Research Article

Improving Blended Learning Using the Modified Deming Technique (PDSA): An Exploratory Study

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ARTICLE INFO	ABSTRACT
	This study examines how students perceive blended learning at Al-Mamoun College, Ahlia University, and suggests a framework for ongoing enhancement based on the modified Deming approach (PDSA). Most studies have demonstrated that incorporating effective educational process design can bolster the blended learning system and enhance the caliber of instruction and student contentment. The research employed a descriptive, exploratory, and analytical methodology to obtain scientific facts. The questionnaire was utilized as a means of gathering data and information, as well as facilitating communication with students at the indicated college. A survey was administered to 192 students in their second, third, and fourth years of study in the Department of Business Administration. Out of these, 149 completed and returned the questionnaire. An analysis was conducted using the statistical program SPSS, utilizing the arithmetic mean, standard deviation, and coefficient of variation. The findings exhibited flexibility in adopting novel teaching and learning methodologies and have formulated tactics to improve students' demeanor and conduct. These efforts aim to guarantee the ongoing delivery of top-notch educational services by educational institutions. The emergence of new and constantly expanding information and communications technologies has been crucial in developing and improving blended learning programs. The ongoing COVID-19 pandemic has provided a valuable chance to alleviate the restrictions placed on academic courses, frequently bound by fixed schedules and time constraints. It is crucial to ensure that technology does not hinder the implementation of blended learning. **Keywords:** Blended Learning, Modified Demick Cycle, PDSA, E-Education, Education Technology.

INTRODUCTION

In recent years, Iraqi colleges have significantly changed their educational techniques due to the global Coronavirus (COVID-19) pandemic and several technological, political, and economic advancements. The educational community was significantly impacted by this pandemic, prompting consideration on how to proceed with learning and recovery. Educational institutions and teachers have made significant efforts to adjust to the changing teaching and learning landscape. They have developed strategies to enhance students' appearance and behavior, ensuring that educational services are consistently provided. New and emerging information and communications technology developments have helped develop blended learning curricula (Ali, Jabir, Almagtome, & Kadhim, 2023). This has created tremendous potential to address the shortcomings in academic courses that have become limited to specific days and times due to the circumstances of the COVID-19 pandemic. Technology mustn't become an obstacle to adopting blended learning (A. Almagtome & Abo-aljun, 2023). Instead, faculty members should be provided with continuous technological support to ensure they will not have to learn. Managing technology independently should focus on the educational benefits of blended learning designs,

including increased teacher interaction. Both traditional online and face-to-face training modalities have their own merits and drawbacks. This highlights the advantage of "blended learning," which merges conventional in-person and online learning methods into a unified course. Incorporating "blended learning" into educational curricula can provide teachers with many tools to create and deliver high-quality education. Shahzadi et al. (2023) indicate that through a theoretical review of studies on the past and future of blended learning, it is viewed as beneficial and enjoyable and is supportive, flexible, and motivating for learners. However, these factors are insufficient to create a profile for successful learning. In other words, to create a positive learning environment, blended learning environments must encourage students to participate more in the environment, and there must be ways to create social interaction through more collaboration to benefit more from this approach.

Krismadinata et al. (2020) discussed the concept of blended learning, its most essential features, and the requirements required for its implementation in the educational system in India. It is a new approach that should be adopted due to the problems that India suffers from: the growing population, the need for infrastructure to achieve quality education, the failure to expand and provide free and compulsory education for all children, and the lack of the ability of educational curricula to meet the requirements of the international market.

MacLeod, Swart, and Paul (2019) conducted a study to assess the efficiency of the blended learning environment at Riyadh Al-Ilm University by applying the principles of continuous improvement and using the Plan-Do-Study-Act cycle as an evaluation method. The study found statistically significant enhancements in the precision of (PDSA). Attaining high precision necessitates a gradual negotiation process to examine many views and promote novel operational approaches.

Al-Mansour (2019) summarized a study that examined implementing the blended learning strategy among primary-stage teachers in the Wadi Al-Seer district in Jordan. The study found that using the blended learning strategy among primary-stage teachers was moderate. Additionally, a statistically significant effect resulted from the interaction between social type and authority. Accordingly, the supervisor recommended the study to increase awareness of the importance of blended education and hold training courses for teachers to increase their awareness of implementing this strategy (A. Almagtome, Khaghaany, & Önce, 2020).

Borah and Devarani (2022) examined the proficiency of faculty members in teaching online to agricultural university students in northern India. They suggested that organizational facilities and support, such as infrastructure, should be provided to deliver training courses on awareness and utilization of e-learning resources and tools effectively. This would enhance the efficiency of online teaching for teachers.

LITERATURE REVIEW

Concept of Blended Learning

The introduction of blended learning in higher education aimed to enhance the pedagogical experience by evaluating the advantages and disadvantages of conventional education (Caner, 2012). Defining Blended Learning (BL) can be challenging (Smith & Hill, 2019) due to the various terms used to refer to it, including hybrid education, blended education, combined education, and blended education. The variation in terminology arises from differing perspectives on their definition, which is influenced by the specific characteristics of the pieces that are combined and integrated. However, the expected terminology depicts BL as a learning incorporating in-person and online components. Alsalhi, Eltahir, and Al-Qatawneh (2019) believe that blended learning is the use of technological innovations to combine the objectives, content, sources, and activities of education and methods of delivering information through the method of face-to-face education and e-learning to create interaction between the teaching staff (the teacher) through innovations that are not required to be tools. Blended learning is an education that combines connected and offline models of education (Al-Wattar, Almagtome, & Al-Shafeay, 2019). The online models are often online through the Internet, while the offline models occur in traditional classrooms. It can be described as a form of education or learning incorporating e-learning. Traditional classroom education typically involves using e-learning technologies, which can be computer-based or network-based. These tools are utilized in many educational settings, including computer laboratories, workshops, and smart classrooms. In this type of education, the teacher and student primarily interact in person (Turkey, Abed, & Abu-Omar, 2022). Integrating communication and information technologies into human life has profoundly impacted the educational system. In previous eras, before the advent of the widespread availability of technical equipment, individuals often exclusively engaged in in-person educational instruction (A. H. Almagtome, Al-Yasiri, Ali, Kadhim, & Heider, 2020). In contemporary society, our workspaces and residential environments are replete with abundant technological equipment, constructively necessitating their utilization. As an instructor, rather than prohibiting cell phones during instructional sessions, we have adopted a policy that permits the use of any

technological devices, including mobile phones and computers, inside the classroom. When students are discouraged from using their mobile phones and are instructed to store them in their bags, their cognitive faculties become preoccupied with strategies for accessing and utilizing their electronic devices. Suppose individuals do not utilize their time for educational purposes. Under such circumstances, individuals frequently partake in leisure pursuits such as gaming or excessively indulging in social media platforms like Instagram and Facebook, primarily fixating on consuming their chosen content and unproductively occupying their time (Muxtorjonovna, 2020). The main principles of blended learning are: (1) self-regulation of learners, (2) flexibility of time and place, (3) active learning methodologies, (4) availability of online materials, (4) stimulating the learning experience, (5) creating the appropriate emotional learning atmosphere (Vaughan et al., 2013). Accordingly, blended learning is "an effective educational program for successfully providing educational content and integration through connected and independent classes, whether online, during classes, or independent study for students." It can also be described as offering online access to the activities and resources utilized in traditional classes (Armellini & Rodriguez, 2021). Rianto (2020) explained the difficulties of blended learning due to:

1. Failing to acknowledge the significance of blended learning as a novel method to enhance the educational process and optimize learning results.

2. Transitioning from the traditional learning approach, characterized by teacher-led lectures and rote memorization for students, to a contemporary learning method poses challenges.

3. Language barrier: Most applications and tools were created in a non-native language (English), hindering students from effectively and simply utilizing them.

4. The presence of human and material barriers, such as the inadequate provision of technical services in laboratories and the absence of comprehensive qualification and training programs for students. There is a scarcity of computers, software, and networks, which are expensive.

5. Most of the courses are still in paper format and require conversion into electronic files for easier management.

6. The students' equipment used for training at home is inefficient, resulting in challenges with evaluation, monitoring, correction, and absence systems.

The author's definition of the dimensions of blended learning varies depending on their perspective. We shall discuss several of these characteristics, as presented in the following **Table 1**:

Table 1. Dimensions of Blended Learning According to the Opinion of Several Researchers

#	Researcher Name, Year, Page	Dimensions
1	Saboowala and Manghirmalani Mishra (2021)	We are acquiring adaptability, remote instruction, academic organization, Technological advancements, traditional learning, and virtual engagement.
2	Babu (2020)	Educational content, media, learning environment
3		Place (traditional education, e-learning), Time (synchronous and asynchronous) Learning (individual learning, such as blogs, and cooperative learning, such as video conferencing).
4	Munawar, Khan, Suleman, and Ali (2023)	Time, cost, potential, and ambient conditions.
5	Alsalhi et al. (2019)	The institutional dimension, the educational dimension, the technical dimension, the interface designing dimension, the evaluation dimension, the management dimension, the supporting resources dimension ,and the ethical dimension.
6	Al-Ramadin (2018)	contact/interactions dimension, technology dimension, teacher dimension, teaching dimension, and course administration dimension.

Dimensions of Blended Learning

The research was based on Ray Alsalhi et al. (2019) in the process of dividing the dimensions of blended learning as it is comprehensive in all aspects of the educational environment and its analysis, and the following is a brief explanation of these dimensions.

Institutional Dimension

The institutional dimension encompasses the organizational and administrative aspects of academic affairs and student services, the university's preparedness for implementing the blended learning program, and the existing infrastructure to support it.

Administrative Dimension

It deals with issues related to blended learning management, such as infrastructures and management of multiple delivery methods, such as scheduling various elements of blended learning.

Technical Dimension

I am studying the technical aspects of the presentation, including the design of the learning environment and the tools and techniques employed in the presentation.

Interface Designing Dimension

It is related to the design of the factors used for each element of the blended education in the program; the interface should be sophisticated, i.e., contain a browser, graphs, and other things to make it easier for the learner to deal with each style of presentation and transition between all different types.

Educational Dimension

It focuses on the content that will be presented based on the needs of learners and the objectives of education, and this dimension is one of the most critical dimensions, as it deals with teaching and authentic learning and how the blended learning program is designed through the selection of goals and methods of presentation as well as presentation patterns.

Resources Dimension

It is related to different numbers and types available to learners, in addition to organizing them. Hence, they allow the learner to view, copy, store, and print quickly.

Evaluation Dimension

It focuses on the program's usability and can evaluate its effectiveness and the learner.

Ethical Dimension

It relates to the literary issues that should be addressed when developing any blended learning program, i.e., it addresses equal opportunities and cultural diversity and ensures that the program serves people with special needs.

Benefits of Blended Learning

Great educational benefits of blended learning can be achieved if you adhere to the application of its curricula, and the truth is that blended learning curricula that benefit from the participation of technological means that are visible and easily accessible, as its benefits can be crystallized as follows (Anthony Jnr, 2022; Kastner, 2019).

Educational Richness

The BL method enhances the decision-making abilities of educational lecturers by facilitating effective learning of lecture content for students.

Access to Knowledge

The BL method enhances the likelihood of unrestricted information availability.

Social Interaction

BL fosters a conducive environment for learners to exchange questions, prevent misunderstandings, and offer diverse perspectives that can assist them in reevaluating their positions, thereby augmenting opportunities for social interaction.

Personal Guidance

Providing a BL (Blended Learning) course enhances students' ability to make choices by fostering the development of their emotional and motor skills in the learning process.

Cost-Effectiveness

Blended learning (BL) decreases the spatial demands for students and minimizes lecture duration, creating room for additional activities. Additionally, it contributes to the reduction of melasma.

The Concept of the Modified Deming Technique (PDSA)

The notion of continuous improvement in colleges and universities refers to the persistent commitment of academic institutions to enhancing processes and practices concerning student outcomes and system efficiency and effectiveness. This commitment is driven by the perpetual challenge of ensuring the quality of education. One possible strategy to increase education quality is applying tools and concepts like Lean Six Sigma and Total Quality Management (TQM). Course on Deming's principles. This research utilizes the Plan-Do-Study-Act (PDSA) course, a principle of continuous process improvement and problem-solving approach. The PDSA course serves as an educational methodology and framework to enhance the quality of the blended learning system. Higher education institutions have widely employed such models in line with improving education quality through innovation and continuous improvement. In this research, we adopt the Deming model, which focuses on ongoing educational reforms to enhance output quality. To evaluate the effectiveness of the blended learning system in our specific context and identify any shortcomings in the system, we will utilize the modified PDSA cycle. This cycle shares similarities with other models of continuous improvement, as it involves a cyclical process of converting potential interventions into actions for continuous quality enhancement. In the 1990s, technology underwent a transformation that is familiar to us today. This transformation was characterized by four stages identified by the quality pioneer Deming. The stages are planning, implementation, study, and correction. Planning involves identifying and studying the problem, collecting relevant data, and setting goals and objectives. Implementation entails identifying needs, proposing a change, and implementing a solution. The study involves monitoring and evaluating actions. Correction includes adopting, adapting, refining, and making new proposals. It is a model that requires a lengthy time to adopt (Rodriguez, 2022). Carzoli (2021) defines a model as a systematic series of actions designed to continuously improve a product or process by gaining critical knowledge and information. Additionally, it has been described as recording modifications, conducting experiments, or collecting data to enhance the standard of healthcare services (Manandi et al., 2023).

Benefits of Applying the (PDSA) PLAN - DO - STAY - ACT Course

PDSA technology brings several benefits, including (McNicholas, Lennox, Woodcock, Bell, & Reed, 2019).

1. Effective use of data, i.e., collecting enough information and data to reach the best procedures that lead to improvement.

2. The most essential advantage often arises from courses that yield meaningful lessons with minimal investment in learning, resulting in a high "return on failure." These courses provide crucial information on what needs to change and how to go about it despite potentially poor results.

3. Identify the necessary performance improvements.

4. Predict errors expected to occur during implementation.

5. Increases confidence that a change in study style will lead to improvement.

Factors Affecting the Unsuccessful Execution of the PDSA Steps

The planning phase involves identifying the problem and is crucial for successfully implementing PDSA technology. Inadequate planning might hinder the execution and learning process of a poorly conceived plan. Flawless implementation alone cannot ensure success if the plan is inadequately devised (Yapa et al., 2020). The implementation stage is crucial, and teams may encounter obstacles in progressing to the study stage due to issues at this phase, such as inadequate planning, or factors beyond the improvement team's control, such as the difficulties of allocating time for change tests, staff turnover, or shifting and conflicting priorities. By halting at the "implementation" stage, the crucial part of PDSA that supports iterative design and enhances the effectiveness of optimization input is eliminated. Another crucial yet frequently disregarded element during the "implementation" phase is inductive learning, which involves progressing from specific instances to general principles by formulating theories and laws. This entails observing unexpected phenomena and incorporating these findings into the study phase.

During the research phase, there are instances where improvement teams bypass the "study" phase entirely and proceed directly from "implementation" to "action." In certain instances, the "study" phase may gather inadequate or inappropriate data to address inquiries arising from new inputs. For instance, quantitative data alone can evaluate the effects of a specific alteration without providing qualitative feedback. Consequently, the underlying causes of these outcomes or employees' perspectives and suggestions for potential enhancements will

remain undisclosed. Teams may draw erroneous conclusions from the collected data or overlook unforeseen repercussions, resulting in improper decisions. A frequent issue is the failure to implement suitable measures based on the knowledge gained from the study phase and prior PDSA training. Inappropriate actions may encompass the endorsement or enlargement of inputs that have not been substantiated as acceptable or productive or the cessation of a project that has demonstrated success or is progressing toward achieving it. The work phase involves a theoretical evaluation of how the inputs are intended to generate the desired outcome. Iterative revision is a crucial element of the PDSA technique, but it is frequently disregarded in practical application (McNicholas et al., 2019).

METHODOLOGY

The adoption of blended learning curricula came as a clear and robust regulatory requirement, not only because of the circumstances imposed by the Coronavirus (COVID-19) pandemic but also because of technological and global developments in teaching techniques. Most universities now include units that use e-learning platforms and tools to support teaching and learning via The Internet, such as electronic learning platforms and preparing tests via Google Forms. In light of this, the research will verify the effectiveness of blended learning as essential to education according to students' perceptions. In light of the above, the research problem can be formulated by raising the following questions:

What is the reality of applying the dimensions of blended learning at Al-Mamoun University College and its teaching practices and implementation from the point of view of several students?

How does using the modified Deming technique (PDSA) help to improve the quality of blended learning?

The Research Sample

Al-Mamoun University College is one of the oldest and most distinguished private colleges in Iraq, as it was established in 1990 in Baghdad by two departments, Fatt for geography and history, and in 1993, a computer department was established. The Department of Business Administration and Law, the college expanded to become in 2023 and includes (11) scientific departments. The number of students is about 650,000 students. The research sample was represented by several students of the fourth, third, and second stages of the Department of Business Administration, whose number is about (600) students practiced e-learning during the coronavirus pandemic, constituting 23% of the total number. As the number of questionnaires distributed reached (192) (149) were retrieved.

Internal consistency refers to the degree to which the questions in a scale aim to measure the same general purpose (DeVellis & Thorpe, 2022). It also refers to the likelihood of obtaining consistent results when the same scale is repeated. The Cronbach alpha coefficient is a commonly used measure of internal stability, with values ranging from zero to one. The stability of the variable and dimension values were assessed using the alpha coefficient, with a threshold of 0.70 and above (Hair, Hair Jr, Sarstedt, Ringle, & Gudergan, 2023). **Table 2** displays the range of Cronbach's Alpha values, which fell between 0.750 and 0.910, indicating higher significance than the threshold of 0.70. The adequate internal consistency of variables and dimensions demonstrates the statistical soundness of administrative and social research. These findings suggest that the research scale (questionnaire) exhibited strong stability.

Table 2. Stability Coefficients of the Search Measurement Tool

Cronbach Alpha	Search Variables
0.765	Institutional dimension
0.860	Administrative dimension
0.756	Educational dimension
0. 733	Ethical dimension
0.732	Technical dimension
0.741	Interface design
0.701	Sourcing Support
0.709	Calendar
0.928	Improving blended learning

Stability of the Tool (Resolution) Using the Method of Half Segmentation

The scale was partitioned into two equal groups using distinct methods: paragraphs with odd numbers were compared to paragraphs with even numbers, and subsequently, the correlation between the two groups was analyzed. Abu-Bader (2021) conducted a study in 2021 with 15 participants. Upon applying this method, it was discovered that the Spearman-Brown resolution coefficient reached 0.850, while the fractionation resolution coefficient using the Cottman coefficient reached 0.844. These values indicate that the method meets different standards and exhibits high stability. Therefore, it can be reliably used at various times, as demonstrated in **Table 3**.

Table 3. Half Hash

Cronbach's Alpha	Part 1	Value	0.883
		N of Items	21a
	Part 2	Value	0.872
		N of Items	20b
		Total N of Items	41
Correlation between Forms			0.739
Spearman-Brown Coefficient		Equal Length	0.850
		Unequal Length	0.850
Guttman Split-Half Coefficient			0.844

RESULTS

In this paragraph, we will learn about the reality of the variable of improving blended education for a sample of students at Al-Mamoun University College, who numbered (149) according to the response of the sample and based on the arithmetic mean, which represents one of the most important measures of central tendency. The arithmetic mean value represents the value around which all the different values of the variable are centered, and the standard deviation is a measure of statistical dispersion. The coefficient of variation that is used to compare the dispersion, the lower the value, the less this indicates the lack of dispersion of the answers of the sample surveyed, and in the light of the results are arranged importance based on them, and finally determine the level of answer for the opinions of the sample surveyed according to their answers—the use of the five-pointed scale (Likert) in the sample answers to the questionnaire.

Institutional Dimension

Table 4. Institutional Dimension Indicators

Indicators		Q1	Q2	Q3	Q4	Q5	Institutional Dimension
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		3.7584	3.5436	3.5302	4.2013	3.4362	3.6940
Median		4.0000	3.0000	4.0000	4.0000	4.0000	3.6000
Std. Deviation		1.15461	1.17107	1.11232	.770920	.808090	.73137
Variance		1.333	1.371	1.237	.5940	.6530	.535
Range		4.00	4.00	4.00	3.00	3.00	2.80

Through the results of **Table 4**, we note that:

The training of faculty members on blended learning is highly consistent among the participants in the study. The average rating for this training was 4.2013, with a dispersion of .770920. This indicates a strong level of agreement among the research sample. It highlights the significance of training faculty members to effectively utilize this educational method, which has become a crucial aspect of university education. Teachers must gain experience and utilize appropriate tools to meet this necessity. Regarding the lowest level of response among the dimension indicators (the college administration's efforts to update the curricula and vocabulary of educational materials to align with blended learning), the average score was 3.5436 with a standard deviation of 1.17107. This suggests a lack of enthusiasm for updating the curricula and vocabulary of educational subjects to cater to blended learning needs in the college.

At the level of the institutional dimension as a whole, the arithmetic mean reached 3.6940 with a dispersion of .5350, which suggests a good homogeneity strength between the sample answers and that the direction of this dimension is agreed.

The Administrative Dimension

Table 5. Indicators of the Administrative Dimension

		W1	W2	W3	W4	W5	W6	W7	Administrative Dimension
N	Valid	149	149	149	149	149	149	149	149
	Missing	0	0	0	0	0	0	0	0
Mean		3.1946	2.9732	3.1946	3.7047	3.5772	3.3289	3.9396	3.4161
Median		3.0000	3.0000	3.0000	4.0000	4.0000	4.0000	4.0000	3.4286
Std. Deviation		1.18366	1.22445	1.42221	.93363	1.05383	1.2049	.96722	.84905
Variance		1.401	1.499	2.023	.872	1.111	1.452	.936	.721
Range		4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.86

Through the results of **Table 5**, we note that :

The dimension of integrating university activities with blended learning techniques among the teachers in the college is the most consistent in the sample responses. The arithmetic mean for this dimension is 3.7047, with a dispersion of 0.93363, indicating a high level of homogeneity in the answers. This suggests that the teaching staff possess sufficient experience in modern technologies and are adept at managing university activities using blended education methods and techniques. On the other hand, the dimension related to the adequacy of devices available in the college for student needs has the lowest level among the indicators. The arithmetic average for this dimension is 2.9732, with a dispersion of 1.22445, indicating a lack of available devices relative to the number of students in the college.

Overall, the average score for the administrative dimension was 3.4161, with a dispersion of .7210. This suggests that there is a decent level of consistency among the responses in the sample and that the direction of this dimension is neutral.

The Educational Dimension

Table 6. Indicators of the Educational Dimension

		R1	R2	R3	R4	R5	Educational Dimension
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		3.5705	3.4765	3.1074	3.5302	2.9732	3.3315
Median		4.0000	3.0000	3.0000	4.0000	3.0000	3.4000
Std. Deviation		.87961	1.02393	1.19198	1.15990	1.15048	.77347
Variance		.774	1.048	1.421	1.345	1.324	.598
Range		3.00	3.00	4.00	4.00	4.00	3.20

Through the results of **Table 6**, we note that :

The dimension of using blended education in the education process is the most consistent among the sample answers, with an arithmetic mean of 3.5705 and a dispersion of .879610. This indicates a strong consistency level between the research sample's answers. However, it also reveals a disparity between the two teachers in keeping up with the developments of blended education in a way that meets the expectations of the educational stage that requires this type of education. This disparity is because some teachers prefer the traditional education system. Among the indicators of this dimension, the college administration's efforts to ensure the psychological readiness of students for blended learning have the lowest level of interest, with an arithmetic mean of 2.9732 and a dispersion of 1.15048. This suggests a lack of focus on conducting preparatory courses for students to prepare them for blended education adequately.

Overall, the average value of the variable in the educational dimension was 3.3315, with a dispersion of .5980. This suggests that there is a strong consistency among the responses in the sample, indicating agreement in the direction of this dimension.

The Ethical Dimension

Table 7. Indicators of the Moral Dimension

		D1	D2	D3	D4	D5	Moral Dimension
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		3.6913	3.1946	4.1074	3.6577	3.5168	3.6336
Median		4.0000	3.0000	4.0000	4.0000	4.0000	3.8000
Std. Deviation		1.20191	1.20066	.99418	1.11362	1.09424	.59973
Variance		1.445	1.442	.988	1.240	1.197	.360
Range		4.00	4.00	4.00	4.00	4.00	2.20

From the results of **Table 7**, we note that:

The study found that blended learning is particularly effective in helping students, especially those with special needs, overcome shyness and actively engage in lectures. The data collected from the research sample indicates a high level of homogeneity in this regard, with an arithmetic mean of 4.1074 and a dispersion of .994180. This suggests a strong consistency in the responses. Teachers strongly believe blended learning facilitates increased participation and involvement, particularly for students with special needs. However, the study also revealed that there is room for improvement in terms of ensuring equal opportunities and justice in blended learning. Specifically, there is a need to address the issue of shyness among some students and provide them with equal opportunities to participate in e-learning.

Regarding the moral dimension as a whole, the average value of the variable was 3.6336, with a dispersion of .3600, indicating a high level of consistency among the sample's responses. The trend of this dimension remains consistently stable.

The Technical Dimension

Table 8. Technical Dimension Indicators

		H1	H2	H3	H4	Technical dimension
N	Valid	149	149	149	149	149
	Missing	0	0	0	0	0
Mean		4.0805	3.4430	3.1745	3.6107	3.5772
Median		4.0000	3.0000	3.0000	3.0000	3.5000
Std. Deviation		.75799	1.15304	1.15508	.97753	.76223
Variance		.575	1.329	1.334	.956	.581
Range		2.00	4.00	4.00	3.00	3.00

From the results of **Table 8**, we note that:

The college administration emphasizes the importance of teachers possessing internet and computer skills proficiency, which was the most consistent skill among the surveyed sample. The average score for this skill was 4.0805, with a dispersion of .757990, indicating a strong level of consistency in the sample's responses. This highlights the significance of enhancing the skill level of professors in utilizing the Internet and computer technologies. Among the various indicators, the dimension related to the college administration's design of a suitable learning environment for blended learning had the lowest score. This can be attributed to a lack of interest in infrastructure and the need for student preparation and educational development improvements.

Regarding the overall technical dimension, the average score for its variables was 3.5000, with a dispersion of .5810. This suggests a good level of consistency in the sample's responses, indicating a consistent trend in this dimension.

Interface Design dimension

Table 9. Interface Design Indicators

		J1	J2	J3	J4	J5	Interface Designing dimension
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		3.3826	3.2886	3.5168	3.6443	3.5101	3.4685
Median		3.0000	3.0000	4.0000	4.0000	4.0000	3.6000
Std. Deviation		.92705	1.14074	1.15433	.90100	1.01753	.72439
Variance		.859	1.301	1.332	.812	1.035	.525
Range		4.00	4.00	4.00	4.00	4.00	3.40

From the results of **Table 9**, we note that:

(The college administration is interested in ensuring that the interface (beneficiaries) is designed to enable them to use all different types of presentation.) is the most homogeneous among sample A answers, as the arithmetic mean reached 3.6443 with a dispersion of .901000, which indicates the strength of homogeneity among the sample answers. This indicates that the administration of The college is interested in providing the most significant possible amount of various blended education offerings, while the lowest level among the dimension indicators was (the college administration provides educational websites that help in completing tasks to the fullest extent) due to the lack of interest in developing modern electronic websites that are characterized by ease and speed of use that suit the needs of students to perform. Regarding the overall interface design dimension, the arithmetic mean was 3.4685, with a dispersion of .724390. This suggests that there is good uniformity across the sample's responses and that the trend of this dimension is neutral.

The Source Support Dimension

Table 10. Indicators Source Support Dimension

		C1	C2	C3	C4	C5	Source Support Dimension
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		4.0604	3.7248	3.5973	3.5168	3.6174	3.7034
Median		4.0000	4.0000	4.0000	4.0000	4.0000	3.6000
Std. Deviation		.77310	1.14407	1.31991	1.01078	1.02402	.66357
Variance		.598	1.309	1.742	1.022	1.049	.440
Range		2.00	4.00	4.00	4.00	3.00	2.20

From the results of **Table 10**, we note that:

Utilizing a blended learning approach enhances learners' ability to retain information, as evidenced by the high level of homogeneity among the responses in the research sample. The average score obtained was 4.0604, with a dispersion of .773100, indicating a significant level of consistency. This suggests that the blended learning method enables students to capture lecture content for future reference effectively. However, it is worth noting that the lowest indicator among the dimensions studied is the lack of interest in incorporating the blended learning strategy to align with the modern educational practices observed in developed countries. Regarding the dimension of source support, the average score obtained was 3.6000, with a dispersion of .4400, indicating a good level of consistency among the sample's responses. The trend observed in this dimension remains consistent.

The Evaluation Dimension

Table 11. Evaluation Dimension Indicators

		B1	B2	B3	B4	B5	Evaluation Dimension
N	Valid	149	149	149	149	149	149
	Missing	0	0	0	0	0	0
Mean		3.8255	3.7517	3.7181	4.0134	4.0805	3.8779
Median		4.0000	4.0000	4.0000	4.0000	4.0000	3.8000
Std. Deviation		.836110	.837520	.908520	.999910	.692790	.58527

	B1	B2	B3	B4	B5	Evaluation Dimension
Variance	.699	.701	.825	1.000	.480	.343
Range	3.00	3.00	3.00	3.00	2.00	2.00

From the results of **Table 11**, we note that:

The most consistent response among the participants in the study is that the teacher effectively plans the dates of lectures and tests, both traditional and electronic, to ensure they do not overlap or occur too close together. This is evident from the arithmetic mean of 4.0805 and a dispersion of .692790, indicating a high level of homogeneity. Within the given responses, it is evident that integrated education allows for the potential to schedule daily and monthly lectures and examinations to accommodate the students' availability without causing any scheduling conflicts. The teacher employs a suitable approach for each learner's performance regarding the lowest level among the dimension indicators. Blended learning facilitates interactive communication between individuals in online sessions. However, some teachers lack interest in adapting their scientific lectures to cater to students of different levels, which poses a challenge in e-learning. Regarding the overall evaluation dimension, the average value of the variable was 3.8779, with a dispersion of .585270. This suggests substantial uniformity among the sample's responses, and the trend of this dimension is consistent.

The Modified Deming Technique

In this paragraph, the PDSA methodology will be applied as follows:

1- Plan

Planning to adopt blended learning curricula and making it a clear and robust organizational requirement, not only because of the circumstances imposed by the pandemic but also because of technological developments in teaching techniques, mainly since most Iraqi universities, including Al-Mamoun College, include units that focus on using e-learning platforms and tools to support teaching and learning via The Internet and preparing tests using Google forms.

2- Execute

At this stage, data was collected using a questionnaire, which considered simplicity in its wording and ensured the stability of its paragraphs that benefit the person being investigated. A random sample was chosen from Al-Mamoun University College, represented by the Department of Business Administration. It included students of the fourth, third, and second stages because they have a clear vision of how to deal with blended learning, which was used with them in the previous stages. Questionnaires were distributed to (192) students, and (149) were retrieved, suitable for analysis. Statistician.

3- Study

The analysis of the study's data, presented in **Table 12**, reveals that the evaluation dimension had the most significant overall arithmetic mean of (3.88), indicating a fair level. This dimension also had a standard deviation of (0.59) and a coefficient of variation of (15.09). The consensus reached was 78%, while there was also some disagreement. The university administration evaluated the blended learning program's effectiveness, focusing on the dimension placed first in relative importance, reaching a percentage of 22%. This demonstrates the administration's commitment to assessing the program's efficacy. The blended learning program should incorporate the capability to assess learners' performance. The teacher employs a suitable approach to synchronize the scheduling of traditional and electronic lectures and assessments, ensuring that they do not occur nearby or concurrently. The teacher employs a suitable assessment technique for each evaluation of learners' performance in blended learning.

The lowest arithmetic mean was seen in the educational dimension, with a value of 3.33. The standard deviation was 0.77, indicating a moderate level of variance. The coefficient of variation was 23.22%, indicating a relatively high degree of variability. The percentage of agreement was 67%, while the percentage of disagreement was 33%. This realm originated at the seventh level. This suggests the teacher's interest in incorporating blended education into the instructional process. The educators claim that this instruction enhances the capacity for innovative thought about scholarly investigation. How to incorporate technology into education, specifically about students' scientific curiosity. However, despite the teacher's explanation, the degree of interest remained ordinary. Guidelines for engaging in electronic lecture activities and utilizing various modalities in the blended learning lecture, such as video presentations, competitions, assignments, etc. The results suggest that the teacher consistently favors instructing the audience due to their pivotal role in facilitating positive student interaction and knowledge dissemination. Efficiently assess immediate responses to the content. Generally, the variable "improving integrated education" had an arithmetic mean value of 3.59, indicating a reasonable level. The

standard deviation was 0.53, and the coefficient of variation was 14.79%. Additionally, there was a 72% agreement on this measure. By contrast, the level of disagreement reached 28%, as indicated in **Table 12**.

Table 12. Statistical Indicators of the Dimensions of Improving Blended Learning

Search Dimensions	Arithmetic Mean	Standard Deviation	Coefficient of Variation	Agreement Ratio	Percentage of Disagreement	Materiality
Institutional Dimension	3.69	0.73	19.80	74	26	4
Administrative Dimension	3.42	0.85	24.85	68	32	8
Educational Dimension	3.33	0.77	23.22	67	33	7
Ethical Dimension	3.63	0.60	16.51	73	27	2
Technical Dimension	3.58	0.76	21.31	72	28	6
Interface Design	3.47	0.72	20.88	69	31	5
Sourcing Support	3.70	0.66	17.92	74	26	3
Calendar	3.88	0.59	15.09	78	22	1
Improving Blended Learning	3.59	0.53	14.79	72	28	

Work, which includes several steps:

Adoption: Adopting blended learning in all college education stages and working to develop it allows the smooth delivery of scientific material to many students simultaneously because it is one of the essential alternatives in light of exceptional circumstances. It also gives students independence in dealing partially with digital media. And the Internet (similar to mobile learning, but blended learning has a more "formal" form).

Adaptation: This education system should be adapted regularly to enable students and teachers to adapt to continue learning with modern education methods.

Abandonment: Based on the research results, blended learning cannot be abandoned as it is one of the essential alternatives in facing future crises that the college may go through, for example, political, economic, or social conditions, taking into account the advantages that involved the learner's participation in blended learning and developing skills. Communication, increasing the level of self-confidence and developing teaching methods, although this system of education may face many limitations, such as the method of communication in which the benefits of face-to-face communication cannot be compared with learning via electronic platforms, as well as the lack of learning experiences tailored to a one-size-fits-all approach.

DISCUSSION

This study examines the perception of students towards blended learning at Al-Mamoun Private University College and suggests a framework for ongoing improvement using the modified Deming Approach (PDSA). Most research has shown that integrating efficient design into the educational process may improve the blended learning system, instructional effectiveness, and student happiness. The study used descriptive, exploratory, and analytical methodologies to acquire empirical knowledge. The findings demonstrated the ability to readily embrace novel teaching and learning approaches and devise strategies to enhance students' behavior and conduct. These endeavors guarantee the ongoing delivery of top-tier educational services by educational institutions. The advent of novel and continuously increasing information and communication technologies has played a vital role in developing and enhancing blended learning programs. The continuing COVID-19 epidemic has presented an excellent chance to minimize limitations on academic courses, generally confined by rigid timetables and time limits. Ensuring that technology does not impede the implementation of blended learning is paramount. Integrating cloud-based information and communication technologies (ICT) may boost the effectiveness of blended learning. Integrating cloud technology with conventional online and mixed learning may augment student autonomy, facilitate remote learning, and foster collaborative research. Furthermore, integrating blended

learning techniques, such as the amalgamation of e-learning and jigsaw approaches, might result in elevated levels of student satisfaction and enhanced information retention. Blended learning has shown its efficacy in several domains, such as medical education, by enhancing student performance and fostering a greater sense of initiative in the learning process. Moreover, blended learning approaches have shown cost-effective advantages compared to conventional in-person instructional techniques. By using cloud technology and adopting blended learning methodologies, one may enhance the quality of learning experiences and achieve better results. The Plan-Do-Study-Act (PDSA) cycle, a modified approach developed by Deming, has been used in several domains, including e-learning. The PDSA cycle is a systematic approach to enhancing procedures and quality via the repeated testing of individual modifications. It has effectively facilitated managing a large-scale e-learning project, including planning, describing, creating, implementing, and evaluating online courses. The PDSA cycle has been used in healthcare settings to optimize operations and quality, including minimizing the average duration of hospitalization and improving the occupancy and efficiency of palliative care. The FOCUS-PDSA model is a widely used technique in healthcare for continuous improvement and quality assurance. It combines the FOCUS sequence to identify areas for improvement with PDSA cycles to verify improvements. Enhancing blended learning may be accomplished via the use of the modified Deming approach. The modified Delphi approach entails collecting information from participants and achieving a consensus among experts with divergent perspectives. This may improve learning formats and instructional strategies in a blended learning setting. Moreover, using the Deming technique may enhance student attendance in laboratory sessions and elevate student test results. Furthermore, artificial minority oversampling techniques and feature selection methods may enhance the precision of forecasting students' activity patterns in a blended learning setting. By carefully choosing the most suitable subset of student activities, it is possible to obtain considerable improvements in prediction accuracy. The modified Deming approach may optimize blended learning by enhancing teaching efficacy, increasing student contentment, and reducing university attrition rates.

CONCLUSION

Iraqi institutions underwent substantial changes in their educational methods in the latter years of the twenty-first century. These changes were primarily influenced by the global Coronavirus (COVID-19) pandemic and technological improvements, politics, and economics. The ongoing epidemic has considerably influenced the educational community, leading to rigorous deliberation regarding continuing studies and rehabilitation. Educational institutions and educators have exerted conscientious efforts to facilitate the reopening of educational facilities and delivering lessons to pupils. They have exhibited flexibility in adopting novel teaching and learning methodologies and have formulated tactics to improve students' demeanor and conduct. These efforts aim to guarantee educational institutions' ongoing delivery of exceptional educational services. The emergence of new and constantly expanding information and communications technologies has been crucial in developing and improving blended learning programs. The ongoing COVID-19 pandemic has provided a notable chance to alleviate the restrictions imposed on academic courses, sometimes bound by precise schedules and timeframes. It is crucial to ensure that technology does not hinder the implementation of blended learning. Instead, providing faculty members with continuous technical assistance is crucial to reduce their reliance on acquiring new information and abilities. When individuals assume responsibility for technology management, it is crucial to highlight the educational benefits of blended learning designs, which involve increased teacher-student engagement through enhanced human interaction. Both traditional online and face-to-face training formats possess distinct strengths and weaknesses, as well as benefits and drawbacks. The text highlights the advantages of incorporating "blended learning" into educational settings, which involves the integration of conventional in-person instruction with online learning techniques to produce a unified course. By incorporating "blended learning" into the educational curriculum, instructors gain access to a wide range of materials that enable them to effectively prepare and provide high-quality instruction.

Instructors' and support technicians' competencies are improved by combining blended learning and Internet browsing. In addition, their training includes acquiring skills in creating digital content, allowing them to efficiently distribute scientific information to pupils through online platforms—organizing workshops involving a diverse group of educators, technicians, and administrators to create a blended learning curriculum collectively. The essential preparations for implementing a blended learning program comprise multiple facets, such as administrative procedures, teaching staff, students, educational curriculum material, infrastructure, and engagement of public stakeholders. Advocates promote contemporary educational approaches, such as autonomous, self-directed, and peer-based learning, as effective methods to develop cognitive and professional capabilities. This equips students with the required capacities to meet the demands of the job market. They are

creating a committee or team and granting it the power to collaborate with computer companies to acquire cutting-edge laptop computers to be delivered to students. Establishing agreements with Internet companies is essential to guarantee the provision of sufficient Internet capacities and speeds that align with the requirements of blended education. Specialized scientific committees, including experienced educators, are established to evaluate and examine the current scientific material, improve its quality, and include the objectives of blended learning. The goal is to establish a digital repository that offers inclusive access to diverse books and scientific materials, guaranteeing uninterrupted availability for all individuals.

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