

Designing and Validation of the Epistemological Model in Blended Learning

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Article history:

Received date: 2022/04/13

Review date: 2022/06/11

Accepted date: 2022/06/21

Keywords:

Designing, Validation, Epistemological, Blended Learning.

Abstract

Purpose: Epistemology as one of the philosophical foundations in the field of education can play an important role in blended learning, ie using more than one method, strategy and technique for learning. Therefore, the present study was conducted with the aim of designing and validation the epistemological model in blended learning

Methodology: The present study was applied from type of qualitative-quantitative. The population of the qualitative section was the documents related to epistemology and blended learning in the years 1990 to 2020 which 80 books, 60 dissertations and 60 articles were selected by purposive sampling method and in addition, included experts in the field of philosophy of education and distance learning which based on the principle of theoretical saturation number of 10 people of them were selected by purposive sampling method. The population of the quantitative section were faculty members and doctoral students of the department of philosophy of education and distance learning of Payame Noor University in 2020-2021 years which based on Krejcie and Morgan's table number of 200 people of them were selected by stratified random sampling method with using the teacher and student ratio. The tool of the qualitative section was the recording of books, dissertations and articles and interviews with experts, and the tool of the quantitative section was a researcher-made questionnaire whose psychometric indicators were confirmed. Data were analyzed by coding method in MAXQDA software and exploratory factor analysis and one-sample t-test in SPSS software.

Findings: Findings showed that the epistemological model in blended learning had 60 subcategories in 9 categories including purpose, evaluation, educational correction, content, teaching method, teacher, learner, media and cognitive presence that its model was drawn. Also, validation of model indicated that the factor load of all 6 questions related to validation of model was higher than 0.30, their validity was higher than 0.50 and their reliability was higher than 0.70. In addition, the mean of all 6 questions was higher than the hypothetical mean of the population ($P < 0.001$).

Conclusion: The findings showed that the designed model for epistemology in blended learning had good validity. Therefore, curriculum specialists and planners can use this model along with other models to improve blended learning.

Please cite this article as: Ahmadian H, Sarmadi M R, Maleki H. (2022), Designing and Validation of the Epistemological Model in Blended Learning, *Iranian Journal of Educational Sociology*. 5(1): 12-22.

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1. Introduction

A major problem in educational environments today is the lack of interest or low interest of learners in learning, which on the one hand is due to high control of the educator and the learner's lack of authority in the learning process and on the other hand low emotional connection between educators and learners (Biddle and Hoover, 2020). The term blended learning was formally first coined by Marsh (2003) and referred to a combination of both traditional and electronic learning methods (Ceulemans, et al, 2021). In another definition, blended learning is the combination of four web-based technology methods to achieve educational goals, combining a variety of pedagogical approaches to optimally generate learning outputs with or without technology, combining any form of educational technology including face-to-face and educator-centered learning, and combining educational technology with Introduced job roles (Prasad, Maag, Redestowicz and Hoe, 2018).

In a more comprehensive definition, it is not only the combination of technology with education with the aim of increasing access to learning, rather blended learning is associated with rethinking and redesigning the relationship between teaching and learning process in accordance with technology and learners' learning styles for better learning (Gjestvang, Høy and Bronken, 2021). In general, blended learning is an approach that provides a set of classroom learning activities, web-based learning, and online learning for learners, and enables learning activities and experiences anytime, anywhere (Coyne, et al, 2018). Blended learning is a powerful business tool for organizations that expands the use of physical classroom boundary technology, facilitates access to learning content and resources, improves educators' ability to receive learning feedback, and provides multiple opportunities for communication, interaction, collaboration and learning control (Li, et al, 2019). In this type of learning, learners can choose activities that are appropriate to their personal speed, level and style of learning; they act more independently and with more confidence in learning; they can attend in real classroom environments and strengthen their social skills, and empower themselves in decision-making, problem solving, creative thinking and critical thinking. In this type of learning the educator as a facilitator, supervisor or an assistant can manage and organize learning activities, they must be creative and have a high ability to support learners and be able to provide a variety of learning materials in different forms for learners (Czaplinski and Fielding, 2020). Blended learning, having the advantages of both traditional and e-learning approaches is an effective approach to increase the effectiveness of learning that by combining different teaching techniques and technologies leads to learners' success in learning, reduces educational costs. It is used for learners with different learning levels and methods and because of using various educational techniques, it better attracts learners' attention to the educational content (Bamoallem and Altarteer, 2022).

Blended learning refers to the third generation of distance learning systems; the first generation consisting of correspondence training applied one-way teaching methods and tools such as radio and television; the second generation, consisting of distance learning based on mere technologies such as learning-based, was web-based and computer-based learning; and the third generation included blended learning, which is used as a method to enhance the benefits of face-to-face learning and multiple learning technologies (Vanslambrouck, et al, 2019). Therefore, blended learning as a third generation or third wave of development of learning environments is rapidly expanding and this method, on the one hand, by using electronic and technological facilities has some of the advantages of e-learning environment such as reducing costs and improving the quality of content, more interaction and easy access; and on the other hand, by using the features of the face-to-face learning environment, it can cover some of the shortcomings of the e-learning environment, such as the inadequacy of some training courses, weak infrastructure and poor access of learners to Internet technology. As a result, a blended learning environment can encourage active learning, enhance interaction between learners, teachers, and learning resources, provide formative and

final evaluation mechanisms for the educator and learner, and develop basic skills such as problem solving and creative and critical thinking. (Long and Chei Sian, 2021).

Learning is the major goal and component in teaching, and from a philosophical perspective, learning can be pursued in epistemological discussions and questions such as "how can one know something? How can new knowledge and experience be gained? And what is the source of knowledge?" are asked. Accordingly, epistemology is a science that discusses human knowledge, evaluation of its type and the criterion of their truth and falsehood (Mehrzoo, Sarmadi and Beheshti, 2021). Since learning deals with knowledge, epistemology is the focus of learning theories, and many of the debates in educational systems are not really about different approaches or methods of learning, but about the meaning of learning and knowing (Turan, 2019). Teachers' beliefs about topics such as learning, education, teaching, classroom, content and learner as important components of teaching and learning environments make a difference in the nature and quality of educational learning experiences so that according to different views of teachers on the mentioned elements and the creation of different educational situations, various educational spaces are created in terms of knowledge, which range from absolutism to relativism to the nature of knowledge, teaching and learning (Hashemi, Khabbazi Kenari and Kazemi, 2017).

A branch of educational philosophy that examines knowledge is called epistemology, which ponders the nature of knowledge, cognition and the process of acquiring them, and always gives various answers to various educational questions (Ocak and Karakuyu, 2022). The formation of epistemological beliefs and what people think about the nature of knowledge, the nature of knowing, the nature of learning and the nature of intelligence is closely related to the curriculum and teaching and learning activities and examines various topics such as knowledge authority, knowledge level and stability, learning method and learning speed (Jiang, Wang and Bonner, 2021). Epistemology is a set of beliefs about knowledge that influences teachers' thinking and important educational decisions. In general, there are three epistemological approaches, including realistic, contextual, and relativistic. Different epistemological approaches lead to differences in curriculum selection, teaching methods, and evaluation. Realists believe that there is a fixed reality and static knowledge in the world that is better acquired through experts. Realistic teachers are actively involved in teaching, and students are passive recipients of knowledge. Contextualists believe that learners actively develop a shared understanding of knowledge in a supportive context in which the teacher acts as a facilitator. Contextual teachers are less concerned with the type of knowledge that students build and instead focus more on the process of knowledge building and application. Relativists believe that each learner builds a unique knowledge base that differs from other learners' knowledge, and such teachers see their role as creating an environment in which learners can learn to think independently (Jena and Chakraborty, 2018). Epistemology affects the level of active participation in learning, effort, perseverance and persistence in learning, comprehension and problem solving (Altay, 2021). Examining the relationship between epistemology and learning is essential for three reasons. First, epistemology is developmental, and the goal of education is the comprehensive development of learners. Second, epistemology exists in the form of beliefs that affect the learning process. Third, epistemological beliefs are theoretically and practically present in all learning activities and educational resources explicitly and implicitly (Keramati, 2019).

Although relatively much research has been done on blended learning and some studies have examined its contributing factors or dimensions, no research has been found on the epistemological model of blended learning. The results of related research are reported below. Abbasi Kasani, et al (2021) while studying the factors affecting e-learning in higher education concluded that the factors include learner, educator, educational factors, environmental factors, institutional and organizational factors, support, Rules and regulations, interactions and technology.

Sadeghitabar and Shariatmadari (2020) while researching the model of continuing education of the medical community based on e-learning introduced seven dimensions for it including pedagogical

dimensions (with components of educational objectives, educational content, heeding to educators' characteristics, heeding to learners' characteristics, teaching and learning strategies and methods and interaction), evaluation and feedback (with components of appropriateness evaluation to objectives, using different evaluation criteria, conducting continuous evaluation and providing feedback), ethical (with components of privacy protection, information security of users, intellectual property rights and content refinement), learning formats (with components based on simultaneous physical presence, simultaneous electronic formats and asynchronous electronic formats), institutional (with components of required educational affairs, required administrative affairs and required educational services), educational management and resource support (with components of educational management, learner support, educator support, instructional resources support, curriculum support and technical support) and technology and design (with the components of access to required technology and design and suitable graphics).

Anthony, and et al (2019) while investigating the role of blended learning for the effectiveness of teaching and learning in higher education, introduced its three main factors including educator, learner and technology. Najafi (2019) while researching the components of blended learning and emotional intelligence and its effect on academic performance, concluded that the components of blended learning included pedagogy, methodology, technology, learning style and organizational strategy, that the components of pedagogy, methodology and technology had the most effect and components of learning style and organizational strategy had the least effect on academic performance respectively.

Mirmoghtadaie and Ahmady (2019) while studying the effectiveness of blended learning in the field of medical education: explaining the dimensions and components, concluded that blended learning has 40 components in 5 dimensions including student competencies (with components of metacognitive skills, information literacy, personality dimensions and netiquette), Instructor competencies (with components of content expertise, professional commitment, information literacy, netiquette, verbal and non-verbal communication skills, emotional intelligence, virtual classroom management, cyber skills, cybergology or pedagogy in cyberspace, accessibility and role modeling), technical aspects (with components of quality content, updated content, reviewable and investigable content, user-friendly design system, cyber rules, interactive virtual environment, free access to content, cyber infrastructure and content volume), pedagogical domain (with components of teamwork, collaborative learning, effective evaluation, designing e-learning activities, student-centered learning, monitoring student progress, content flexibility, content quality, content attractiveness, virtual feedback system and content organization) and supportive environment (with components of electronic mentorship, active management, extensive communication, secure environment, strong guidance and support and counseling system). Nortvig, Petersen and Balle (2018), while studying the factors affecting e-learning and blended learning, introduced factors such as presence of the educator in online environments, interaction between learners, educators and content, and the connection between online and offline activities.

Knowledge is one of the main sources of teachers 'and educators' professions, so epistemology or theory of knowledge is vital for them and knowledge covers all parts of learning from the curriculum to teaching and evaluation methods. Therefore, epistemology affects learning, and one of the relatively new approaches to the discussion of learning is blended learning on which some research has been done, but no research has designed an epistemological model for it. As a result, one of the gaps is not finding a model for epistemology in blended learning and the present study seeks to reduce the gap and start further research in this field. In addition, conducting this research can help develop the range of knowledge in one of the topics of learning called blended learning, based on which, specialists and curriculum planners can take effective steps to improve learning and academic performance. According to the issues raised, the present study was conducted with the aim of designing and validating the epistemological model in blended learning.

2. Methodology

The present study was a qualitative-quantitative applied research. The study population of the qualitative section included documents on epistemology and blended learning in the years 1990 to 2020, of which 80 books, 60 dissertations and 60 articles were selected by purposive sampling method and also included experts in the field of philosophy of education and distance education that according to theoretical saturation 10 of them were selected by purposive sampling. In the purposeful sampling method, the most relevant documents or the most appropriate people are selected as the sample that can help the most in obtaining comprehensive information. To select documents, keywords related to philosophy, epistemology, blended learning, traditional learning, e-learning and distance learning (e.g. *Philosophia*, *Epistemology*, *Blended Learning*, *Traditional Learning*, *E-Learning* and *Distance Education*) were searched on reputable sites and 200 cases were selected as a sample and examined. In the next stage, regarding the review of documents, experts in the field of philosophy of education and distance education were interviewed about the epistemological model in blended learning and their results were recorded.

The study population of the quantitative section included faculty members and doctoral students of the Department of Philosophy of Education at Payame Noor University in 2020-2021. According to Krejcie and Morgan's table, 200 of them were selected by stratified random sampling using the teacher-student ratio. In the stratified random sampling method, first the number of professors and doctoral students of the Department of Philosophy of Education at Payame Noor University was identified and then their ratio to each other was calculated and finally 200 people were sampled in the same proportion according to the sample size. In the next step, according to the researcher-made questionnaire designed based on reviewing and taking notes of documents and interviewing experts, the subjects of the quantitative sample were asked to complete the researcher-made questionnaire of the epistemological model in blended learning.

The tool for the qualitative section was the taking note of books, dissertations and articles, and in-depth and semi-structured interviews with experts. For this purpose, first documents including 200 books, dissertations and articles were reviewed and by note taking, categories and sub-categories for epistemology in blended learning were specified. According to the results of the note taking, questions were designed to interview the experts and in addition a series of materials were provided to the interviewees. The interviews conducted individually and lasted around 40-50 minutes, and during the interviews, key topics including categories and subcategories were noted. The validity of the findings of the qualitative part was evaluated by the appropriate triangulation method. Triangulation methods include data source triangulation (using multiple data sources in study or research), researcher triangulation (using more than one researcher to collect, analyze, and interpret data) and theoretical triangulation (using multiple perspectives to interpret data). For the validity of triangulation in this study the interview questions were examined with two experts and the study of theories, information sources and documents were used as well. In addition, the reliability of 0.82 was obtained by Cohen's Kappa coefficient method.

Moreover, the tools for the quantitative part was a researcher-made questionnaire based on documents note taking including books, dissertations and articles, and interviews with experts. The questionnaire had 60 subcategories, each was graded from one to five according to the 5-point Likert scale, and a higher score indicated that epistemology was more desirable in blended learning. The validity of the quantitative findings was confirmed by factor analysis and the reliability of 0.94 was obtained by Cronbach's alpha method for them. Data were analyzed by coding method in MAXQDA software and exploratory factor analysis and one-sample t-test in SPSS software.

3. Findings

The results of coding the document note taking and interviews with experts on the epistemological model in blended learning are presented in Table 1.

Table1. Findings on coding the epistemological model in blended learning

Categories	Number of Subcategories
Objective	8
Evaluation	6
Educational reform	7
Content	10
Teaching method	8
Educator	4
Learner	6
Media	6
Cognitive presence	5

The results of Table 1 showed that the epistemological model in blended learning had 60 subcategories within 9 categories including objective, evaluation, educational reform, content, teaching method, educator, learner, media and cognitive presence. According to the identified categories for the epistemological model in blended learning, the model is presented in Figure 1.

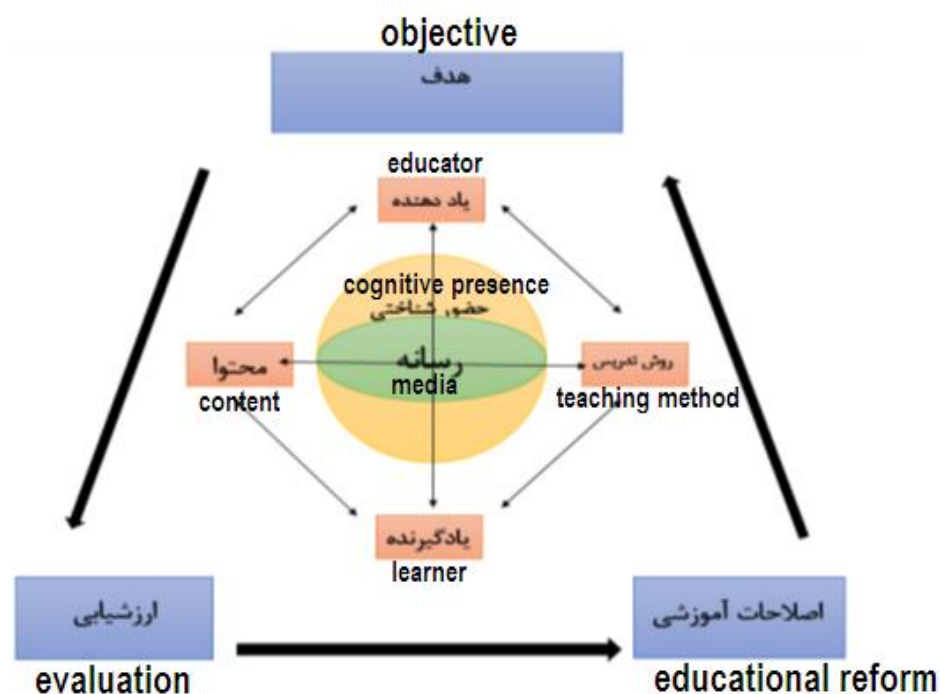


Figure1. Epistemological model in blended learning based on the categories identified for it

To validate the designed epistemological model in blended learning, six questions were designed and presented in Table 2.

Table 2. Questions to validate the epistemological model in blended learning

Rows	Questions
1	How appropriate is the proposed epistemological model in blended learning?
2	To what extent are the categories of the epistemological model in blended learning based on the blended learning perspective?
3	How appropriate is the interaction between the categories of the model?
4	To what extent the model has been implemented so far at Payame Noor University?
5	To what extent does Payame Noor University have the basis and context for implementing an epistemological model in blended learning?
6	How much does it suggest that the model can be implemented at Payame Noor University?

Before performing the factor analysis, the hypotheses were tested and in this regard, KMO statistic with a value of 0.86, Bartlett test statistic with a value of 934.85 and significance level less than 0.001, indicate the adequacy of the sample for factor analysis. The results of exploratory factor analysis of the questionnaires about the questions of the epistemological model in blended learning are presented in Table 3.

Table3. Findings related to the exploratory factor analysis of the epistemological model in blended learning

Questions	Factor loading	Explained variance	Average variance extracted	Reliability
Question 1	0.78	0.61	0.64	0.86
Question 2	0.72	0.52	0.79	0.95
Question 3	0.62	0.39	0.52	0.78
Question 4	0.31	0.10	0.60	0.86
Question 5	0.35	0.12	0.57	0.75
Question 6	0.57	0.33	0.78	0.89

The results of Table 3 showed that in the epistemological model in blended learning, the factor loading of all 6 questions related to the validation of the model was higher than 0.30, their validity was higher than 0.50 and their reliability was higher than 0.70. The results of one-sample t-test related to the questions of the epistemological model in blended learning are presented in Table 4.

Table4. Findings related to t-test of the epistemological model in blended learning

Questions	Mean	Standard deviation	t statistic	freedom degree	Significance	fiducial interval	
						lower bound	Upper bound
Question 1	3.90	0.76	17.13	199	0.001	0.80	1.02
Question 2	3.82	0.78	14.84	199	0.001	0.71	0.92
Question 3	4.07	0.86	17.48	199	0.001	0.94	1.19
Question 4	3.10	0.94	3.62	199	0.001	0.12	0.40
Question 5	3.35	1.03	3.44	199	0.001	0.36	0.09
Question 6	4.14	0.93	17.37	199	0.001	1.01	1.27

The results of Table 4 showed that in the epistemological model in blended learning, the mean of all 6 questions was higher than the hypothetical mean of the study population, i.e. number 3 ($P < 0.001$).

4. Discussion

Blended learning is one of the main and practical measures to improve quality of teaching and learning. Due to the growth of science and technology and applying learning in various traditional and electronic and blended forms, it is necessary to consider knowledge and learning and applying it; thus the implementation of it requires special attention to the model in the field of epistemology in blended learning. As a result, the present study aimed to design and validate the epistemological model in blended learning.

Findings showed that the epistemological model in blended learning had 9 categories including objective, evaluation, educational reform, content, teaching method, educator, learner, media and cognitive presence. Also, the findings by validation of the epistemological model in blended learning indicated that the model was valid and the rate was higher than the hypothetical average. These findings are consistent with the findings of Abbasi Kasani et al (2021), Sadeghitabar and Shariatmadari (2020), Anthony et al (2019), Najafi (2019), Mirmoghtadaie and Ahmady (2019) and Nortvig et al (2018).

The categories identified for the epistemological model in blended learning included the categories of objective, evaluation, educational correction, content, teaching method, educator, learner, media, and cognitive presence. These categories are interrelated and interact with each other like components of a system and affect each other. In this research, in order to identify the components of the model, various books, dissertations and articles were reviewed and the experts were interviewed as well. In addition, six questions were used for the accuracy of the identified categories and the questions indicated the appropriate validity of the model.

Objective is a major category and one of the most effective factors in the field of blended learning. Organizations that design educational objectives for different educational courses should pay special attention to blended learning and how to achieve the objectives in the learning process. Content is another effective category in the field of blended learning and it should be appropriate to the interests and needs of learners; therefore in designing curricula and educational programs it is necessary to pay special attention to the interests and needs of learners for which the use of electronic networks can be effective and improve blended learning. The educator is another important and influential factor in the application and use of blended learning and plays a prominent role in effective and efficient learning. In fact, the educator's duty is to design and develop the learning experience, guide and support learners, and evaluate learning outcomes. The educator must understand the learners' abilities and give them feedback. In addition, asking the teacher, making suggestions, participating in classroom activities, and giving feedback are effective in improving the educator's performance and creating concepts. The educator's attitude and interest in blended learning is very important in using any kind of educational and learning system because if educators have a negative attitude towards blended learning, one cannot expect an effective and efficient educational system. The learner is one of the influential factors in the epistemological model in blended learning. In fact, learners' characteristics play an important role in their use of blended learning and learners' attitudes toward blended learning and their interest and motivation are important components related to learners. It is the attitude, interest and motivation of learners that makes them tend to or move away from this type of learning, i.e. blended learning. Learners' prior knowledge and information is another factor related to the learner factor that plays an important role in applying blended learning, because the learner's prior knowledge and information may be consistent only with traditional education or with e-learning, and the learner may not be able to continue in a blended manner. Teaching method as the main role of the educator is an important factor in blended learning. Because in learning environments, teaching style and method has an important role on academic outcomes and educators choose the type of teaching method based on educational objectives, learning subject and learners' characteristics. Media can be considered a major factor in blended learning because the basis of this type of teaching and learning is technology. Therefore, the use of blended learning requires hardware, software, network and Internet, cost-effective technologies and media, effective communication infrastructure, availability of system and technology, quality and user-friendly system and technology, and ease of use of technology. The reason for this is that part of the learning is done online with the help of new technologies and the technologies need to have the necessary quality and be available to teachers and learners. Cognitive presence also plays an important role in the epistemological model in blended learning, and this item can cause learners to perceive science in themselves. Cognitive presence is an insightful and cognitive dimension for the development of thinking that needs to be given special attention in blended learning. Evaluation is also one of the educational factors of blended learning, related to both the educator and the learner and to the training course as well. In fact, evaluation is an

important element in any type of educational system, and through evaluation, it is possible to identify existing strengths and weaknesses and prepare the ground for improving and enhancing the teaching and learning processes. Educational reform is another important and effective factor in blended learning. Specialists and curriculum planners and even educators and learners can design new goals and contents to practice blended learning when inefficient educational goals or content fail.

Little research has been done on epistemology in learning and no research has been found on the epistemological model in blended learning. On the one hand, this is a positive point and a strength of the present study and on the other hand, it is a limitation since it is impossible to compare the findings of this study with the previous ones. Another limitation is the relatively small sample size for planning to improve learning in educational systems. Therefore, it is suggested that more research on epistemology in blended learning be conducted and the size of study population for macro-level decision-making and planning be increased. The results showed that the model designed for epistemology in blended learning had good validity with the categories of objective, evaluation, educational reform, content, teaching method, educator, learner, media and cognitive presence. Therefore, specialists and curriculum planners can use this model along with other models to improve blended learning.

Acknowledgment

I would like to thank everyone who worked on this research.

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