Integration of Information Technology in School Leadership: Challenges and Innovations in Teacher Professional Development in Azerbaijan

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A B S T R A C T S

This study aims to identify the challenges faced by school principals in supporting teacher professional development, with a particular focus on the integration of Information and Communication Technology (ICT). Using qualitative methods through interviews with 15 school principals in Azerbaijan, the study found that the main barriers include limited time, financial resources, and teacher motivation. However, the findings also indicate a significant digital transformation through the establishment of educational information systems, e-learning platforms, and international cooperation to improve teachers' digital competence. The results emphasize the importance of strengthening digital pedagogical leadership and providing sustainable technological infrastructure to support 21st-century learning.

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1. INTRODUCTION

Principals are key drivers in improving the quality of education by supporting teacher professional development. In the digital age, this role extends beyond administrative duties to include instructional leadership that facilitates the use of technology in the classroom. In Azerbaijan, there is a coordinated effort to modernize the education system with an emphasis on school-based initiatives led by principals.

The OECD (2009) has recognized that instructional leadership is essential in promoting, enhancing, and inspiring students' academic advancement. As instructional leaders, school principals consistently facilitate student learning and development through curriculum management, resource allocation, planning of professional development for teachers, establishing clear objectives, and conducting teacher evaluations.

Research underscores the significant role of administrators as instructional leaders who actively facilitate teacher growth. Robinson et al. (2009) assert that principals' enhancement of instructors' pedagogical methods and the establishment of conducive environments tailored to students' needs are essential for exemplary teaching.

In Azerbaijan, similar to numerous other nations, the responsibilities of school principals extend beyond administrative duties to encompass educational leadership and the professional development of teachers. The caliber of teacher performance is a crucial determinant of educational quality; thus, investing in the ongoing development of educators is essential.

Challenges arise because the skills required for face-to-face teaching differ significantly from those required for online or blended learning environments. Therefore, professional development strategies must include a vision

for preparing teachers to be effective in the digital ecosystem. The Azerbaijani government has begun integrating high-tech learning tools and establishing international partnerships to address the ICT competency gap among educators.

2. RESEARCH METHODS

This study aimed to examine the issues encountered by 15 school principals in Azerbaijan regarding the support of teachers' professional development. A qualitative research methodology was selected to investigate the issue comprehensively and within its contextual framework. Semi-structured interviews served as the principal instrument for data gathering.

1. Data Analysis: Semi-structured interviews were conducted with 15 school principals from various regions of Azerbaijan, taking into account the diversity of locations and management experience. Data were analyzed thematically using MAXQDA 2020 software.
2. Technology Architecture and Implementation: In an effort to address professional development challenges, a technical assistance project between Azerbaijan and South Korea implemented an educational information system architecture that included:
   - Data Center: Installation of adequate server and network equipment.
   - Content Studio: Construction of a studio equipped with advanced video and audio equipment to produce e-learning content.
   - E-Learning Portal: Development of an e-learning system capable of accommodating up to 5,000 simultaneous users for in-person teacher training.
3. Procedure: Interviews were conducted in-person via the Zoom platform, demonstrating the use of information technology in the research data collection process.

The pre-prepared interview questions addressed administrators' strategies for teacher professional development, actions implemented, primary challenges faced, and recommendations. Interviews were taped with participants' agreement and subsequently transcribed for theme analysis. Thematic analysis was utilized on the gathered data. To ensure reliability, data triangulation was conducted by comparing replies from principals across several circumstances to formulate broad findings. The confidentiality of participants was preserved, and ethical norms were rigorously upheld. The study's objective was explicitly articulated, and voluntary permission was secured.
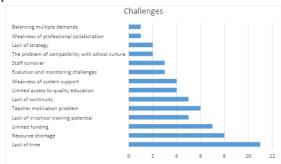

FIG 1. Challenges faced by principals when implementing or sustaining professional development initiatives for teachers

The following are the formulas and calculations used to process the data:

1. Attestation Success Percentage Formula (Competency Effectiveness)
   To determine the success rate of teachers in competency tests or attestations conducted by the Ministry of Science and Education of Azerbaijan, the following basic percentage formula is used:

$$P = \left(\frac{n}{N}\right) x \, 100\% \tag{1}$$

   - P: Percentage of success.
   - n: Number of teachers who passed (the source recorded 8,787 teachers).
   - N: Total number of teachers who took the attestation (the source recorded 11,591 teachers).
   Results: This calculation yields a 76% pass rate, which serves as the basis for competency evaluation.
2. Quantifying the Frequency of Leadership Challenges
   In the qualitative method used with 15 school principals, researchers used a frequency distribution to determine the most dominant challenges:

$$F = \text{number of subjects identifying a particular problem} \tag{2}$$

   - Time Challenges: F = 11 (73.3% of the sample).
   - Lack of Resources: F = 8 (53.3% of the sample).
   - Teacher Motivation Issues: F = 6 (40% of the sample).
3. System Load Capacity Parameter (Concurrent Users)
   In the development of information technology infrastructure (E-Learning Portal) in collaboration with South Korea, there are technical specifications regarding the maximum system load limit: Umax ≤ 5,000 users. This formula indicates that the architecture of the educational information system is designed to remain stable when accessed by up to 5,000 users simultaneously for teacher professional development activities.

In 2022, there was an authentication of pedagogical staff. This involved 11,591 primary school teachers, and 8,787 of them (76%) passed the attestation. A competitive compensation and motivation system that took into account skills and results in the job market was used. By September 2022, 10% of the 3,163 teachers (27%) who passed the attestation had their salaries raised by 5,624 teachers (49%). The pay of directors and deputy directors at 868 schools started to go up. In 2022, 30,000 teachers took part in in-service training, and 10,280 teachers received ICT training (Ministry of Science and Education of Azerbaijan, 2022).

The most common difficulty that principals talked about was not having enough time (11 principals highlighted this problem). This is because principals have a hard time managing their administrative and teaching duties, and teachers can't find time for professional development programs because of their heavy workloads. The next biggest problems are not having enough resources (8 principals) and not having enough money (7 principals). The lack of the right logistical and financial support for training and development activities in schools explains these situations. Principals say that these problems make it harder to plan training, carry out motivational programs, and set up long-term development.

The issue of teacher motivation (6 principals) and the restricted efficacy of in-school training (5 principals) are both significant concerns. Sometimes, teachers are not interested in new ideas, don't want to change, or see professional development activities as a formal process. This makes training less effective and makes it harder for principals to take the lead.

Five principals say that there isn't enough consistency, and four say that there aren't enough good professional development chances. These are some major reasons why principals can't execute professional development in a systematic and strategic way. Training that is delivered in short, unrelated sessions does not help people reach their long-term development goals.

The Data Center, which is in the building of the Korean Education System Informatization Department, got the right server and network equipment. Based on what Korea learned, 21 electronic content projects covering 123 lessons of the first national electronic content of the training program for Azerbaijani language teachers were started.

Korea has set up a new e-learning portal to help instructors grow professionally. They also gave teachers training to learn how to use and manage the system. The e-learning system may connect up to 5,000 users at once. Teachers are going to use the technology in a test mode starting next year. In the first stage, only some of the training will be done through this system. In the next stage, all of the training will be done through this system (Ministry of Science and Education of Azerbaijan, 2022).

3. RESULTS AND DISCUSSION

The research findings indicate that the challenges faced are multidimensional. Lack of time (mentioned by 11 principals) and limited resources (by 8 principals) remain major barriers to the sustainable implementation of ICT initiatives. Furthermore, there is resistance to change among some teachers who are still accustomed to traditional teaching methods.

The most common complaint was not having enough time, which 11 principals brought up. This is because principals have a hard time managing their administrative and teaching duties, and teachers don't have time in their busy schedules to concentrate on their professional development.

Lack of resources (8 principals) and insufficient financial resources (7 principals) are the next biggest problems. The absence of essential logistical and financial support for training and development activities in schools elucidates these conditions. Principals say that these problems make it harder to plan training, start incentive programs, and set up long-term development.

Despite this, significant technological progress has been made:
1. Mass ICT training: By 2022, 10,280 teachers had received ICT training.
2. National e-content: A total of 21 e-content projects covering 123 lessons have been launched to support Azerbaijani language teachers.
3. International Collaboration: Through the "eTumbling" project, teachers participated in international tumbling training to improve their ICT and language skills with European colleagues.

The discussion revealed that the effectiveness of professional development depends heavily on a robust monitoring and evaluation system and the creation of a school culture that supports lifelong learning. The use of a new e-learning portal is expected to transform training from an episodic model to a sustainable system.

Even though teacher professional development is important, school principals in Azerbaijan have a lot of problems to deal with. Here is a summary of these problems:
• Not enough money and resources for full professional development programs.
• Some teachers don't want to modify or use traditional teaching approaches.
• Balancing administrative duties with instructional leadership duties (Ministry of Science and Education of Azerbaijan, 2021).

There are, however, also crucial chances to make teacher development programs better, such using new technologies and building international cooperation.

In 2023, 17 educators, including 8 teachers, went to conferences in different European countries. 9 teachers also took part in international online trainings as part of the "eTwinning" project. The European Central Support Service helped with activities that aimed to improve teacher training using modern methods, improve ICT and language skills, and make it easier for teachers to work together on lesson plans and international projects (Ministry of Science and Education of Azerbaijan, 2023).

The project also gave teachers a chance to take part in online training sessions. In 2023, the Greek National Support Service hosted an international event about inclusive schools that 9 teachers from all around the country attended (Ministry of Science and Education of Azerbaijan, 2023). It is important to note that "eTwinning" is part of the European Union's Lifelong Learning Programme. It gives teachers in pre-school, secondary, and higher education the chance to get professional development training, work with teachers from other countries, and make joint learning models.

The issue of teacher motivation (6 principals) and the restricted efficacy of in-school training (5 principals) are both significant concerns. Sometimes, teachers are not interested in new ideas, don't want to change, or see professional development activities as a formal process. This makes training less effective and makes it harder for principals to take the lead. Another big reason why principals can't execute professional development in a systematic and strategic way is that there is no continuity (5 principals) and not enough access to good professional development opportunities (4 principals). Training that is given in short, unrelated bursts does not help people reach their long-term development goals.

The findings indicate that to enhance teachers' professional development, the responsibilities of school principals should extend beyond administrative duties to include instructional leadership, accompanied by increased resources and training opportunities. At the same time, schools and systems should set up ways to make sure that training is motivating and lasts.

4. CONCLUSIONS

This study concludes that supporting teacher professional development in Azerbaijan requires a structural approach that deeply integrates information technology. Challenges such as lack of motivation and financial resources can be mitigated by strengthening digital pedagogical leadership and providing infrastructure such as widely accessible e-learning portals. Continued investment in technical capacity and international collaboration through digital platforms will be key to the success of future educational transformation.

These findings underscore the necessity for enhanced structural and organizational support for professional growth within the Azerbaijani education system, as well as the critical need to bolster the pedagogical leadership competencies of principals. The suggested all-encompassing strategy should involve making real progress toward boosting school-level resources, setting up processes for ongoing training, and finding ways to motivate students. Future study ought to concentrate on investigating institutional processes that facilitate teachers' professional development, formulating effective training programs to enhance principals' pedagogical leadership skills, and assessing the effectiveness of their implementation. Furthermore, an extensive examination of the influence of school culture and personnel on the professional growth process could inform innovative strategies for educational management.

It is important to remember that school administrators are very important to the above-mentioned efforts to make education better and make teachers more professional in Azerbaijan. Principals give instructors the tools, support, and leadership they need to keep improving their teaching and help students do better. In the future, it will be important to keep investing in building crucial skills and working together to promote teachers' professional growth and the quality of education in Azerbaijan.

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