


Article

Using Blended Project-Based Learning for Students' Behavioral Intention to Use and Academic Achievement in Higher Education

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Abstract: This research focused on the potential of project-based learning and blended learning, which offer a distinctive cross-point in regard to building 21st-century skills in the classroom. Specifically, this research hypothesized that using the BPBL approach has an effect on perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention of using BPBL, and students' academic achievement. To achieve the research goal, we employed a questionnaire as the main data collection method and dispensed it to 80 students, all of whom use the BPBL approach. The findings were obtained via a quantitative research method, structural equation modeling (SEM). We found a significant relationship between the BPBL approach and perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention of using BPBL, and students' academic achievement. Therefore, we believe that the BPBL approach enhances students' behavioral intention to use and academic achievement in a blended project-based learning approach and allows sharing knowledge, information, and discussions. Thus, it is recommended that students use the BPBL approach for educational purposes, and they should also be encouraged to do so through their learning at university level.



Citation: Alamri, M.M. Using Blended Project-Based Learning for Students' Behavioral Intention to Use and Academic Achievement in Higher Education. *Educ. Sci.* **2021**, *11*, 207. <https://doi.org/10.3390/educsci11050207>

Academic Editor: Neil Gordon

Received: 1 April 2021
Accepted: 25 April 2021
Published: 28 April 2021

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Keywords: blended learning; project-based learning; academic achievement; structural equation modeling (SEM); education technology; higher education

1. Introduction

Faculties face several challenges such as decreasing student interest and motivation, computerization of the university environment, the need to incorporate teaching through technology in the curriculum, and so forth. Businesses and parents also have increased demands regarding skill-based learning and career-oriented education, with a significant emphasis on praxis rather than classical 'learning-for-the-sake-of-learning' education in which the accent is on memorizing theory, facts, and statistics, with little or no insight into how that knowledge could be implemented in real life. Thus, with the ever-increasing development of the technological and digital industries, the contemporary educator strives to not lag behind the times. This blended learning approach is called flipped classroom. Flipped classroom shifts part of the subject material that is traditionally taught in whole-group instruction (class in the physical classroom) into an individual learning space (created in a virtual classroom). Students in first-semester education courses use blended project-based learning in their learning process (new students). One of the reasons for the need to implement a project-based blended learning model is to address this problem. Through this approach, the teacher has more time for the development of essential skills, critical thinking, and personalized and blended project-based learning while in class with students [1]. Inspired by the ideas of John Dewey for 'learning by doing', Blumenfeld and Krajcik developed four pillars, or key 'learning science ideas' for BPBL: social interactions, cognitive tools, situated learning, and active construction [2]. Blended project-based learning, complemented with blended learning, could be an effective method to achieve better student engagement by transferring the focus on students, thus

creating student-centered lessons, where core 21st-century skills such as critical thinking, communication, collaboration, and creativity are addressed [3]. The use of virtual platforms allows students to strengthen their understanding and practice of digital skills by receiving instructions and communicating through a virtual classroom. The allowance for more initiative among students has led them to shift part of their communication to Facebook, with the teacher creating a group in the social media network to facilitate day-to-day team communication and collaboration in the blended space, while BPBL has been used as a more formal method for communication with the teacher [4–6]. Another important issue to be mentioned is peer feedback received by each team, which teaches students to be more detail-oriented and responsible as well as provides an understanding of the assessment process and of how important it is to meet the expected criteria and follow guidelines in order to achieve learning goals [7,8]. This serves as evidence of how important both project-based and blended learning are in securing “space” for a student-directed, bottom-up approach, where students are more active and engaged. The blended element of blended-project-based learning allows for a constant monitoring of student work and communication, especially when students are online, and thus, bullying and unethical behavior decrease to a minimum. Students can also be introduced to a code of conduct they must follow in order to deal with any issues of verbal aggression, bullying or immoral behavior toward classmates [9,10]. Across these two approaches, there is early evidence that both experienced and novice teachers may exert influence on instructions for newly qualified teachers regarding how to use the BPBL approach in the field [11,12]. The BPBL approach may be suitable for all students; however, it may not be appropriate all of the time as a single instructional practice [13] if our aim is to provide instructions that are unique to the content which is collaboratively negotiated between students and teachers and to the university context in which it is studied. Nonetheless, there have not been many studies on teacher education programs examining the views of participants and learners in BPBL processes, particularly in terms of students’ experience, or their personal insights regarding events, situations, and phenomena [14]. Flipped classroom is one of the most recent e-learning models to reach classrooms all around the world. The pedagogical paradigm aims to reverse the task of teaching by focusing on giving students assignments, which allows them to digest new instructional material outside of the classroom. Teachers can then use their classroom time to encourage students to put what they have learned into practice through a series of realistic assignments. Blended learning, on the other hand, entails learning both online and in a physical venue. To have a more effective learning environment for pupils, mixed learning classrooms use both online and conventional teaching approaches. Online learning elements, such as instructional videos, apps, online learning content, and podcasts, are often used by teachers. Therefore, this research develops a model to enhance students’ behavioral intention to use and academic achievement in a blended-project-based learning approach.

2. Blended-Project-Based Learning (BPBL) Approach

The concept of the BPBL approach refers to involving two or more students at a certain level in the planning, delivery, and collaboration process and/or principally evaluating students [15] through reflective dialogue and the sharing of learning expertise [16]. The BPBL approach has been proven to offer a valuable learning experience to novice students and to provide a diverse range of knowledge and to assist them in their professional and personal growth [17]. Working in a team enables transforming students from “experts” to “expert learners”. Students can also collaborate in the classroom with teachers and share authority and expertise with them on various topics, thus sharing the discovery process [18]. BPBL approach offers students and learners many benefits and making it an overall very rewarding experience [19]. Working in a team allows students to learn through a different pedagogical approach or with a different perspective, and using the BPBL approach offers students and learners professional and emotional support [20] (e.g., pedagogical skills), as well as increased learning and professional and personal development (e.g., gains in

self-confidence) [21]. According to [22], the BPBL approach enables students to critically review their field experiences as they learn to teach through sharing their own experiences. Notwithstanding the potential disadvantages of this learning model, students working in a team achieve more than they would if they were working alone [23]. Students working together can offer support to each other and thus achieve higher levels of performance [24]. The BPBL approach process also affects the role of a mentor, who must provide both individual and group feedback, and it encourages good professional relationships among students [25] as well as offering enough support to them [26]. However, students in this model seek help more frequently from their peers [27] than they do from their mentor, who plays a less directive role in the BPBL approach [28].

3. Theoretical Model and Hypotheses

Five major dimensions of the BPBL approach have been identified in this research, which are “perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention of using BPBL, and students’ academic achievement”. See Figure 1.

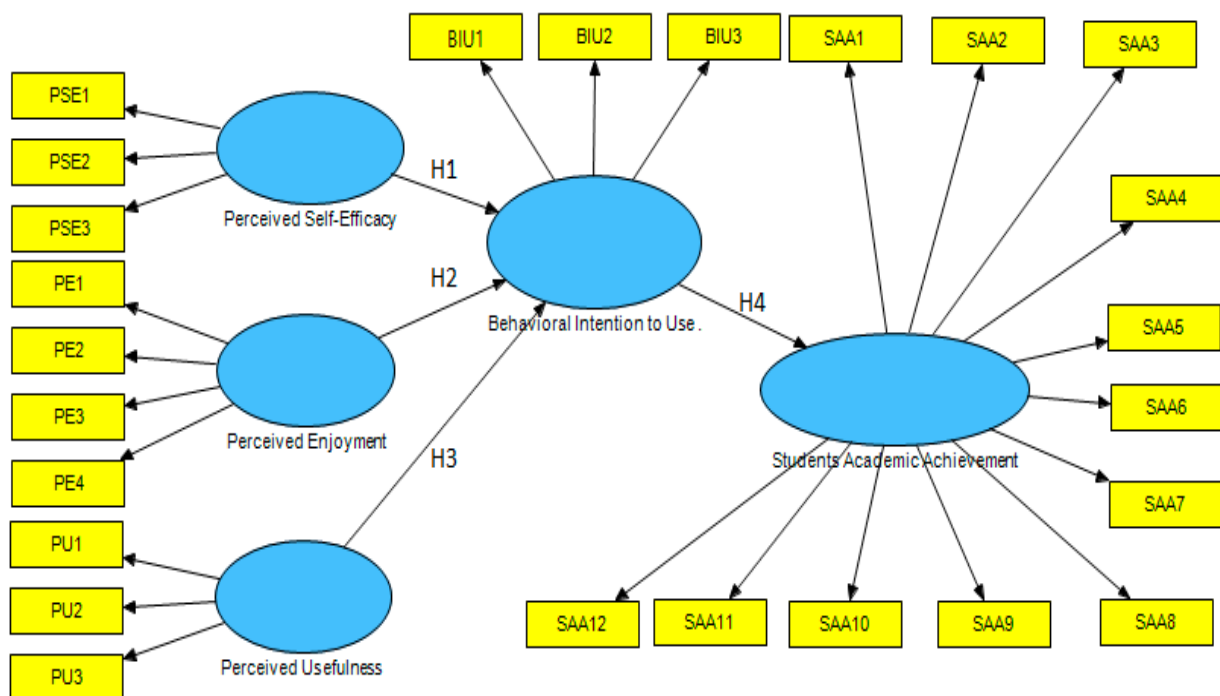


Figure 1. Research model.

3.1. Perceived Self-Efficacy

Bandura [29] defines “self-efficacy as organize and execute courses of action required to People’s judgments of their capabilities to attain designated types of performances”. In the literature, reported self-efficacy is an essential factor in understanding the BPBL approach [30]. In relation to this, a large number of students have been reported to have a high level of self-efficacy [31]. Therefore, this research uses perceived self-efficacy, which refers to the extent that students believe using the BPBL approach enhances their behavioral intention to use and academic achievement in a blended project-based learning approach.

3.2. Perceived Enjoyment

Perceived enjoyment, as regards the BPBL approach, refers to whether it is “perceived to be enjoyable in its own right through the extent to which the service offered, and also separate from any expected performance consequences” [32]. Several terms, such as critical intrinsic, extrinsic motivation for adopting learning and hedonic motivation, and perceived

enjoyment, were used to refer to services as in previous research [32,33]. The values of perceived enjoyment include usefulness and fees as determining factors, such as mobile internet from cognitive elements [34]. The continuous intention of perceived enjoyment as claimed through social virtual service usage is largely determined by [35,36]. Therefore, this research uses perceived enjoyment to refer to using the BPBL approach to enhance students' behavioral intention to use and academic achievement in a blended-project-based learning approach and the extent to which students believe this is feasible.

3.3. Perceived Usefulness

Perceived usefulness refers to the extent to which individuals believe that using a particular system can enhance their job performance [37]. Perceived usefulness has been investigated and found to be largely influenced by user intentions to use a system [38]. Furthermore, perceived usefulness is influenced by a continued intention to provide utilitarian benefits and using a short message service to users in search of effective communication alternatives [34,39]. Some researchers found that perceived usefulness influences people's intention to continue to use the BPBL approach for learning. This research uses the BPBL approach to test how perceived usefulness affects students' behavioral intentions and to which extent students believe in their own potential academic achievement in a blended-project-based learning approach.

3.4. Behavioral Intention to Use BPBL

Behavioral intention to use is "known as the learners' choice whether to continue using the technology or not and this term is seen as a factor determining the use of a technology" [33]. Thus, it is assumed in this study that the BPBL approach is able to improve students' academic achievement through behavioral intention to use. The basic principles of TRA, individual behaviors, and subjective norms that consider BPBL use as the function are considered the origin of all of these theories and models. TRA was enhanced to include BPBL and perceived control [40]. Both perceived ease of use and perceived usefulness found high levels of continued intention and user satisfaction to be the most likely products [41]. This research took behavioral intention to use BPBL to refer to the extent to which students believe that using the BPBL approach enhances their behavioral intentions and potential academic achievement in a blended project-based learning approach.

3.5. Students' Academic Achievement

Gomez-Pablos et al. [42] reported that the BPBL approach represents the best student-based learning process for students' academic achievement because it considers the interests of students and encourages them to learn to participate actively. According to [43], a major BPBL principle, compared to the direct learning method, is that it offers the best learning opportunities at present by contributing to interaction with and learning of course materials and the development of essential skills. Therefore, results suggest that the PBL approach helps to better engage students in learning, as they are highly motivated by the perception that they can improve their academic achievements [44].

4. Research Methodology

This research aimed to develop a model to examine the relationship between "BPBL approaches with perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention of using BPBL, and students' academic achievement". Therefore, the questionnaire survey distributed involved using the BPBL approach as a quantitative approach among students. The questionnaire comprises factors to two main sets. The first set of independent factors comprises factors that include behavioral intention to use blended project-based learning (BPBL), perceived self-efficacy (PSE), perceived enjoyment (PE), and perceived usefulness (PU), while the second factor of the dependent model is students' academic achievement (SAA). The study used a questionnaire form structured

with a five-point scale and administered to a large sample (25 items), and the participants were undergraduate students who were users of the BPBL approach, selected through a simple random sampling size technique [45]. In the current study, to measure students' rating of different items, the 5-point Likert scale utilized included the options "strongly disagree (1), disagree (2), undecided (3), agree (4), strongly agree (5)". This research adopted quantitative data collection and analysis methods by surveying 80 university students. In particular, we utilized structural equation modeling (SEM—Smart-PLS) for analysis purposes. The main purpose was "to achieve a satisfactory result regarding content validity by adapting constructs items". The adapted research model factors were as follows: three items for the BPBL approach were adapted from [13], four items for perceived enjoyment and three items for perceived usefulness three items were adapted from [39], three items for perceived self-efficacy were adapted from [29], and twelve items for students' academic achievement were adapted from [43].

5. Results and Data Analysis

The reliability coefficient of Cronbach's alpha was 0.932 of the "perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention to use, and students' academic achievement". The evaluation of three criteria through discriminant validity (DV) was conducted, namely, we determined that index among variables which should be below 0.80 [46], then the value of AVE should be equal to or more than 0.5, and the inter construct correlations (IC) linked with the factor should be lower than the square average variance extracted (AVE) [46]. Furthermore, factor loading (FL) with crematory factor analysis (CFA) results should be 0.70 or over, while Cronbach's alpha (CA) results should be ≥ 0.70 [46]. Composite reliability (CR) should be ≥ 0.70 , as added by the researchers.

5.1. Measurement Model and Instrumentation

Two phases were used for the measurement model of structural equation modeling (SEM). The first stage of the model includes asserting the validity and reliability of the model, while the second determines the factor loadings, composite reliability, and Cronbach's alpha, as recommended by [47].

5.2. Construct Validity of Measurements

Development legitimacy is "delineated as the level to which the things used to gauge a component can appropriately quantify the idea they were meant to quantify" [46]. The gauge of develops to ought to entire factors used to stack basically to their individual develops rather than different factors. Transferring items of writing with the aim of an orderly audit of things that have been set up and tried by earlier writers was guaranteed. It was affirmed that the premise of component analysis of things was reasonably named "development" as high loadings stood out from various values (see Table 1).

Table 1. Factor loading and cross-loading of items.

Factors	Items	BIU	PE	PSE	PU	SAA
Behavioral Intention to Use	BIU1	0.878889	0.455914	0.583219	0.516134	0.587544
	BIU2	0.871241	0.412827	0.567014	0.546148	0.572430
	BIU3	0.856589	0.452579	0.571780	0.569316	0.596934
Perceived Enjoyment	PE1	0.452275	0.866975	0.511481	0.431910	0.560491
	PE2	0.417380	0.874638	0.506714	0.423823	0.555515
	PE3	0.323141	0.733009	0.365966	0.405711	0.465189
	PE4	0.474492	0.848408	0.498748	0.508804	0.598297

Table 1. *Cont.*

Factors	Items	BIU	PE	PSE	PU	SAA
Perceived Self-Efficacy	PSE1	0.599038	0.519177	0.863085	0.491138	0.574784
	PSE2	0.500847	0.400424	0.779310	0.389474	0.488595
	PSE3	0.535262	0.491806	0.839058	0.460930	0.566839
Perceived Usefulness	PU1	0.580998	0.496803	0.496637	0.912311	0.605090
	PU2	0.584195	0.473593	0.491339	0.931005	0.606942
	PU3	0.546834	0.489035	0.496865	0.891719	0.604206
Students' Academic Achievement	SAA1	0.489760	0.425706	0.429054	0.453846	0.714132
	SAA2	0.489398	0.476840	0.449454	0.482821	0.744746
	SAA3	0.513945	0.468064	0.477199	0.453926	0.739293
	SAA4	0.451371	0.457391	0.453182	0.421524	0.708723
	SAA5	0.463820	0.480669	0.494652	0.484303	0.775164
	SAA6	0.502945	0.497678	0.494823	0.496829	0.775427
	SAA7	0.580527	0.547729	0.533374	0.603040	0.767073
	SAA8	0.535999	0.531759	0.536804	0.531268	0.761825
	SAA9	0.505863	0.507899	0.551550	0.511094	0.799661
	SAA10	0.542724	0.562680	0.541792	0.546390	0.813481
	SAA11	0.545692	0.544864	0.519880	0.540274	0.784110
	SAA12	0.554297	0.533118	0.551163	0.548803	0.807773

5.3. Convergent Validity of Measurements

The reliability of composite values ranged from 0.944682 to 0.867104, and throughout the prescribed cut-off estimation of 0.70, they are everywhere, with “Cronbach values contrasting from 0.936056–0.837771, over the prescribed cut-off estimation of 0.60”. In addition, from 0.831415 to 0.587746 (all surpassing the cut-off estimation of 0.5), they were in contrast to mean normal change removed (AVE) values, with critical element loadings surpassing 0.50. These qualities all went over the prescribed incentive set by [46,47]. Table 2 presents the measurement model of the CFA results.

Table 2. Convergent validity.

Factors	Items	Factors Loading	Composite Reliability	AVE	Cronbach's Alpha	R Square
Behavioral Intention to Use	BIU1	0.878889	0.902420	0.755083	0.837771	0.541467
	BIU2	0.871241				
	BIU3	0.856589				
Perceived Enjoyment	PE1	0.866975	0.900050	0.693434	0.851917	0.000000
	PE2	0.874638				
	PE3	0.733009				
	PE4	0.848408				
Perceived Self-Efficacy	PSE1	0.863085	0.867104	0.685419	0.870137	0.000000
	PSE2	0.779310				
	PSE3	0.839058				
Perceived Usefulness	PU1	0.912311	0.936671	0.831415	0.898491	0.000000
	PU2	0.931005				
	PU3	0.891719				

Table 2. Cont.

Factors	Items	Factors Loading	Composite Reliability	AVE	Cronbach's Alpha	R Square
Students' Academic Achievement	SAA1	0.714132	0.944682	0.587746	0.936056	0.454586
	SAA2	0.744746				
	SAA3	0.739293				
	SAA4	0.708723				
	SAA5	0.775164				
	SAA6	0.775427				
	SAA7	0.767073				
	SAA8	0.761825				
	SAA9	0.799661				
	SAA10	0.813481				
	SAA11	0.784110				
	SAA12	0.807773				

5.4. Discriminant Validity of Measures

The level to which an idea and its indicators move mislead from another idea and its markers is surveyed by discriminant legitimacy [48]. The estimation of average variance extracted is “well over 0.50 and is critical at $p = 0.001$ ”, and the discriminant legitimacy appears to be bolstered for the whole builds [47]. In this manner, [46] clarified that the relationships between pairs of two evolve to the point where they do not override the square base of normal fluctuation shared by a solitary development of things (See Table 3).

Table 3. Latent variable correlations.

Factors	Items	BIU	PE	PSE	PU	SAA
Behavioral Intention to Use	BIU	1.000000				
Perceived Enjoyment	PE	0.507177	1.000000			
Perceived Self-Efficacy	PES	0.660695	0.571198	1.000000		
Perceived Usefulness	PU	0.626213	0.533269	0.542589	1.000000	
Students' Academic Achievement	SAA	0.674230	0.658434	0.657920	0.663777	1.000000

5.5. Analysis of the Structural Model

Following affirmation of the validity of the demonstrated estimation, connections among builds were conjectured using the following stride involved in testing. Specialists utilized the model analyzed through PLS calculation using Smart-PLS 2.0. Coefficients were then delivered as in Figures 2 and 3; theories are shown in Table 4.

Table 4. Hypothesis testing.

H	Independent	Relationship	Dependent	Path Coefficient	Standard .E	T. Value	Result
1	PSE	→	BIU	0.424980	0.122690	3.463864	Accepted
2	PE	→	BIU	0.074698	0.116686	0.640161	Accepted
3	PU	→	BIU	0.355789	0.115663	3.076077	Accepted
4	BIU	→	SAA	0.674230	0.061310	10.996989	Accepted

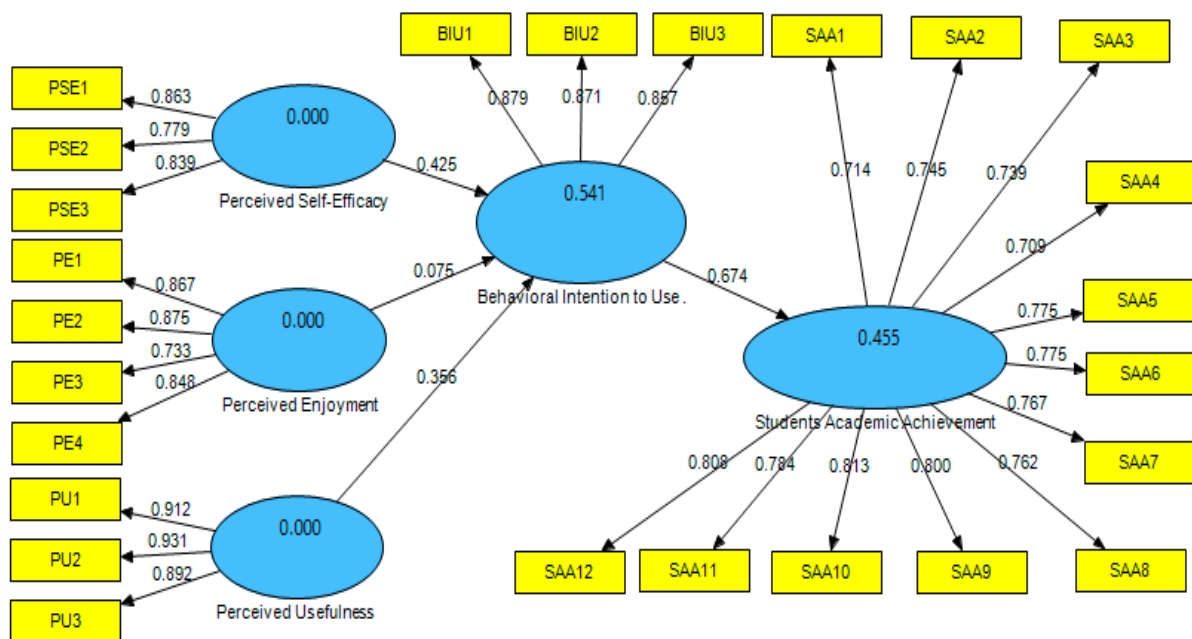


Figure 2. Path coefficient results.

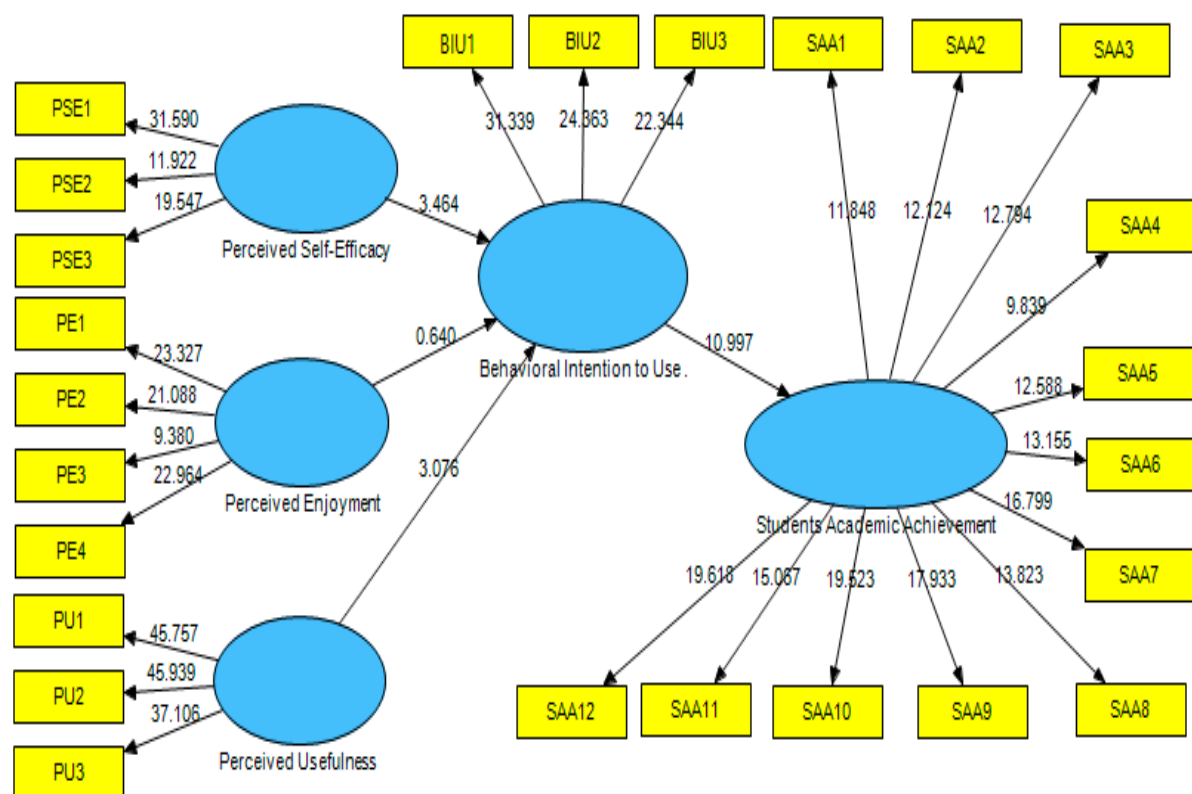


Figure 3. Path coefficient T values.

The relationship between “perceived self-efficacy and behavioral intention to use ($\beta = 0.424980, t = 3.463864$)” was confirmed. Therefore, H1 was accepted. The next hypothesis was a positive relationship between “perceived enjoyment and behavioral intention to use ($\beta = 0.074698, t = 0.640161$)”. Therefore, H2 was accepted. The third hypothesis involved the relationship between “perceived usefulness and behavioral intention to use ($\beta = 0.355789, t = 3.076077$)”. Therefore, H3 was accepted. Finally, hypothesis number

four regarded a positive relationship between “behavioral intention to use and students’ academic achievement ($\beta = 0.674230$, $t = 10.996989$)”. Therefore, H4 was accepted.

6. Discussion and Conclusions

In accordance with the model proposed, we explored the relationships between four hypotheses in the BPBL approach and the following factors: “perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention of using BPBL, and students’ academic achievement”; see Figures 2 and 3. As per the purpose of this research, the BPBL approach is highlighted among university students for its importance when it comes to the debate around students’ academic achievement, as well as its ability to provide a clear vision. Therefore, the BPBL approach helps to enrich the daily experiences of students and can assist them in meeting their academic achievement targets, as has previously been discussed [29,33,34,42]. The findings of this research support the BPBL approach, which enhances students’ behavioral intention to use and academic achievement in a blended project-based learning approach. The findings also showed that “perceived self-efficacy, perceived enjoyment, perceived usefulness, behavioral intention of using BPBL, effect positively students’ academic achievement”. Hence, the results of this research show were enough to confirm all hypotheses, which means that the behavioral intention to use the BPBL approach to improve students’ academic achievements has a positive effect, and thus, future work on learning and teaching methods ought to consider the creation of student guidelines on how to combine the BPBL approach with established methods in various fields.

According to the results, the therapy group had a higher mean value of reasoning skills than the control group. As a result, the BPBL can be seen to be successful in strengthening and enhancing new students’ cognitive skills. BPBL can also stimulate the three elements of cognitive skills: self-control, critical thought, and creative thinking. Many observations and expert opinion will clarify the beneficial impact of BPBL on cognitive skills. BPBL, according to Bell, is a cutting-edge learning method that teaches a variety of effective critical thinking techniques for the twenty-first century. Students promote their own learning through inquiry, collaborate on research, and develop projects that represent their knowledge. Students benefit from this approach to teaching in a variety of ways, from learning innovative and useful technical techniques to becoming skilled communicators and advanced problem solvers. The BPBL is the foundation of the program, where the majority of assignments include reading, writing, and mathematics. Greater comprehension of a subject, deeper learning, higher-level reading, and an improved desire to learn are all outcomes of BPBL. BPBL is an essential strategy for developing individual learners and thinkers. Students formulate their own inquiries, schedule and organize their studies, and use a variety of learning tools to solve real-world problems. BPBL further improves students’ problem-solving, strategic thinking, visualizing, decision-making, and logic skills, as well as their written and oral communication skills. Students who participate in project-based learning take ownership of their learning and grow as lifelong learners. They develop their leadership and listening skills as well. Since BPBL is based on active learning and engages students in its activities, it motivates students to learn more about the topics they are studying. In comparison to conventional textbook instruction, research shows that students are more likely to maintain their experience by using this method. Furthermore, BPBL is essential for connecting learning to work and influences learners’ active involvement through collaboration and social interaction. Therefore, future attempts should consider the use of the BPBL approach in educational settings to gauge the views of students and other higher education stakeholders. The limitations and facilitating factors need to be investigated in future research; in addition, studies from different countries and cultures would certainly contribute to research in this area by offering different perspectives.

Funding: The Author acknowledges the Deanship of Scientific Research at King Faisal University for the financial support under Nasher Track 2020 (Grant No. 206011).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The author declares no conflict of interest.

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