find out the personality factors which exert their presence over Technology Acceptance Model for technology adoptions. Technology Acceptance Model papers are then sub categorized based on participants. According to the review shown in TABLE 1, TABLE 2 and TABLE 3, there are four moderating factors of Technology Acceptance Model and five factors of Big Five which are important for this research. Moderating factors include, Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Attitude towards Use (ATU), Behavioral Intention (BI), and Big Five factors include Agreeableness, Openness, Conscientiousness, Neuroticism and Extraversion.

4. USES OF TECHNOLOGY ACCEPTANCE MODEL AMONG TEACHERS AND STUDENTS

Teaching and learning using technology for both teacher and student provides more flexibility and efficiency. FIGURE 1 shows the basic Technology Acceptance Model by Davis in 1989 [10]. TAM has been widely used to expect the acceptance of a new technology. A research model has been based on TAM to study the adoption of WebCT for higher education and the component of ‘technical support’ has been incorporated in the TAM model, and serves as an extension to TAM for measuring the acceptance of Web-based learning systems [11]. According to Luan, W.S. and T. Teo [12] TAM is a model to predict student teachers’ technology acceptance and also was found to be a suitable model in predicting student teachers’ intentions to use computers. TAM is a very functional model to help the researcher to understand the attitude of the teachers to use technology in the field of teaching [13]. TAM has been used by the researchers as it is the most commonly researched theoretical model used to describe the adoption of new systems and other information technologies [13].

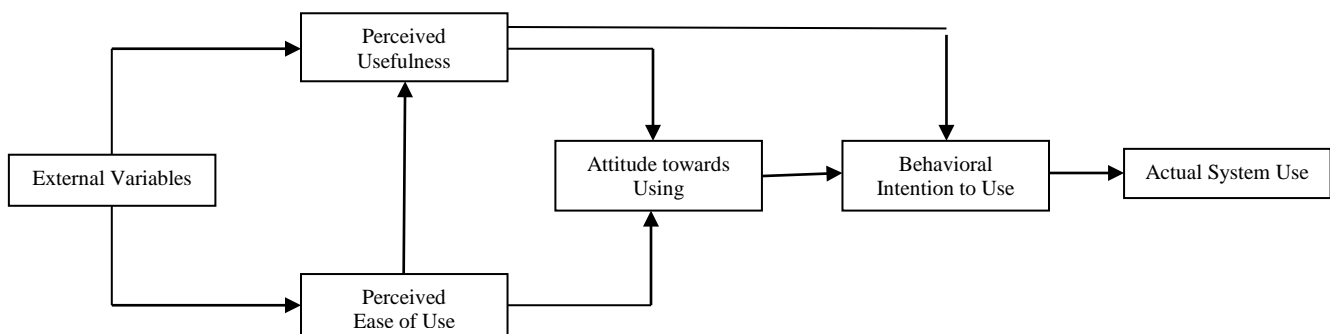


FIGURE 1: Common Factors of Technology Acceptance Model (TAM); Adapted from Davis [10]

A. Perceived Usefulness (PU)

Perceived usefulness is described here as "the scale to which a person believes that using a particular system would enhance his or her job performance and Perceived Usefulness was more important in Western cultures [10].

B. Perceived Ease of Use (PEoU)

Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort" [10].

C. Attitude towards Using (ATU)

Attitude towards using IT is generated by the individual's salient beliefs about the consequences of using IT (behavioral beliefs) and evaluation of these consequences [14] as well as the extent to which a teacher possesses positive feelings about using technology [15].

D. Behavioral Intention to Use (BI)

The behavioral intention can be defined as the likelihood an individual intends to use Computer Based Learning and the degree of a teacher's willingness to use technology [10]. Intention is an indicator used to capture the factors that influence a desired behavior [15].

The relationship between attitude and behavioral intention will be stronger for users than for potential adopters of an IT, and there will be more behavioral beliefs underlying attitude for users than for potential adopters of an IT [14].

For the purpose of reviewing all related papers, we categorized Technology Acceptance Model into two categories: 1) Technology Acceptance Model used for students and 2) for teachers. TABLE 1 represents the significant factors among students and TABLE 2 shows the significant factors for teachers. Both categories are related with technology adoptions.

TABLE 1: Factors of TAM for Students

| SI | Previous Studies | Area | Participants | Factors |
|----|--------------------------------|------------|--------------|-------------------|
| 1 | Masrom [16] | E-Learning | Students | PEoU, PU, ATU |
| 2 | Tobing, Hamzah et al. [17] | E-Learning | Students | PU, PEoU, BI |
| 3 | Zhang, Zhao et al. [18] | E-Learning | Students | PU, PEoU, BI |
| 4 | Abbad [19] | E-Learning | Students | PEoU, PU |
| 5 | Yadegaridehkordi and Iahad [6] | M-Learning | Students | PU, PEoU, ATU, BI |

TABLE 2: Factors of TAM for Teachers

| SI | Previous Studies | Area | Participants | Factors |
|----|-----------------------|------------------------|--------------|-------------------|
| 1 | Ataran and Nami [20] | Technology in Teaching | Teachers | PEoU, PU, BI |
| 2 | Hu, Clark et al. [21] | Technology Adoption | Teachers | PEoU, PU |
| 3 | Park, Lee et al. [22] | Electronic Courseware | Tutor | PEoU, PU, BI |
| 4 | Yuen and Ma [23] | E-Learning | Teachers | PEoU, PU, BI |
| 5 | Teo, Wong et al. [24] | Using Technology | Teachers | PE, PEoU, ATU, BI |
| 6 | Teo [25] | Using Technology | Teachers | PU, PEoU, ATU, BI |
| 7 | Teo, Lee et al. [26] | Using Technology | Teachers | PE, PEoU, ATU, BI |
| 8 | Teo [27] | Technology | Teachers | PU, PEoU, ATU |
| 9 | Teo [28] | Technology Adoption | Teachers | PU, PEoU, ATU, BI |
| 10 | Nair and Das [13] | Technology Adoption | Teachers | PU, PEoU, ATU |

From the above tables, Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Attitude towards Using (ATU) and Behavioral Intention to Use (BI) are commonly found factors for the study.

5. INTREGRATION OF PERSONALITY TRAITS AND TECHNOLOGY ADOPTION MODEL

The five-factor model of personality is a hierarchical organization of personality traits in terms of five basic dimensions: extraversion, agreeableness, conscientiousness, neuroticism and openness to experience [29]. The first trait, extraversion, reflects a person's tendency to exhibit social behavior and to experience positive emotions [30]. Second,

agreeableness reflects the tendency of a person to be trustworthy, compliant, sympathetic and cooperative [30]. The third dimension, conscientiousness, reflects the extent to which a person is organized, dedicated and conscientious [30]. Trait four, neuroticism, reflects the tendency of a person to experience psychological distress and to be extremely sensitive to threats [30]. Last, openness to experience, represents a person's willingness to consider alternatives, be curious and to enjoy artistic activities [30].

A. Openness

Open individuals are intellectually curious, imaginative, willing to entertain new ideas, and open minded [31]. In another study the author says that openness to experience is an obvious candidate as this personality trait is characterized by an individual's approach to new situations [9].

B. Conscientiousness

The conscientious individual finds it more difficult to trust in others in a team environment for fear of other people's unreliable behavior reflecting on him/her. The conscientious individual prefers to work alone when he/she knows that his/her outcomes will be evaluated by others [32].

C. Agreeableness

People with high levels of agreeableness are a good team player in team-based work performance settings and individuals with high agreeableness are friendly, emphatic, cooperative, trusting, warm, and considerate [31]. Agreeableness is the degree to which an individual is helpful and unselfish with others, has a for-giving nature, and is generally trusting. Agreeable individuals tend to get along well with a variety of others and tend to trust others more quickly [32]. Agreeableness represents an individual's propensity to strive for harmony and low levels of conflict in interpersonal relationships. Highly agreeable individuals have been found to trust others and to avoid conflict by accepting requirements of their environment [33].

D. Extraversion

Extraversion is the degree to which an individual is talkative, full of energy, and emotionally expressive. Extraverts tend to have many friends and enter into relationships freely [32]. According to [34] it is the degree to which an individual is talkative, full of energy, and emotionally expressive.

E. Neuroticism

Neuroticism is the degree to which an individual is tense, worries more than others, and is a moody, neurotic individual who is concerned about the details of work and often gets bogged down by them [32].

TABLE 3 shows the previous studies which have integrated Big Five theory with Technology Acceptance Model. Three previous papers which are related to personality and Technology Acceptance Model are reviewed to discover the common factors used for technology adoption. Though these papers are based on students and technology users, they are taken into account for this study due to lack of studies done based on teachers.

TABLE 3: Factors of TAM and Big Five

| SI | Previous Studies | Area | Participants | Factors |
|----|------------------------------|------------------------|----------------------|---|
| 1 | Punnoose [35] | E-Learning | Students | PU, PEoU, BI, Openness, Agreeableness, Conscientiousness, Neuroticism |
| 2 | Svensden, Johnsen et al. [9] | Using Technology | Users | PU, PEoU, BI, Openness, Conscientiousness, Extroversion |
| 3 | Rosen and Klumper [36] | Social Networking (SN) | Social Network Users | PU, PEoU, BI, Openness, Conscientiousness, Neuroticism, Extroversion |

6. HYPOTHESIS DEVELOPMENT

Hypothesis is an idea or theory that is temporally accepted in order to interpret certain events or phenomena, and to provide guidance for further investigation. A hypothesis may be proven correct or incorrect, and must be capable of denial. If it remains un-deniable by facts, it is said to be verified or corroborated. The current study attempts to examine the impact of big five personality variables over Technology Acceptance Model using a suitable model to explain the Computer Based Learning adoptions.

TABLE 4 shows the summary of hypotheses tested before in previous studies by different researchers. The table indicates the source from where the hypotheses are derived. According to the following table 15 hypotheses are developed and from these hypotheses a model has been developed as shown in FIGURE 2. About 19 previously tested models have been reviewed; these models are developed and tested by each individual for their research goal. From these previous models hypotheses are developed according to their influence over personality and Technology Acceptance Model variables.

TABLE 4: Hypothesis Development with Source

| | | |
|-----|--|---|
| H1 | Perceived Usefulness has strong influence on Attitude towards Using | [16], [27], [24], [26], [28], [25] |
| H2 | Perceived Usefulness has strong influence on Behavioral Intention | [16], [17], [20], [18], [24], [28], [25], [19], [21], [22], [35], [9], [36] |
| H3 | Perceived Ease of Use has strong influence on Perceived Usefulness | [16], [13], [27], [17], [20], [23], [18], [24], [26], [19], [21], [22], [28], [25], [35], [9], [36] |
| H4 | Perceived Ease of Use has strong influence on Attitude towards Using | [16], [13], [27], [24], [26], [28], [25] |
| H5 | Perceived Ease of Use has strong influence on Behavioral Intention | [17], [23], [18], [19], [22], [9], [36] |
| H6 | Attitude towards Using has strong influence on Behavioral Intention | [24], [26], [28], [25] |
| H7 | Openness has strong influence on Perceived Ease of Use | [9] |
| H8 | Consciousness has strong influence on Perceived Usefulness | [35] |
| H9 | Consciousness has strong influence on Perceived Ease of Use | [9], [36] |
| H10 | Extroversion has strong influence on Perceived Usefulness | [9], [36] |
| H11 | Extroversion has strong influence on Perceived Ease of Use | [9], [36] |
| H12 | Neuroticism has influence on Perceived Ease of Use | [36] |
| H13 | Openness has partial influence on Perceived Usefulness | [35] |
| H14 | Neuroticism has partial influence on Perceived Usefulness | [35] |
| H15 | Agreeableness has partial influence on Perceived Usefulness | [35] |

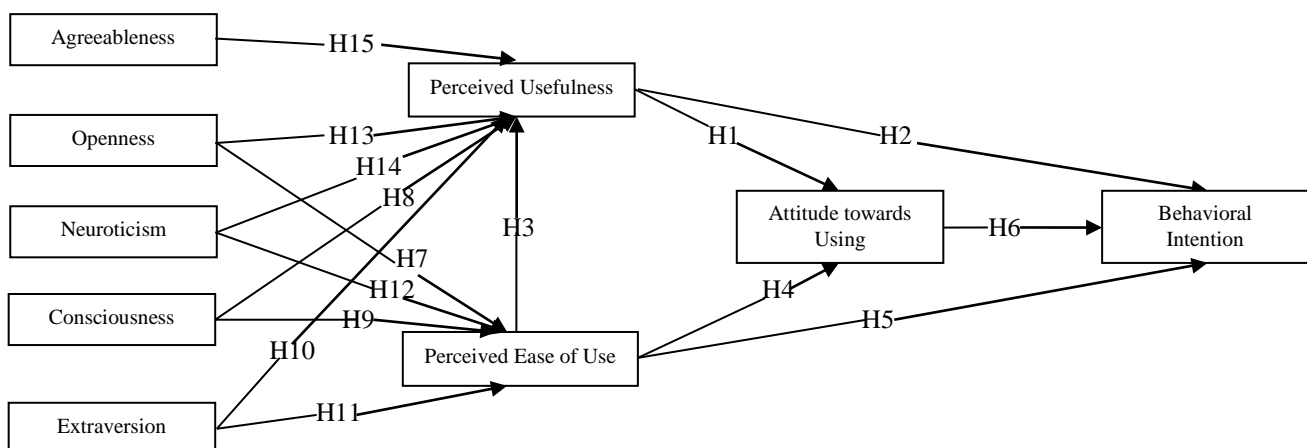


FIGURE 2: Model based on Hypothesis from TABLE 4

7. DISCUSSION

All the hypotheses (H1, H2, H3, H4, H5 & H6) based on Technology Acceptance Model (TAM) display a strong and significant presences indicating that they are quite acceptable for the research. Hypothesis H7, H8, H9, H10 & H11 also show the personality factors which really have strong & very significant presence over Technology Acceptance Model variables. These all are also acceptable for the research. Hypothesis H12 was adopted from [36] where they tested, neuroticism as a negative impact associated with the perceived ease of use and found it was not significant. This shows H12 has a positive impact but it was not clear whether it has a strong influence or not. According to [37] Neuroticism is negatively associated with beliefs about the Perceived Usefulness of technology. It clearly shows H12 is not strongly supported, whereas, H13, H14 & H15 have partial not strong support. Thus the previous studies already rejected Hypotheses H12, H13, H14 and H15. It means in the final model we can consider hypotheses except the rejected Hypotheses H12, H13, H14 and H15. The final model which was derived from Hypotheses H1, H2, H3, H4, H5, H6, H7, H8, H9, H10 and H11 is shown in FIGURE 3.

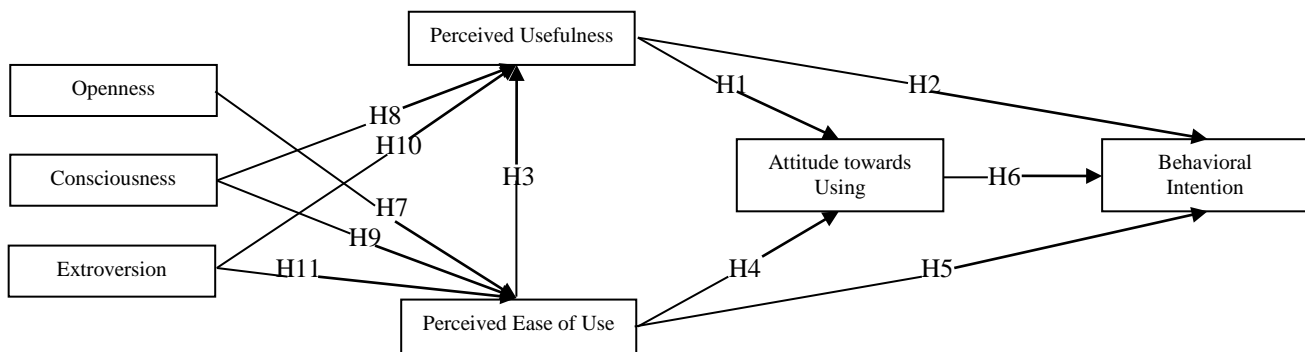


FIGURE 3: Final Model

8. CONCLUSION

This study is a comprehensive review study and the final model is adapted from the previous well known researches. The research's main aim is to examine the personality factors which have a positive strong influence over Technology Acceptance Model in the technology fields. Openness, Consciousness and Extraversion have strong significance over technology adoption models Perceived Usefulness and Perceived Ease of Use. Also Technology Acceptance Model variables like Perceived Usefulness and Perceived Ease of Use have strong significance over Attitude towards Using and Behavioral Intention. Attitude towards Use also show strong presence over Behavioral Intention.

9. FUTURE SCOPE

This study is a review of previous research which was performed by prominent researchers. The final model in FIGURE 3 can be tested among teachers, students or technology users to find out the actual value based on the participants. The model can be changed due to the participant's behavior and also according to their demographic positions.

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