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Development of Problem-Solving and Techno-Pedagogical Skills among Pupil Teachers in the B.Ed. Programme

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Abstract

Teachers with great pedagogical skills may create an inviting educational atmosphere in which students actively engage and learn. Using pedagogical skills, teachers may adjust their education to each student's effective learning style and needs, ensuring that all students receive an effective education for success. The present study investigates the development of problem-solving and technological pedagogical skills of pupil teachers in the B.Ed. programme, with a comparative focus on Phase I and Phase II. The study was conducted on the Hemvati Nandan Bahuguna Garhwal University's Birla campus in Srinagar, Garhwal, Uttarakhand, India. A qualitative method approach was adopted for the study. The sample consisted of 50 pupil teachers from the Birla campus of H.N.B. Garhwal University Srinagar Garhwal. An interview schedule and observation were used for data collection. According to study findings, the research shows a considerable improvement in Phase II compared to Phase I, demonstrating that ongoing exposure to pedagogical training, classroom practice, and technology-integrated education greatly improves these skills. Phase II pupil teachers showed increased confidence in detecting learners' difficulties, using suitable instructional techniques, and effectively integrating technology to assist teaching-learning processes.

Keywords: pedagogical skills, pupil teachers', effective learning style, problem solving and technological skills

Introduction

India's future progress depends on its teachers. a major focus on the importance of teacher empowerment for the future of the country. Teachers must be knowledgeable about the most recent advancements in education and pedagogy in addition to having a strong basis in Indian languages, ethos, values, and customs. (NEP-2020). When it comes to teaching, pedagogical

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skills are the ways in which a teacher can plan, carry out, and assess instruction in a way that most accurately reflects the different needs of the pupils. This entails having the skills to create engaging and pertinent learning activities as well as effectively manage classroom behaviour and skill levels. Pedagogical skills also include having the skill to assess student progress and adjust lessons as needed to ensure that every student can accomplish their learning objectives. In general, creating a positive and effective learning environment for pupils requires pedagogical skills. According to (Goldhaber 2005 and Wright et al. 1997), teachers' understanding of pedagogical procedures and material is crucial to a student's efficacy. Regardless of a student's background, aptitude, or chosen learning style, teachers with pedagogical abilities may develop and conduct lessons that support each student's important learning needs. Teachers can use their pedagogical talents to create captivating and alluring classrooms that inspire students to study and actively participate in the learning process. Teachers with outstanding pedagogical skills are able to provide students who are struggling academically with the right guidance and support, allowing them to develop their skills and reach their full potential.

Effective educators give pupils clear instructions, welcome new challenges, continuously motivate them, are flexible in their methods, respect their opinions, and always exhibit positive behaviour and manners. The school's educational approaches must adapt to the times (Devine, 2010). The information, methods, and strategies that student instructors need to effectively prepare, implement, and evaluate their teachings in the classroom are known as pedagogical skills. These skills are necessary to encourage student involvement, comprehension, and success. Student instructors need to be equipped with essential pedagogical skills in order to optimize classroom learning. Innovation and originality are becoming more and more crucial for success in both academic and professional contexts in the twenty-first century. Prioritizing the development of students' problem-solving abilities is crucial to fostering creativity and innovation. The skills to solve problems allows students to analyse difficult issues, develop with creative solutions, and successfully put those answers into practice. Academic performance, career success, and increased levels of creativity and invention have all been associated with students' ability to solve problems (Moses et al., 2023). This means participating in educational organizations, making decisions as a group, and forming

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partnerships that boost student achievement. Teachers who are effective observers pay attention to and perceive classroom events in addition to their well-planned replies. Successful teacher education programs provide prospective student teachers with the skills and information needed to build these pedagogical qualities and get them ready for the problems they will face in the classroom. Teachers' professional experiences, intentional practice, or capacity to identify and address critical classroom circumstances are all highlighted in a contextual perspective on their knowledge. (Borko and Putnam, 2000).

Koray et al., (2008) focused on improving pre-service teachers' problem-solving abilities and providing them with opportunities to comprehend the problem-solving process. The quantitative findings, which were corroborated by the qualitative study, showed that pre-service primary school teachers who received problem-based learning had greater problem-solving abilities than those who received traditional education. This entails providing constructive feedback, assessing learning objectives, and promoting introspection and metacognition. To increase student learning and engagement in the contemporary technological environment, educators must be skilled at using technology as a teaching tool and incorporating it into their classes. Teachers must have excellent communication skills in order to work with students, parents, and other members of the educational community. The instructor is the most crucial component of this process. It is continuously essential in this process to evaluate and enhance the function of the teacher and the qualities that this job requires. The most important educational factor influencing student accomplishment is "the competency of teacher" (World Bank Report, 2011).

Pupil instructors can develop successful teaching methods and tactics by utilizing pedagogical skills. With these abilities, student instructors may better tailor their classes to better suit their students' requirements, create dynamic and interesting learning environments, and effectively communicate knowledge. To support students' academic success, pedagogical skills are crucial. Teachers with strong pedagogical skills may identify and fill up students' learning gaps, customize instruction, and provide opportunities for engaging and rewarding learning. According to Choy et al. (2013) and Nind & Lewthwaite (2018), pedagogical skills comprise teaching-learning related abilities including lesson planning, classroom management, choosing the appropriate teaching method, supporting students in their learning process, and so on. The

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findings provide an overview of the techno-pedagogical skill levels of B.Ed. student teachers and offer valuable insights for teacher educators and educational technologists. (Thiru & et al., 2021).

Research Objective

To study the development of pedagogical skills in the first and second phases of pupil teachers.

To study the development of the problem-solving pedagogical skill phase first and the second phase of the pupil teachers.

To study the development of technological pedagogical skill phase first and phase second of pupil teachers.

Assumption

It has been assumed that the pupil teachers studying in the B.Ed. programme possess the potential to develop problem-solving and technological pedagogical skills during their teacher education program.

Methodology:

The current study used a qualitative research methodology to thoroughly examine the problem at hand. Pupil teachers (B.Ed. trainees) at HNB Garhwal University's Birla Campus made up the study's population. For the selection of the sample, the purposive sampling method was adopted. A total of 50 pupil teachers from the Birla Campus of HNB Garhwal University were selected as the sample of the study. The two main methods the researcher utilized to gather data were an interview schedule and an observation strategy. To systematically evaluate the replies, the statistical technique of frequency and percentage was used to analyse the data.

Result

Pedagogical Skills Assessment Phase I and Phase II

During the first and second phases, student teachers' pedagogical competence growth has been assessed using an interview schedule

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Table No. 1: Assessment of Problem-Solving Skill through Interview Schedule

Pupil Teachers Response of Phase I & II	
Comfortable	**Un comfortable**
X36: We can identify the problems of students, especially those who are weak or quiet. Their body language often reveals their difficulties, and we then identify their problems by asking them questions or inquiring about their difficulties. X05: We identify problems by observing students' activities and behaviour, or by giving them opportunities to express themselves through various activities, which allows us to assess them. This helps us connect with students more closely and easily identify the causes of any problems or challenges they face. X16: To solve problems, students need to set a final goal. This is a crucial task for the successful learning of problem-solving skills, which I use during teaching. When you successfully help students answer questions like "what?" and "why?", finding the answer to "how?" becomes easier. This benefits both the teacher and the students, making teaching and learning easier and more effective. X44, X50: We give students time to learn how to work in teams, share ideas, and learn effectively. It is essential that teachers provide students with constructive feedback on their problem-solving, preparing them for future challenges and	X22: Giving students the opportunity to ask questions disrupts the class. Students ask irrelevant questions and cause disturbances, which breaks the rhythm of teaching. Sometimes, students' problems are related to other subjects or issues on which I don't feel qualified to give advice. X17: I get flustered when there are questions other than those related to academic activities in the classroom, or when there are problems related to classroom management and student behaviour. X09: Sometimes, students come with problems, and we fail to solve them. Their problems are of various kinds, often ranging from family issues to fights with classmates, which disrupt the teaching process. We are forced to tell them to be quiet and remain silent in the classroom. X11: We are unable to give individual attention to students in the classroom or school, which means that their personal problems often remain unresolved. Sometimes, we try to

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enabling them to analyse and solve problems independently. X06: We are prepared to address any kind of problem that students bring to us. Initially, it took some time to understand, but now there is no significant difficulty. Whether the problems are related to teaching, reading, understanding lessons, memorization, conflicts with peers, social media, or family issues, we are prepared to help students overcome them so that they can achieve their goals without any obstacles.	solve problems before understanding the process, which increases the chances of making mistakes.

Many pupil teachers shown a lack of confidence in their ability to solve problems throughout Phase I. Mostly reported disturbances in the classroom, felt uneasy answering students' queries and personal concerns, had trouble managing the classroom, received little individual attention, and were unsure about how to handle academic and non-academic problems. This stage represents early difficulties and insufficient readiness in terms of educational problem-solving abilities. Pupil teachers showed a discernible improvement in their ability to solve problems in Phase II. Through activities, inquiry, and observation, they grew more at ease recognizing the problems that students were facing. Goal-setting, collaboration, constructive criticism, and being prepared to deal with behavioural, academic, and personal problems were all stressed by the teachers. This stage is characterized by increased self-assurance, introspective practice, and successful educational problem-solving abilities. The assessment of the answers shows that pupil teachers use a variety of methods to recognize and resolve students' issues in the classroom. The majority of respondents stated that their main strategies for spotting learning challenges, particularly in weak or introverted pupils, were behaviour observation, body language, and classroom engagement. It has been shown that giving students the chance to express themselves through activities and inquiry improves teacher-student engagement and helps identify issues early. The results also show that pupil teachers understand the value of goal-setting and structured questioning in helping pupils develop their problem-solving

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abilities. Sometimes early attempts to tackle issues without fully comprehending their nature resulted in ineffective responses. Overall, the findings show that student teachers are becoming more competent while nevertheless facing ongoing difficulties in developing their problem-solving abilities.

Table No. 2: Assessment of the Problem-Solving Skill through Observation Schedule

Phase I

S.NO.	Assessment of Problem-Solving Skill	Responses	
		Yes	No
1	Identification of the problems	23	27
2	solve the problems if not related to the topic of the students	13	37
3	solving the problem of the students in difficult circumstances	16	34
4	solve students' problem related to the other subjects and academics	15	35
5	students' problems while giving proper space to their individual views	12	38
6	problems in teaching student's favourite topic and awakening their interest	08	42

54% of respondents reported having some trouble identifying the issues during the first phase. 46% of student instructors believe they were successful in identifying the issues during the first stage. The study discovered that if a student's concern was unrelated to the subject, teachers were unable to address it. Some student instructors found it easy to solve the students' academic and other-related problems. While students were talking about unrelated topics, 74% of the respondents encountered this issue. Among those surveyed, 26% said that they have no trouble doing so. Just 38% of student teachers did not encounter any difficulties and have the requisite abilities to solve students' problems in challenging situations, whereas 68% of student teachers had to deal with some difficulty. While 30% of respondents were completely confident in their ability to manage student difficulties, 70% of respondents were unable to solve their problems pertaining to other disciplines and academics. The majority of respondents acknowledged that they employ questioning techniques to uphold classroom discipline. While lecturing in the classroom, some of the respondents acknowledged that they were having trouble asking questions. In order to increase students' interest in their studies, the majority of student

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instructors attempt to teach them their favourite subjects. 76% of pupil teachers were unable to address students' issues while providing adequate room for their unique perspectives. and 24% of the student instructors reported that they had no trouble allowing their unique perspectives to be heard in the classroom. While 16% of student instructors reported having no trouble teaching their students' favourite subjects in the classroom and igniting their enthusiasm, 84% of respondents reported having difficulties doing so,

Table No. 3: Assessment of Problem-Solving Skill through Observation Schedule Phase-II

S.NO.	Assessment of Problem-Solving Skill	Responses	
		Yes	No
	Identification of problems	39	11
1	solve the problems if not related to the topic of the students	45	05
2	solving the problem of the students in difficult circumstances	47	03
3	solve students' problem related to the other subjects and academics	35	15
4	students' problems while giving proper space to their individual views	47	03
5	problems in teaching student's favourite topic and awakening their interest	44	06

In the second phase most of the pupil teachers were not finding any difficulty in solving the student's problems related to the other subjects and academics. 89% of student teachers did not experience any difficulty and have the necessary skills to do so. while just 11% of student teachers had to face some difficulty in solving the problem of the students in difficult circumstances. 78% of the respondents said that they felt some difficulties of identification of the problems. 10% of respondents faced the problem while students' talk not related to the topic and 90% respondent did not face any difficulties solving the problem of students while problem not related to the topic. 30% of respondents were not able to solve their problem while related to the other subjects and academics and 70% respondents were fully confident to solve the student problem. 94% of the pupil teachers did not experience any difficult circumstances, and have the necessary skills to do so. 94% of the pupil teachers did not face any problem while giving proper space to their individual views in the classroom teaching.06% of the pupil

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teachers were not able to students' problems while giving proper space to their individual views. 12% of the respondents faced problems in teaching student's favourite topic and awakening their interest and 88%of the pupil teachers did not face any problem in teaching the student's favourite topics in the classroom teaching and awakening their interest.

Assessment of the Problem-Solving Skill through Observation Schedule phase I and II

Approximately 85% of the student instructors were unable to address children's issues, and their critical thinking was still developing, according to the results of the I phase observation connected to the Problem-Solving Scale. Nearly 80% of the student instructors were spending a long time to ask the kids questions and were having trouble making recommendations. The majority of student instructors were having trouble determining the cause of children's issues and assessing them. When the pupil teachers were monitored in the second phase, it was noted that most of them had the ability to comprehend the students concerns and assess them after learning about their activities, despite their inability to address the student inquiries and objections. It was discovered that about 92% of the student instructors were able to ask their pupils questions and engage their interest. In the second phase, pupil teachers were seen exchanging ideas and recommendations with students, whereas in the first phase, they were struggling to comprehend the students' difficulties.

Table No. 4: Assessment of Technological Skills through Interview Schedule

Pupil Teachers Response of Phase I & II	
Comfortable	**Un comfortable**
R**22**, R**18**, R**15**, R**28:** They consider themselves technically proficient, using methods such as PowerPoint presentations in the classroom, smart classes, and skilfully employing technology-driven activities to enhance students' knowledge and learning. They are interested in computer-based education and sometimes use it in the classroom when resources are available. Smart classes are a good option; students learn with greater interest, and using their senses makes the learning more	R19, R13, R23: Teaching through PowerPoint takes more time; creating lesson plans along with presentations is time-consuming, so they avoid making PowerPoint presentations. R05: Schools lack sufficient communication technology resources, which prevents them from learning how to use them. Teaching

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permanent. Technological assistance can also overcome language barriers. This allows students to learn in an engaging way. R**34**, R**48:** They use PowerPoint presentations and can easily work with computer applications such as Word, Excel, audio and video editing, and email. They also use these resources for feedback, which improves teaching and learning. R**38**, R**44:** They use information and communication technology (ICT) to create a language-rich classroom environment along with teaching materials. They give students group tasks using communication resources and utilize their ICT skills for learning and teaching. Videos can be used to bring about necessary improvements in students' habits. They share interesting information related to a lesson, which sparks students' interest, and they repeatedly request that the subject matter be taught through technological means, making them eager to learn	children is not possible without these devices. However, I have improved my own technical skills during this time. R07: There are problems using modern technology during classroom teaching. It cannot be used every day. Initially, I was very hesitant to operate technological resources, but there has been some improvement. However, more training is needed. They use audio and video resources less frequently and instead use charts and other teaching aids.

The analyse of pupil teachers in the use of technology in teaching comfort with technological integration and discomfort or limits in usage, which were seen throughout Phases I and II of the B.Ed. programmes. The majority of student instructors felt comfort and confidence in using technology tools to facilitate teaching and learning processes. These responders were proficient in using PowerPoint presentations, smart classroom equipment, and computer software such as Word, Excel, email, and audio-video editing. Technology was viewed as a tool of creating interactive, language-rich, and engaging classrooms, hence increasing students' attention and retention of knowledge. Smart classes were seen favourably since they encouraged lifelong learning, stimulated a variety of senses, and assisted in overcoming language difficulties. Additionally, ICT technologies were utilized for group projects, feedback, sharing additional

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material, and enhancing students' habits through videos, all of which demonstrated increasing pedagogical competency, especially in Phase II.

On the other hand, some pupil teachers expressed unease and difficulties while utilizing technology. Due to the perception that creating lesson plans and PowerPoint presentations takes a lot of it me, time restrictions became a significant problem. Regular use of technology was hampered by the lack of ICT infrastructure in schools, particularly during Phase I. Some respondents said they were hesitant and unconfident while using contemporary technology, preferring to use more conventional teaching tools like charts. These responders highlighted the need for further training and ongoing assistance, even if some progress was seen over time. Overall, the findings show that although technology pedagogical competency increases from Phase I to Phase II, institutional resources, time availability, and professional preparedness all affect how well it is used.

Table No. 5: Assessment of the Technological Skills through Interview Schedule

Phase I

S.NO.	Assessment of Technological Skills	Responses	
		Yes	No
1	Encourage to the students by technology in the classroom teaching	17	33
2	operate the micro soft word sheet in the classroom teaching and awakening their interest	13	37
3	Can you use the tool bar located in MS word	10	40
4	Can you convert word files into PDF	05	45
5	Operate the animation of the slides in the classroom teaching	08	42
6	Insert the image in micro soft word office and developing the knowledge of engaging the students actively in the classroom.	08	42
7	Can you make ppt presentation on power point	06	44
8	Are you able to email	23	27

The majority of respondents stated that they retain effective learning in the classroom by using their technology abilities. When using Micro Soft Office in the classroom, several respondents encountered difficulties. In an effort to increase students' interest in their studies, the majority

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of student instructors attempt to educate using student power points. When presenting the PowerPoint slides in class, the student instructors did not operate them correctly. While 34% of student teachers had no trouble using technology to motivate students in the classroom, 66% of student teachers were unable to engage students in the classroom using technical abilities. While 26% of the pupil teachers reported having no trouble teaching students how to use the micro soft Excel sheet in the classroom, 74% of respondents reported having difficulty teaching students Microsoft Word and igniting their enthusiasm. Ninety percent of the respondents had trouble converting Word files to PDF, and eighty percent of the pupil teachers were unable to use the tool bar in Microsoft Word. whereas animating the slides in the classroom, 84% of respondents reported experiencing technical difficulties, whereas 16% reported no issues at all. 84 percent of pupil teachers were unable to insert the image into Micro Soft Word Office and learn how to effectively engage students in the classroom. 16% of pupil teachers had no trouble inserting the image into the micro soft word office and learning how to actively engage students in the classroom. 54% of respondents are unable to send emails, and 88% of student instructors are unable to create PowerPoint presentations.

Table No. 6: Assessment of the Technological Skills through Interview Schedule

Phase II

S.NO.	key points Responses of Pupil Teachers	Responses	
		Yes	No
1	Encourage the students by technology in the classroom teaching	37	13
2	Operate the micro soft word sheet in the classroom teaching and awakening their interest	40	10
3	Can you use the tool bar located in MS word	45	05
4	Can you convert word files into PDF	38	12
5	Operate the animation of the slides in the classroom teaching	42	08
6	Insert the image in micro soft word office and developing the knowledge of engaging the students actively in the classroom.	43	07
7	Can you make ppt presentation on power point	35	15
8	Are you able to email	48	02

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Almost all the respondents said that they were proper use of technological skills to maintain effective learning in the classroom teaching. Some respondents faced little problem in proper use of micro soft office. Most of the respondents were able to do teach through power point of the students so that they can develop more interest in the studies in the classroom teaching. Mostly pupil teachers after being trained,74% pupil teachers did not face any problem in encourage the students by technology in the classroom teaching 26% of the pupil teachers were not able to engaged the students in the classroom teaching through technological skills and created the atmosphere of the teaching classroom in such a way that the students can be made to feel good and valuable.20% of the respondents faced problems in teaching student's micro soft word and awakening their interest 80% pupil teachers did not face any problem of the students operate the micro soft excel sheet in the classroom teaching and awakening their interest. 90 % of the pupil teachers fully confident in use the tool bar located in MS word. Some of the respondents faced little problem in creating the atmosphere of the teaching classroom in such a way that the students can be made to feel safe and valuable. 76% of responded did not face any problem of the convert word files into PDF file. 16% of the respondents were facing technological problems while animation of the slides in the class and 84% of the respondents did not face any technological problems while animation of the slides in the classroom teaching. 14% of the pupil teachers were not able to insert the image in micro soft word office and develop the knowledge of engaging the student actively in the classroom. 86% of the pupil teachers did not face any difficulties while insert the image in micro soft word office and developing the knowledge of engaging the students actively in the classroom.70% of the pupil teachers skilled in make ppt presentation on power point and 96 % of the respondent are able to write emails.

Discussion:

When student teachers' problem-solving abilities were evaluated in phases I and II, it was discovered that phase II had better develop problem-solving abilities than phase I. It was evident in the way student instructors behaved. In phase II, their understanding of how to address student-related issues was also improving. The current study shows that, in comparison to Phase I, Phase II of the B.Ed. program makes a greater contribution to the development of technology pedagogical skills and problem-solving abilities among student instructors. The

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experiential, practice-oriented, and reflective aspects of Phase II training are responsible for this improved growth. Pupil teachers actively participate in school internships, extended teaching practice, and real-world classroom exposure throughout Phase II, which necessitates quick and autonomous problem-solving. Phase II encourages student teachers to deal with real-world classroom obstacles such learner diversity, classroom management, instructional adaptability, and assessment-related concerns, in contrast to Phase I, where problem-solving is mostly theoretical and directed. Problem-solving abilities significantly increase as a result of ongoing engagement with students, mentors, and educational institutions, which promotes critical thinking, reflective decision-making, and situational judgment. Technological pedagogical skills throughout Phase II show a similar tendency of increased development. In order to effectively integrate technology with pedagogy, student instructors go beyond simple technological understanding. Digital lesson planning, multimedia teaching aids, online assessment platforms, smart classroom technologies, and e-content production all become essential components of their teaching methods. A higher degree of technical pedagogical competency than Phase I is demonstrated by the growing use of technology as a teaching tool to improve student engagement, efficiently run classrooms, and solve learning challenges. Overall, the results show that, Phase II is a time of application and consolidation when the fundamental information and abilities learned in Phase I are converted into useful competences. The relevance of prolonged teaching practice, reflective supervision, and ongoing technology assistance within the B.Ed. program is highlighted by the noticeably higher growth of problem-solving and technical pedagogical abilities in Phase II. Enhancing these components can further improve pupil teachers' professional readiness for the demands of the modern classroom.

Conclusion

The present study comes to the conclusion that the B.Ed. program is essential for helping pupil teachers develop their problem-solving and technological pedagogical skills, with Phase II making a greater contribution than Phase I. Although Phase I offers a fundamental exposure to educational technology and a foundational grasp of pedagogy, its primarily theoretical focus limits the development of these skills. Phase II, on the other hand, promotes autonomous problem-solving and successful integration of technology with pedagogy through extended teaching practice, school internships, and actual classroom experiences. The results

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unequivocally show that reflective practices, real-world teaching scenarios, and ongoing mentorship throughout Phase II improve pupil teachers' capacity to effectively and creatively handle classroom issues. The study emphasizes how crucial a phased, practice-focused B.Ed. program is. Enhancing effective technology integration and experiential learning, especially in Phase II, can help student teachers better handle the needs of classrooms in the twenty-first century and enhance teaching-learning outcomes. Based on the current study's findings, it is determined that pupil teachers' technological pedagogical skill and problem-solving skill fluctuate significantly between phase I and phase II. When compared to the I phase, the II phase's findings were shown to be more favourable for the development of pedagogical skills.

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