From Theory to Practice: A Mathematics Pre-service Teachers' Pedagogical Practice Dilemma

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Abstract: There are many theories on how students acquire knowledge and how instructions should be conducted in the classroom. Research has presented clear instructional strategies appropriate for students in diverse circumstances. However, most of these instructional strategies are not implemented in the classrooms. This research aims to investigate the gap between theory presented in the lecture rooms and actual teaching in the schools, and to examine the effect of this disconnect on the pre-service teacher. Data was collected through questionnaires answered by students from 11 universities in Kurdistan, Iraq. Results indicate the existence of a gap between theories in the lecture halls and actual practice in classrooms. Perceived insufficient time for instructors, actual insufficient time allocated to the practicum course, broad curriculum, cultural influences, and inadequate qualified and experienced mentor teachers are some of the suggested reasons for the missing link between theory and practice. Recommendations for stakeholders and suggestions on the way forward are discussed.

Keywords: Pre-service Teachers, Missing Link, Self-efficacy, Performance, Theory-to-practice.

1. Introduction

1.1 Background of Study

Teaching practicum is one of the fundamental courses obligatory for preservice teachers in the final year of study. Conventionally, student-teachers immerse themselves into the actual schools following all the school routines as they observe in-service teachers perform their duties for one semester. In the process, they prepare and deliver supervised lessons guided by the mentor teachers, where they are expected to develop their pedagogical skills, confidence in the classroom, and solidify their content knowledge Kerschbaum (2007). This course is supposed to enable students to put into practice the theories they learn in the lecture halls.

The student-teachers learn modern research-based courses, especially pedagogy and pedagogical content knowledge courses. Universities strive to equip student-teachers with current, researched, and scientifically approved pedagogical content Knowledge through various courses. Among the pedagogical techniques preservice teachers learn are inductive and deductive, concept attainment, constructivism, project-based learning, cooperative learning just to mention but a few.

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However, most mathematics preservice teachers in Kurdistan seem conflicted after they finish the teaching practicum course. They are unable to reconcile the theory learnt and the actual methods used by in-service teachers. The in-service mathematics teachers in the region almost exclusively use the traditional teacher-centred method, where students sit quietly, listen to the teacher who works out examples on the board, then assigns exercises and/or homework, and the process repeats throughout the year. Since in-service teachers act as mentor teachers for pre-service teachers, it makes it difficult for pre-service teachers to question them on their methods, or even apply anything different in their classes. Hence the pre-service teachers' dilemma.

The dilemma by pre-service teachers about theory and practice is a frequent phenomenon around the globe (Zeichner & Liston, 2014). Zeichner, (2010) defines it as the challenges that pre-service teachers encounter due to transition from learning in the theoretical form to applying it practically in the classroom. Papkahan, (2023) attributes this to lack of sufficient opportunity by pre-service teachers to experience practical lessons, to get adapted to different kinds of the learners, and personal non-realistic expectations of teaching from the pre-service teachers. To minimize the challenges, preservice teachers should be given more opportunities for practical experiences like classroom examinations, co-teaching, and later guided lessons (Swanson & Petrosko, 2021). In the same breath, Kuswandono, (2012) suggests that reflective teaching practice can help pre-service teachers to fill the gap between the theory and practice and make sense of how pedagogical theories can be applied in different contexts.

Research also suggests that the dilemma can be fixed through mentoring by experienced teachers. The pre-service teachers can benefit from feedback about planning and implementation, support for classroom management, and observing experienced teachers apply pedagogical theories into practically in class. The mentor teachers can provide guidance for pre-service teachers to help navigate the challenges of the classroom and apply their theoretical knowledge in real-life situations (Yavuz, 2020). But Özkan and Demir, (2019) warn that experienced teachers must be motivated to supervise the pre- service teachers and provide ongoing support and feedback as they navigate the challenges of the classroom. They further stated that co-working is the key to reducing the gap between theory and practice (Özkan & Demir, 2019).

The pre-service teachers fail to apply the teaching methods learnt at university mainly due to one of the following two reasons, or perhaps both. Firstly, the Kurdistan region has a strong culture embedded in unwavering belief in religion that forbids young people to argue or talk back at elders, and teachers are respected as some of the most important members of society. It would there be considered rude for a student-teacher to challenge an experienced teacher about the methods they use in class. Secondly, most of the methods students learn at university are student-centred and highly interactive. Therefore, using these methods requires extensive and careful preparations by teachers, which takes a lot of time and effort that most teachers do not care for. Pre-service teachers therefore find it easy to go along with their mentor teachers rather than engage in an exercise that will cost them time and energy.

It is important to note that the gap between theory and practice is not a new discovery. Literature on this topic abound (Vonk, 1985: Allsopp, DeMarie, Alvarez-McHatton & Doone, 2006; Cheng, Cheng & Tang, 2010; Rasmussen & Rash-Christensen, 2015; Resch & Schrittesser, 2023). However, due to imbalance in the world's economy and political issues, equity in education has been a pipe dream for many nations. In some regions, the gap has been addressed or at least reduced to tolerable levels by linking theory to practice

rather than vice versa (Korthagen, 2010). Unfortunately, in many other places, the gap still persists and even widens at times, in the case of Kurdistan region.

This research aims to explore the disconnect between university education as pertains teacher training and the actual practice in the schools' classrooms, particularly mathematics classrooms. The specific research objectives are as follows.

1.2 Research Objectives

1. To determine if there exists a missing link between the theory in the lecture rooms and actual teaching in the schools' classrooms.
2. To explore the effects of the disconnect on the pre-service teacher.

1.3 Theoretical Framework

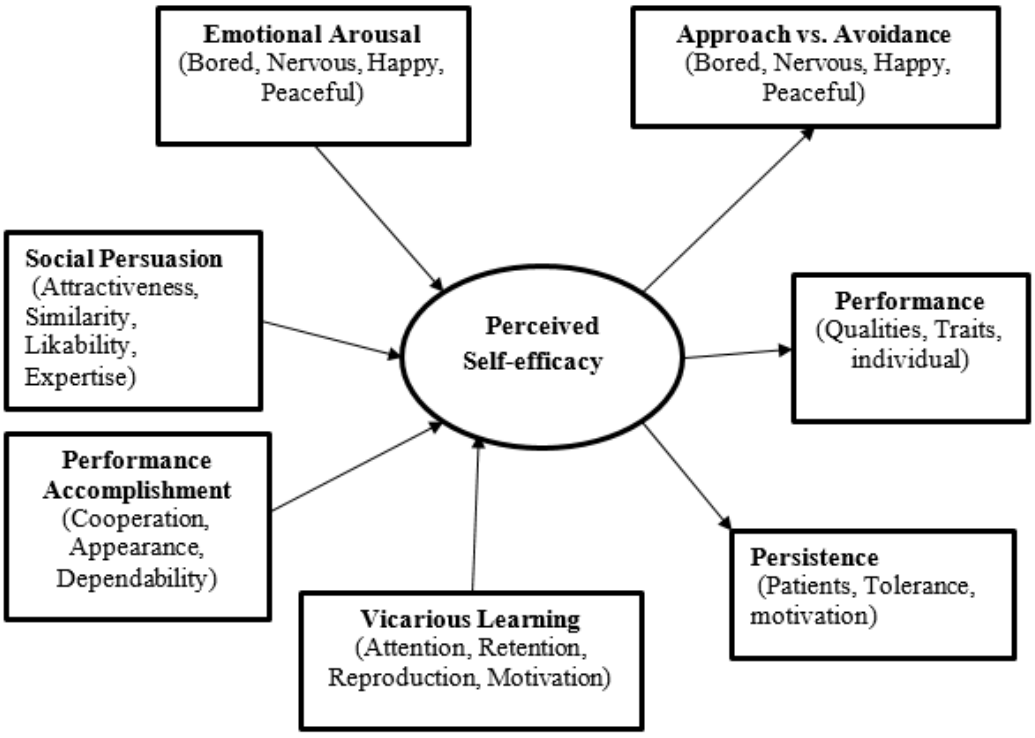

Figure 1: The theoretical Framework. (Bandura, 1977)

This research is based on the theory of Self-Efficacy, a social cognitive theory that refers to the belief of an individual performing or accomplishing specific tasks. Self-efficacy deals with raising the capacity of the individuals through raising their beliefs. First proposed by Albert Bandura, self-efficacy is influenced by several factors including performance accomplishment, vicarious experience, verbal persuasion, and emotional arouser. Individuals with sufficient self-efficacy may show persistence in their work, strive for high quality performance, and approach tasks happily, otherwise they'll easily get bored performing their tasks.

2. Methods and Design

This quantitative study analyzed data from a questionnaire answered by 180 participants from 11 universities in Kurdistan region of Iraq. Among the universities that participated in the survey, 6 were from Erbil, 3 from Sulaymaniyah, and 1 each from Halabja and Koya. To collect data, stratified technique of purposive sampling was used. The total populations in each stratum were utilized. Individual strata populations were not sufficient for strata sampling or any other alternative method, hence the need for total populations.

Final-year undergraduates from faculties of education in the above-mentioned universities were engaged to answer the questionnaire for the research. The questionnaire sort to address several main issues including the perceived gap between theory and practice, relevance of the theories taught at university, adequacy of teacher training, and the mathematics curriculum. Other themes such as teacher self-confidence and complexity of theoretical concepts also emerged from the questionnaire. Google forms were used to administer the questionnaire online. This was purely for convenience to both the researcher and respondents besides being cost friendly to the researcher and making it easy to monitor and track data collection in real time. The success rate for feedback was 100% as the population involved was not large, which made follow-up easy to undertake. The data collected was analyzed through the SPSS program using frequencies, descriptive statistics, t-tests, and analysis of variance. The results obtained are discussed below.

3. Result and discussion

3.1 Biodata Analysis

Among the 180 respondents of the study, 48 of them were taking their practicum course in primary schools, 51 in secondary schools, and 81 high schools representing 45% of the total respondents. The research had slightly more male respondents, 52.8 %, as compared to the female respondents at 47.2 %. Five departments were involved in the study with biology department having majority of respondents at about 26% followed by mathematics department with about 24% of the respondents, then English Language Teaching (ELT) department with about 21%, physics department 16%, and chemistry department having the least number of participants represented by 13%.

3.2 Descriptive statistics analysis

Table 1: Descriptive Analysis

Item	Strongly disagree	Disagree	Natural	Agree	Strongly agree
The theory taught in the lecture rooms is directly applicable in the classroom setting.	7.8	10	25.6	37.8	18.9
Teachers are adequately trained to apply theoretical concepts in practical teaching.	2.8	20	21.7	38.9	16.7
Theoretical concepts taught in the lecture rooms are relevant to the current classroom setting.	2.8	11.7	32.8	34.4	18.3
There is a significant gap between the theory taught in the lecture rooms and practical teaching in the classroom.	3.3	16.7	24.4	36.7	18.9
Teachers face difficulties in translating theoretical concepts into practical teaching methods.	8.3	18.3	23.9	31.1	18.3
There is a need for more practical training for teachers to bridge the gap between theory and practice.	10	13.3	22.8	30	23.9
The curriculum should be revised to incorporate more practical aspects of teaching.	9.4	15	21.1	36.7	17.8
Teachers should be given more opportunities for on-the-job training to improve their teaching skills.	3.3	11.7	23.9	33.3	27.8
Theoretical concepts taught in the lecture rooms are too complex to be applied in the classroom setting.	5	17.8	27.8	28.3	21.1
There is a need for more collaboration between academic researchers and classroom teachers to bridge the gap between theory and practice.	5.6	12.8	29.4	34.4	17.8
I feel confident in my ability to apply theoretical knowledge in practical teaching situations.	3.9	17.8	22.8	34.4	21.1
I believe that my practical experience in the classroom has helped me understand the theoretical concepts covered in lectures.	5.6	13.3	26.1	31.1	23.9

I feel that there is a significant gap between the theoretical knowledge I gain in lectures and the practical experience I gain in the classroom.	7.2	17.2	21.1	33.3	21.1
I think that my self-efficacy as a pre-service teacher would improve if there was more integration between theory and practice in my training.	3.9	17.8	21.7	34.4	22.2
I find it challenging to apply the theoretical concepts I learn in lectures to real world teaching situations.	10	18.3	20.6	32.8	18.3
I believe that my self-efficacy as a pre-service teacher is negatively impacted by the disconnect between theory and practice.	10.6	16.1	25	31.7	16.7
I feel that my practical experience in the classroom has helped me feel more confident in my ability to teach.	5	17.2	19.4	34.4	23.9
I think that my theoretical knowledge would be more valuable to me if it was more closely connected to the practical aspects of teaching.	8.9	12.8	23.3	33.3	21.7
I feel that the current approach to teacher training is not preparing me adequately for the realities of the classroom.	7.8	22.2	28.9	26.1	15
I believe that bridging the gap between theory and practice would lead to a significant improvement in my self-efficacy as a pre-service teacher.	7.2	13.9	22.8	32.8	23.3

Analysis shows that approximately 55% of the responds agree that the theory taught in the lecture rooms is directly applicable in the classroom setting, and that teachers are adequately trained to apply theoretical concepts in practical teaching. A similar percentage agrees that the theoretical concepts taught in the lecture rooms are relevant to the current classroom setting, although they believe existence of a significant gap between the theory and practical teaching in the classroom.

Results also indicate that slightly less than half of the respondents believe that teachers have difficulties translating theoretical concepts into practical teaching methods. To address this issue and reduce the gap, about 53% of the respondents suggest the need for more practical training for teachers, and that it can be done through curriculum changes to incorporate more practical aspects of teaching. But almost three-quarters prefer professional development programs to address the issue, and 51% suggest more collaboration between academic researchers and classroom teachers to bridge the gap between theory and practice.

Regarding self-evaluation, the majority of the respondents, 55%, were confident they could apply theoretical knowledge in practical teaching situations. A similar percentage further suggested that the

practicum course actually improved their understanding of the theories learnt in the university, but desire more practical experience to boost their self-efficacies. Indeed, 47% believe their self-efficacy is negatively impacted by the disconnect between theory and practice. Therefore, bridging the gap between theory and practice would lead to a significant improvement in their self-efficacy as pre-service teachers.

3.3 Independent Samples T-Test For gender and disconnect

Table 2: Independent Samples T-Test for Gender and Disconnect

Item	Df	F	Sig.
Disconnect: Equal Variances assumed	178	10.200	0.043

The table above shows that the variances of the two groups are significantly different because the Levene's test's significance is 0.02, which violets the assumption of equal variances. Despite the violation, the t-tests indicate a significant difference in means between the variables. The difference is statistically significant with a P-value of 0.043, which is less than 0.05. The table therefore shows that there is a difference in the way female preserve teachers perceive the disconnect between theory in the lecture halls and practice in the classrooms, as compared to male teachers.

3.4 Independent Samples T-Test for gender and Effect of disconnect

Table 3: Independent Samples T-Test for Gender and Effect of Disconnect

Item	Df	F	Sig.
Effect of disconnect: Equal Variances assumed	178	22.292	0.041

The table above shows that the variances of the two groups are significantly different. The difference is statistically significant with a P-value of 0.041 which is less than 0.05. The result therefore means that there is a difference in the way female preservice teachers perceive the effect of disconnect between theory in the lecture halls and practice in the classrooms, as compared to male teachers. This result is expected following the outcome of the preceding test.

3.5 Analysis of variance for Disconnect and Departments

Table 4: One Way ANOVA for Disconnect and Departments

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.655	4	0.414	0.952	0.435
Within Groups	76.047	175	0.435		
Total	77.702	179			

The ANOVA table above tests whether there is a significant difference in the means of the "disconnect" variable across different departments. As can be seen, the F-value of 0.952 is not statistically significant since the P-value is 0.435, which is more than 0.05. This result means that there is no statistically significant difference in the way preservice teachers from various departments perceive the disconnect between theory and practice in education.

3.6 Analysis of variance for Effects of Disconnect and Departments

Table 5: One Way ANOVA for Effects of the Disconnect and Departments

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2.052	4	0.513	0.842	0.501
Within Groups	106.681	175	0.610		
Total	108.733	179			

The ANOVA table above tests whether there is a significant difference in the means of the "Effect of disconnect" variable across different departments. As can be seen, the F-value of 0.842 is not statistically significant since the P-value is 0.501, which is more than 0.05. This result means that there is no statistically significant difference in the way preservice teachers from various departments perceive the effect of disconnect between theory and practice in education.

3.7 Analysis of variance for Disconnect and Type of School

Table 6: One Way ANOVA for Disconnect and Type of Schools

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.363	2	0.181	0.415	0.661
Within Groups	77.339	177	0.437		
Total	77.702	179			

The ANOVA table above tests whether there is a significant difference in the means of the "Disconnect" variable across different departments. As can be seen, the F-value of 0.415 is not statistically significant since the P-value is 0.661, which is more than 0.05. This result means that there is no statistically significant difference in the way preservice teachers from various departments perceive the disconnect between theory and practice in education.

3.8 Analysis of variance for Effects of the Disconnect and Type of School

Table 7: One Way ANOVA for Effects of the Disconnect and Type of Schools

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2.154	2	1.077	1.788	0.170
Within Groups	106.579	177	0.602		
Total	108.733	179			

The ANOVA table above displays the results of the test determining whether there is a significant difference in the means of the "Effects of disconnect" variable across different departments. As can be seen, the F-value of 1.788 is not statistically significant since the P-value is 0.170, which is more than 0.05. This result means that there is no statistically significant difference in the way preservice teachers from various departments perceive the disconnect between theory and practice in education.

4. Conclusion and Conclusion

4.1 Discussion

The study found a disconnect between the theory pre-service teachers receive at university and the practical applications in the classrooms, a result consistent with Allen and Wright, (2013) findings and reinforced by Phillips and Condy, (2023). Whereas the latter found the reason for the disconnect to be the “isolation” of teacher educators from the real-world classrooms, referring to the educators as “out of touch”, this study finds contrary reasons.

In the Kurdistan region context, it is clear that pre-service teachers are taught the necessary theory and research based pedagogical knowhow, but mentor teachers are stuck in the traditional way of teaching and therefore do not enable pre-service teachers to explore ideas during practicum. Indeed, the in-service teachers, who act as mentor teachers, hardly allow preservice teachers to express themselves citing spurious reasons such as insufficient time to cover the required curriculum or complaints from parents. The mentor teachers do not recognize the pedagogical knowledge of preservice teachers, erroneously equating the lack of experience to lack of pedagogical knowledge. In light of this, it is apparent that most in-service teachers do not see the connection between theory and practice, either intentionally so as not to get out of their comfort zones, or inadvertently due to lack of motivation, professional development training, and finance and administrative policies, a result also found by Ismail, (2019)

The study revealed that male and female pre-service teachers differ in their views regarding the disconnect between theory and practice. This could possibly be due several reasons including differences in cultural and societal expectations, access to professional development, self-efficacy (Caka, 2021), institutional biases in teacher training, gender-based workloads expectations, and gender-based classroom barriers. The Kurdish society has traditionally been very ‘protective’ of their female members, and even though this practice still persists, it is on much less scale. A definitive explanation can be achieved through research investigating whether the said ‘protection’ extends beyond societal matters into the academic realm.

Furthermore, it is clear that there is a need for more practical training for pre-service teachers. In most cases the time allocated to the practicum course is not enough and is often not utilized maximumly. Students-teachers are mostly required to attend classes and observe in-service teachers for a full semester. In the second semester they are then allowed to teach for a few hours, mostly when the supervisor visits to assess them. Observing experienced teachers is not enough and cannot be termed as practical experience. This calls for curriculum changes in the teacher training institutions to accommodate the issue, a result supported by Mohammadkarimi, (2023). It is understandable that the Kurdistan region, just like the rest of Iraq, is emerging from the post-conflict era and thus facing challenges in the education sector including physical infrastructure leading to overcrowded classrooms (Waswa & Al-kassab, 2022), under-resourced, and insufficient experienced and well-trained mentor teachers. All these factors contribute to widening the gap between theory and practice in the region.

4.2 Conclusion

In conclusion, the pre-service teachers face challenges in applying theoretical knowledge in the classroom. The curriculum, culture, and the self-efficacy of pre-service teachers affect the application of theoretical knowledge into practice in the classroom. Therefore, revising the curriculum can be helpful in addressing this issue given that a large majority of participants advocate for inclusion of more practical courses. The curriculum should consider cultural values that can be scientifically incorporated so that teachers or pre-service teachers are not hindered when applying theoretical knowledge in the classroom. More training and sufficient practicum time for pre-service teachers may play a crucial role in raising the self-efficacy of the pre-service teachers as they seek to apply the theoretical knowledge in the classrooms.

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