

# FOSTERING 21<sup>ST</sup> CENTURY SKILLS IN PRE-SERVICE TEACHERS THROUGH PROBLEM BASED LEARNING: INTEGRATING REAL-WORLD PROBLEM SOLVING IN TEACHER EDUCATION PROGRAM

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## ABSTRACT

*Problem-based learning (PBL) is increasingly recognised as an effective alternative teaching strategy in higher education. By introducing significant, real-world problems at the beginning of the learning process, PBL redefine traditional teaching approaches and provides prospective teachers with a contextual framework for learning. This study aimed to investigate the impact of PBL on prospective teachers' academic performance and engagement and to study the challenges faced by Prospective Teachers conducting problem-based learning in the classroom. A quantitative research design was employed, involving a sample of N=150 prospective teachers from the Education Department at Shaheed Benazir Bhutto University, Shaheed Benazir Abad. Data were collected using quota sampling across batches 2019, 2020, and 2021. Based on a Likert scale, close-ended questionnaires served as the primary data collection tool. Data were analyzed using SPSS, with Cronbach's Alpha indicating strong internal consistency. Regression analysis revealed significant within-subject variations. The findings indicate that the majority of respondents agree that PBL enhances the academic achievements of prospective teachers. However, challenges such as time constraints and the complexity of implementation were noted. The study recommends adopting a flexible pedagogical approach that blends traditional teaching methods with PBL to optimize outcomes. Furthermore, it highlights the need for faculty development programs to address gaps in teacher expertise and overcome challenges in implementing PBL effectively.*

**Keywords:** Problem-Based Learning, Prospective Teachers, University Education, Pedagogical Flexibility, Learners' Engagement.

## INTRODUCTION

Postsecondary education has undergone significant transformation, driven by the liberal tradition that emphasizes critical thinking and problem-solving skills. Problem-based learning (PBL) has emerged as a pivotal pedagogical approach in this shift, fostering the integration of knowledge through real-world problem-solving (Tan, 2021). Unlike traditional methods, PBL immerses learners in real-world challenges from the outset, encouraging active engagement and

solution-focused learning (Lee & Jo, 2023). This approach not only contextualizes academic concepts but also motivates prospective teachers to explore and resolve complex issues, enhancing their analytical and problem-solving abilities (Cebesoy & Rundgren, 2023).

Despite its global recognition, the adoption and impact of PBL in specific regions, such as Pakistan, remain underexplored. In Pakistan, the educational landscape is shaped by diverse

cultural, socioeconomic, and political factors (Fidan & Tuncel, 2019). The province of Sindh, with its varied student demographics and institutional challenges, offers a unique context for examining the implementation of PBL. While PBL holds promise for improving undergraduate education in Sindh, there is a noticeable lack of research on its application, challenges, and effectiveness in this region (Hung, Jonassen, & Liu, 2008). This knowledge gap underscores the need for a comprehensive study to evaluate the applicability, benefits, and limitations of PBL within Sindh's distinct sociocultural and educational framework

### Research Objective

1. To investigate the impact of problem-based learning on the academic performance of prospective teachers.
2. To identify the challenges faced by prospective teachers when conducting problem-based learning in the classroom.

### Research Questions

1. What is the impact of problem-based learning on the academic performance of prospective teachers?
2. What challenges do prospective teachers face when conducting problem-based learning in the classroom?

### Literature review

Problem-based learning is widely regarded as a paradigm shift that has brought about revolutionary changes in the field of education (Duda, et.al, 2019). This method has shifted the focus away from the old paradigms of teaching and learning, placing more of an emphasis on student-centred learning rather than the more traditional model of teacher-led instruction. problem-based learning may be traced back to the middle of the 20th century, representing a considerable divergence from the established educational conventions of the time. Problem-based learning's genesis and development can be traced back to this period. The middle of the 20th century was a time of significant upheaval and advancement. During this time, the globe was still picking up the pieces after the devastation wrought by globe War II, and there was an urgent need for innovative educational methods that could meet the challenges of the contemporary day. It became more apparent that traditional methods of education, which mostly consisted of lecturing,

were not suitable for preparing prospective teachers for the obstacles that they would face in the actual world (Ulger, 2018; Lashari & Umrani, 2023). The beginnings of problem-based learning may be traced back to this era when the concept was first conceived.

The university is widely regarded as the institution that spearheaded Problem-Based Learning in the 1960s. The instructors at the university recognised the constraints posed by traditional teaching methods in fostering the growth of critical thinking and problem-solving skills in medical prospective teachers (Lashari et al., 2018; Ahmed, Lashari & Golo, 2023). They believed that prospective teachers would benefit more from a curriculum that emphasised real-life medical cases from the past, rather than focusing on the repetitive memorization of material (Buriro et al., 2023). Consequently, a novel instructional approach emerged, wherein prospective teachers were assigned authentic medical problems to examine, discuss, and resolve collectively. Consequently, a novel educational paradigm was established. This marked the inception of what would later be recognised as problem-based learning.

Problem-based learning was not only a passing educational fad; rather, it was a reaction to the larger social changes that were going place at the time. The 20th century witnessed the beginning of the information era, which meant that books and schools were no longer the only places where people could get knowledge (Lee & Jo, 2023). Because of the explosion of information sources and the advent of the internet, it is now very necessary for prospective teachers to acquire the abilities that will allow them to differentiate between different types of knowledge, assess that knowledge, and apply it to relevant situations in the real world (Rehman, Lashari & Abbas, 2023). Problem-based learning, with its focus on active learning, critical thinking, and teamwork, was well suited to meet these demands because it was perfectly suited to address these needs.

The fact that problem-based learning's relevance and influence have been recognised by educational researchers and practitioners alike is shown by David Boud and Grahame Feletti developed deep into the complexities of problem-based learning, investigating both its theoretical underpinnings and its implementations in the real world (Ulger, 2018; Fayaz et al., 2023). They emphasized how problem-based learning had been modified and

applied in a variety of educational contexts, ranging from schools of medicine and business to schools of engineering and the humanities. The findings of their study offered important new perspectives on the advantages of problem-based learning, such as increased student engagement, higher information retention, and the development of abilities for learning to continue throughout one's life.

On the other hand, just like every other method of teaching, problem-based learning has its fair number of detractors. Some teachers were concerned that problem-based learning may cause pupils to have knowledge gaps because they might not pay enough attention to fundamental ideas when they are concentrating on solving particular issues (Cebesoy & Rundgren, 2023). Others voiced concerns over the practicability of applying problem-based learning in big classes as well as the possible difficulties that may arise when evaluating the performance of pupils. Despite these issues, the use of problem-based learning has been steadily increasing, which has been driven by good feedback from prospective teachers as well as real improvements in the outcomes of learning. problem-based learning has undergone development and modification during its existence to better meet the requirements of a variety of educational settings. The use of digital tools and platforms has made possible more interactive and immersive learning experiences, which has contributed to the further enrichment of the problem-based learning experience brought about by technological improvements (Raichel, 2022). Prospective teachers are presented with chances to study, experiment, and explore in ways that have never been possible before thanks to some of the most recent additions to the problem-based learning toolset, including virtual reality, augmented reality, and artificial intelligence.

## **METHODOLOGY**

This chapter, therefore, goes deeply into the study approach that has been painstakingly selected to evaluate the accomplishments of Prospective teachers inside a problem-based learning environment at a Shaheed Benazir Bhutto University Shaheed Benazirabad has been included into the curriculum of universities all over the globe in an effort to develop Prospective teachers who are not just informed but also skilled in the application of their knowledge in real-world situations.

This study was determined that a technique based on surveys would be the most appropriate approach to take, particularly due to the survey's capacity to collect data from a diverse range of respondents in an organized fashion (Creswell & Creswell, 2017). Surveys are considered as important ways of collecting research data and have been considered as robust means. Education in Sindh is characterized by its own unique set of dynamics, which are shaped by a variety of cultural, social, and economic variables. This is accomplished by placing the study within the context.

### **Sample Size**

A sample of 150 Prospective teachers was randomly selected from Education department of the Shaheed Benazir Bhutto University Shaheed Benazir Abad.

### **Sampling Technique**

A quota sampling technique was employed to ensure representation from batch 19, 20 and 21 batch Prospective Teachers ' of the education department. The concept of quota sampling was initially proposed by Moser and Stuart in the context of experimental research (Creswell & Creswell, 2017). The quota sampling approach bears a resemblance to stratified sampling since it involves the selection of a sample from a population that has been partitioned into several subgroups (Futri, Risfandy & Ibrahim, 2022). In contrast to stratified sampling, which involves the random selection of subgroups, quota sampling employs a convenient approach within each segment (Creswell, 2013). To enhance the credibility of the participants, a set of specified criteria is employed when choosing samples following the definition of the population. This is commonly referred to as the controlled quota.

### **Survey Instrument**

A closed-ended questionnaire was developed as the primary instrument for data collection. The questionnaire was designed to be concise, clear, and easy for respondents to complete. The questionnaire was adapted from Ulkarr Satarova's study conducted in 2021.

### **Data Analysis**

Data collected from the closed-ended questionnaire was analysed using statistical software SPSS. Descriptive statistics, such as means, standard deviations, and frequencies, were computed. Inferential statistics, including t-

tests and Regression analysis, were used to determine significant differences in Prospective Teachers' achievements across various groups. This study aims to investigate the utilization of regression analysis to analyze the impact of Problem-Based Learning on the evaluation of learning outcomes among aspiring educators. The objective of this study is to utilize regression analysis to investigate potential associations between the adoption of problem-based learning and the evaluation results among prospective teachers. The regression analysis will help to understand the relationship between the variables (Pallant, 2022). The study also uses T-test to see the impact of the problem-based learning based on gender difference (Pallant, 2022).

Variables	Items	Cronbach's Alpha
Academic achievement	10	.799
Challenges of PBL	09	.786

## Results and Analysis

This study provides an in-depth analysis of the data collected through a structured questionnaire aimed at assessing Prospective Teachers' on Problem-Based Learning. A series of statistical analyses have been performed using SPSS, including Descriptive Statistics, Reliability Statistics, Regression analysis and T-test. Each section will present the findings, their interpretation, and implications for the broader study.

### 4.1. Frequency Table

Table 4.1.1 Gender

Gender		Frequency	Percent
Valid	Male	81	54.0
	Female	69	46.0
	Total	150	100.0

Graph 4.1.1

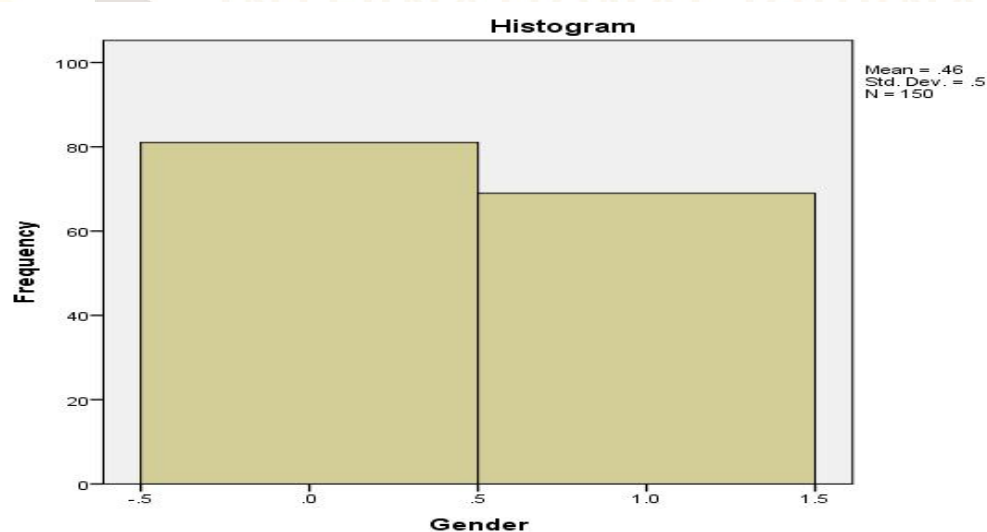


Table 4.1 Presents the frequency and percentage distribution of the participants based on gender. Out of 150 total respondents, 81 (54%) are female, and 69 (46%) are male. This shows that the sample has a fairly balanced gender distribution, although there is a slightly higher

representation of females. The balanced nature of the sample allows for a meaningful comparison of male and female prospective teachers' achievements and experiences in the problem-based learning environment.

Table 4.1.2

### Age of Respondents

Age		Frequency	Percent
Valid	18-22	80	53.3

23-27	54	36.0
28-32	14	9.3
33-37	2	1.3
Total	150	100.0

Graph 4.1.2

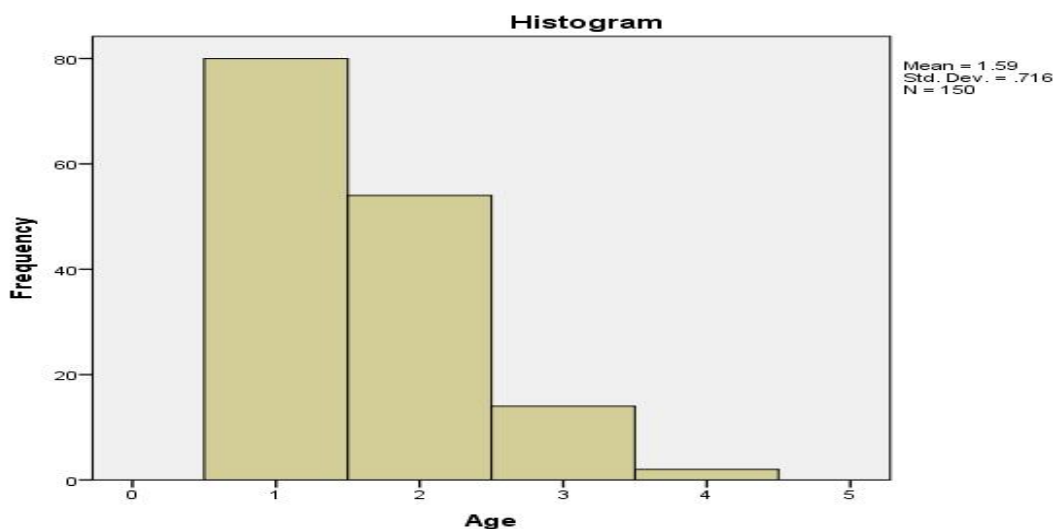


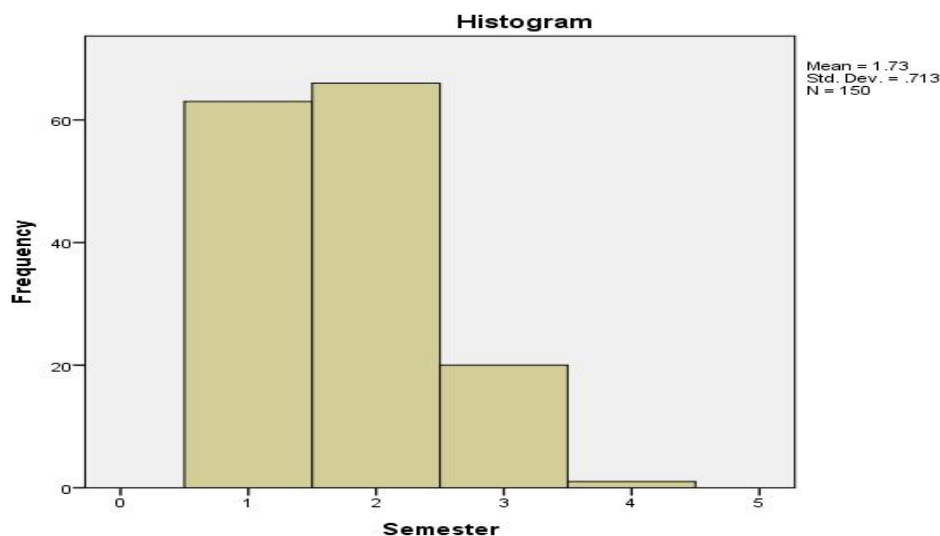
Table 4.1.3 result shows that, out of the total N=150 respondents in the study, there were n=80 (53,3%) respondents belonging to the 18-22 years age category, n=54 (36.0%) respondents belonging to the 23-27 years age category, and

14 (9.3%) respondent belongs to the 28-32 years age category and n=2 (1.3%) belongs to the 33-37 age group. It is observable that respondents in the research study are from all age groups.

**Table 4.1.3**  
**Semesters of respondents**

Batch	Frequency	Percent
Valid Batch 19	63	42.0
Batch 20	67	44.7
Batch 21	20	13.3
Total	150	100.0

Graph 4.1.3





According to table 4.3 reveals that out of the N=150 respondents are participate from different batch 20 and most of respondent n=67 (44.7%) participates from batch 19, n=63 (42.0%) respondent participate from batch 21, n=20 (13.3%) respondent participates.

s.no	Questionnaire	S.D	D	N	A	S.A	Mean	SD
1	Problem-based learning has positively impacted my grades and academic performance.	21	46	31	25	27	2.94	1.327
2	I find that I retain and understand information better through problem-based learning than traditional methods.	28	26	36	31	29	3.05	1.382
3	The collaborative nature of problem-based learning has enhanced my learning experience.	33	30	33	27	27	2.09	1.408
4	Problem-based learning has made me more inquisitive and curious about my subjects.	29	28	37	18	38	3.05	1.451
5	I believe my academic growth has been significantly influenced by problem-based learning.	36	31	31	22	30	2.86	1.452
6	Through problem-based learning technique a student becomes real world problem solver	31	27	33	26	33	3.02	1.440
7	Through problem-based learning technique a student becomes critical thinker.	33	33	30	30	24	2.86	1.390
8	If given an opportunity, I would like to take another problem-based learning class.	23	33	36	39	19	2.99	1.269
9	I have a good understanding of basic principles and concepts.	23	29	30	37	31	3.16	1.366
10	I feel that I can apply the general principles I learned to other topics.	27	29	36	26	32	3.05	1.407

The mean scores of the items range from 2.86 to 3.16, indicating that the students have a moderate level of agreement with the statements related to the impact of problem-based learning on their academic achievement. None of the items have a mean score above 4, which suggests that the students do not strongly agree with any of the statements. The highest mean score is for item 10, which indicates that the students feel that they have a good understanding of basic principles and concepts. This implies that the students think that problem-based learning has helped them grasp the fundamental knowledge of their subjects. The lowest mean score is for item 5, which suggests that the students do not believe that their academic growth has been significantly influenced by problem-based learning. This implies that the students do not perceive

problem-based learning as a major factor for enhancing their academic development. The standard deviations of the items range from 1.269 to 1.452, indicating that there is a moderate variation in the responses of the students. This suggests that the students have different opinions and experiences with problem-based learning and its impact on their academic achievement.

s.no	Questionnaire	S.D	D	N	A	S.A	Mean	S.D
1	I sometimes find it challenging to adapt to the problem-based learning approach compared to traditional learning methods.	28	32	32	25	33	3.07	1.446
2	2. There is a lack of adequate resources and materials to support problem-based learning in some courses.	27	35	24	29	35	3.25	1.375
3	The collaborative nature of problem-based learning can sometimes lead to conflicts and disagreements among prospective teachers.	29	32	36	28	25	2.92	1.359
4	I believe more guidance and support are needed to navigate the challenges of problem based learning effectively	28	34	21	30	37	3.09	1.472
5	Problem-based learning is a difficult method of teaching than traditional method.	34	32	28	32	24	2.87	1.403
6	By problem-based learning potentially poorer performance on test.	32	28	35	27	28	2.94	1.406
7	Lack of objective guidelines in this method.	27	31	33	23	36	3.07	1.432
8	Unequal participation seen in this method.	28	26	36	31	29	3.05	1.382
9	Lack of team spirit find in this method.	15	38	33	36	28	3.16	1.275
10	I feel that not all instructors are adequately trained to implement problem-based learning effectively.	22	27	27	40	34	2.89	1.372

The mean scores of the items range from 2.87 to 3.25, indicating that the students have a moderate level of agreement with the statements related to the challenges of problem-based learning. None of the items have a mean score above 4, which suggests that the students do not strongly agree with any of the statements. The highest mean score is for item 2, which indicates that the students agree that there is a lack of adequate resources and materials to support problem-based learning in some courses. This implies that the students face some difficulties in accessing or finding relevant information for problem-based learning. The lowest mean score is for item 5, which suggests that the students disagree that problem-based learning is a difficult method of teaching than traditional method. This implies that the students do not perceive problem-based learning as a more complex or challenging approach than conventional methods. The

standard deviations of the items range from 1.269 to 1.472, indicating that there is a moderate variation in the responses of the students. This suggests that the students have different opinions and experiences with problem-based learning and its challenges.

### Discussion

On the above findings, 20 items were to assess the Prospective Teachers' achievement in the problem-based learning environment. The instrument consisted of five Likert scales and 20 items with responses recorded. The maximum items were in favour of a problem-based learning environment. Gathered data expose a general prospective teacher's bias ranging from neutral to favourable towards problem-based learning, although with significant variations in their views concerning different aspects of this educational approach. The descriptive statistics

indicate a mild tendency among Prospective Teachers to recognize problem-based learning's value for academic growth, but there's a spectrum of opinions surrounding this notion. The survey's reliability was underscored by a Cronbach's Alpha statistic of 0.78. Additionally, Cochran's Test showed the diversity in Prospective Teachers' regarding the numerous facets of problem-based learning. This implies that a universally applicable strategy might not be the most effective for problem-based learning implementation. Interestingly, both male and female Prospective Teachers often share the viewpoint that problem-based learning presents equivalent challenges and benefits, suggesting its inclusivity as an educational methodology.

It was determined that Cronbach's Alpha has a value of 0.78, which indicates that the items on the questionnaire have an adequate amount of internal consistency. One of the aspects of the descriptive statistics that equipped my curiosity, in particular, was the fact that gender-related questions were rather neutral, with mean values near 3.0. The findings imply that both male and female prospective teachers consider problem-based learning to be equally useful or difficult, which suggests that the instructional strategy is gender-neutral in terms of its efficacy and reception.

Even though the beneficial features of problem-based learning, such as greater involvement in learning activities, critical thinking, creative skills, management skills, problem-solving skills and leadership skills. There is evidence that problem-based learning might be time-consuming and sometimes perplexing for Prospective Teachers. In addition, the results of the survey indicate that not all teachers are considered to have appropriate training in problem-based learning approaches. This shows that there is a potential for faculty development programs to be useful in this area.

It is essential to keep in mind that the scope of this research was restricted to a particular institution, which may not be indicative of student demographics in other educational settings. In further research, to get a more holistic understanding of the usefulness of problem-based learning, it may be necessary to engage several distinct institutions, as well as several distinct educational levels. In addition, the survey did not dive into the causes underlying the prospective teachers' opinions, which was disappointing. Methods based on

qualitative research might provide better insights into this topic.

Problem-based learning boosts prospective teachers' self-regulation and collaboration and increases their excitement for teaching (Duda et al, 2019). The study also revealed that prospective teachers' participation in learning is significantly influenced by the quality of their interactions with their professors.

According to Tan, (2021), project-based learning final grade and peer evaluation grades are positively correlated. In peer grades and final grades, female prospective teachers outperformed male prospective teachers, according to the research. The study, however, did not offer convincing evidence to support the disparities discovered. Student-centred instruction and problem-based learning have a significant impact on academic attainment (Lee, 2022). The study found that student-centred teaching and problem-based learning may account for a sizable portion of the variance in academic performance levels, demonstrating their efficacy in raising academic accomplishment. In conclusion, while there is proof that female prospective teachers perform better than male prospective teachers in problem-based learning, further research is needed.

Real-world issues are used as the foundation for learning in the student-centred teaching method known as problem-based learning. Problem-based learning can aid prospective teachers in acquiring problem-solving abilities, multidisciplinary knowledge, and long-term memory retention. By giving prospective teachers, the chance to engage in real-world problem-solving techniques, problem-based learning may also promote self-control and collaboration, strengthen the bonds between prospective teachers and instructors, and increase student motivation.

Finding genuine issues that function well with problem-based learning is one of the obstacles in implementing problem-based learning. Recognizing your ignorance, getting familiar with problem-based learning. Accepting real failure maybe performing worse on tests, unprepared prospective teachers, unprepared teachers, Time-consuming evaluation, varying degrees of relevance and applicability, and difficulty letting go of control to act as a facilitator, encouraging the prospective teachers to ask the correct questions rather than providing them with answers.



## CONCLUSION

The study introduces problem-based learning as a student-centred teaching method that uses real-world problems as the basis for learning. The study mentions two studies that support the effectiveness of problem-based learning in improving academic performance, problem-solving skills, and student motivation. The study also mentions that female prospective teachers tend to perform better than male prospective teachers in problem-based learning, but the reasons for this are unclear and need further research. The study lists some of the challenges in implementing problem-based learning, such as finding suitable problems, accepting uncertainty and failure, preparing learners and teachers, and evaluating the outcomes.

When it comes to learning, the student-centred instructional approach known as problem-based learning is built on the utilization of real-world problems as the basis for learning. Problem-based learning can help potential teachers acquire problem-solving skills, knowledge of several disciplines, and the ability to retain information for a longer period. Problem-based learning may also develop self-control and teamwork, strengthen the relationships between potential teachers and instructors, and increase student motivation. This is because it provides prospective teachers with the opportunity to engage in approaches for problem-solving that are based on real-world scenarios.

Identifying genuine problems that are compatible with problem-based learning is one of the challenges that must be overcome to successfully apply problem-based learning. Being aware of your lack of knowledge, acquiring a working knowledge of problem-based learning recognizing that one has failed may result in a lower performance on tests, unprepared potential instructors, unprepared teachers, and so on. Evaluation that takes a lot of time, varied degrees of relevance and applicability, and the difficulty of letting go of control to act as a facilitator, encouraging prospective teachers to ask the right questions rather than supplying them with answers are all challenges.

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