



Exploring the Challenges in Aligning Biometric Attendance with Cluster-Based CPD Activities: Perspective of Teachers, and Administration in Sindh

Nadia Qasim¹ & Dr. Najmonnisa Khan²

¹Continuing Professional Development (CPD) Specialist, Sindh Teacher Education Development, Authority (STEDA), M.S Scholar, Department of Education,, SZABIST University Karachi, Email: Nadia.shah.syed@gmail.com

²Associate Professor, HoD, Department of Education, SZABIST University Karachi, Email: najmunnis7@hotmail.com

ARTICLE INFO

Article History:

Received: January 08, 2025
Revised: February 04, 2025
Accepted: February 05, 2025
Available February 06, 2025
Online:

Keywords:

Biometric attendance, CPD, Continuing Professional Development, teachers' motivation, attendance compliance, cluster-based CPD, alignment of biometric with CPD model. Sindh Education Sector

Corresponding Author:

Nadia Qasim

Email:

Nadia.shah.syed@gmail.com

ABSTRACT

This qualitative study explores the challenges faced by the teachers in Sindh regarding aligning the biometric attendance system with cluster-based Continuing Professional Development (CPD) activities. Despite the widespread adoption of a biometric attendance system to track teachers' attendance in schools, the alignment of this system with cluster-based CPD activities has become a significant challenge, particularly when teachers are marked absent. At the same time, they attend the CPD cycles in cluster hub schools. The previous research provided insight into the effectiveness of the cluster-based CPD model and biometric monitoring system in regulating teachers' attendance. However, there is a need to identify the issues teachers face in compliance with biometric attendance and their regular and active participation in CPD activities, as currently, both are not aligned. According to Herzberg's Two-Factor Theory, misalignment of the current biometric system with the CPD activities acts as a hygiene factor, marking them absent despite participation and creating dissatisfaction among teachers. This hampers teachers' engagement in CPD sessions and affects their professional development and classroom practices. This research aimed to understand teachers' experiences, perceptions, and challenges regarding attendance compliance during the CPD cycle. The data was collected through semi-structured interviews with 10 participants, including mentee teachers, guide teachers and subject coordinators. The data was analyzed thematically using NVivo software to identify patterns and insights. The findings indicated that the current biometric system demotivates teachers from attending CPD sessions due to fear of being marked absent and logistical challenges such as distant venues, frustration, tiredness, and disinterest, hindering learning outcomes and their smooth transfer to classroom practices. The research suggested that integrating manual attendance into biometric systems, modifying current biometric software, providing administrative support and modifications at CPD, and using a biometric attendance monitoring system at the policy level can ensure active and regular participation of teachers in the CPD activities. Future studies could investigate integrated biometric-CPD systems, policy reforms, and the impact of administrative support on teacher participation in CPD classroom practices and students' outcomes.



Introduction

Biometric attendance system is considered a vital tool that not only reduces absenteeism but also ensures accuracy, transparency and accountability, making them indispensable in modern organizational and educational setting. This technology eliminates issues in attendance marking like buddy punching and time theft while streamlining the attendance process with improved efficacy and reliable record keeping. Biometric attendance systems are becoming essential tool for workforce and management (Singh, 2024). Like other sectors, effective attendance management and monitoring is important in education specifically teachers' and students' attendance very much influences the learning outcomes (Guerrero et al., 2013). The absence of a regular teacher can cause decline in instructional quality that negatively affects students learning (Miller, Murnane, & Willett, 2008). Despite many educational reforms, Pakistan's education system faces numerous challenges that include inadequate resources, outdated curricula, poor infrastructure, high drop-out rates and lack of professional development opportunities for teachers. Teacher absenteeism is still a big challenge, negatively impacting the quality of education in public schools (Warsi, Naseer, & Asghar, 2024). The Sindh government has introduced biometric attendance systems to ensure the regularity of the teachers and also for teachers' professional development, a cluster-based CPD model has been introduced and implemented to improve the teachers' skills and capacity. These initiatives are part of the broader reforms that aim to improve the accountability and overall educational outcomes in the province (Khosro, Siddiqui, & Tagar, 2019). Though, at the time of this study, the current CPD model is being implemented by donor agencies without any change in the model with their areas of programs. Guide teachers (GTs), Subject Coordinators (SCs) are training the teachers(mentees) within their allocated clusters During CPD activities, all cadres (GTs, SCs & teachers/mentees) are required to travel to the hub schools to attend the sessions. These venues (hub schools) are often located at a considerable distance from their respective schools. As per the policy, all the teachers have to mark their biometric attendance at their home schools making it challenging to comply with attendance requirements while participating in CPD sessions. This creates a conflict among teachers to avail professional opportunities and comply with administrative obligations. This situation is leading to lower participation rates and decreased motivation among teachers.

Herzberg's Two-Factor-Theory (Herzberg, 1959) provides a useful lens to analyze this challenge. The policy related barriers, such as rigid biometric attendance requirements, fall under the hygiene factors that means, they do not necessarily enhance motivation but can cause dissatisfaction when poorly managed.

On the other hand, CPD activities serve as motivators, that offer teachers opportunities for skills development, career growth and their professional recognition. However, in the current situation, when the teachers attend the CPD session and do not mark their biometric attendance in their home school, they are considered absent in the system. This situation creates stress and dissatisfaction and overshadows the positive impact of CPD. Research has shown that even if the motivators are present but hygiene factors are inadequate, they contribute to the dissatisfaction (Herzberg, Mausner, & Snyderman, 1959). Recent research has also shown that though biometric attendance systems can enhance accountability, their rigid implementation without realizing and addressing the logistical challenges often leads to teachers' resistance. For instance, Hamad et al. (2022) found that Jordanian teachers resisted the use of fingerprint attendance because they were not involved in decision making process by the educational authorities. Similarly, in Sindh, the CPD model and biometric attendance systems are not aligned and teachers perceive attendance systems as burdensome and misaligned with their core responsibilities. This causes demotivation among

teachers that result their decreased participation in professional development activities, thereby diminishing the overall effectiveness of CPD initiatives. This study is crucial in addressing this misalignment by exploring the challenges teachers face in balancing their participation in CPD activities and compliance of biometric attendance. The aim of this study is to identify practical solutions to ensure that CPD remains an enriching and motivating experience for teachers and they participate without any stress and administrative burden.

Objectives

1. To explore the lived experience of teachers (GTs, SCs, Mentee Teachers, head teachers) regarding biometric attendance compliance during CPD activities.
2. To identify administrative challenges in aligning biometric systems with cluster-based CPD model.
3. To investigate how biometric attendance system influence teachers' motivation and engagement during CPD activities.

Research Questions

1. What are the lived experiences of teachers (GTs, SCs, Mentee Teachers, head teachers) regarding biometric attendance compliance during CPD activities?
2. What administrative challenges are faced in aligning biometric systems with cluster-based CPD models?
3. How does the biometric attendance system influence teachers' motivation and engagement during CPD activities?

Limitations

1. Limited access to comprehensive data on teachers' attendance and donor reports.
2. Responses from teachers may reflect personal biases, potentially skewing qualitative findings.
3. The findings might not be generalized across all regions due to a limited number of participants.

Literature Review

Research indicates that regular and accurate attendance monitoring systems positively influence both teacher behavior and students' outcomes (Guerrero et al., 2013). In this regard the role of Biometric Attendance Systems has become increasingly prevalent in education institutions, offering reliable means of attendance tracking and improving accountability. Several researchers emphasize on the relationship between introduction of biometric attendance systems and the increase in teacher performance. For instance, a case study of Nadwi center in Kenya showed that biometric systems brought down absenteeism and also changed the behaviors and instructional quality of teachers (Namiti & Ondiek n.d.). Likewise, Al-Shamsi et al. (n.d.) researched on the same technologies in the Arab world vowing that these technologies did not only enhance attendance but increased the allegiance of the faculty and performance of the institution. These systems are unique in terms of verifying identity (e.g., fingerprints, facial recognition), reducing fraudulent practices and errors common in manual systems (Necochea-Chamorro et al., n.d.). Though, the integration of biometric attendance systems in educational settings has gained popularity, however, the implementation of such technologies encounters many challenges, particularly in aligning them with existing professional development frameworks for public school

teachers. The research indicates that teachers mostly express concerns regarding the practicality and effectiveness of biometric systems, issues such as technical difficulties, lack of training and their implications on professional autonomy (Abdullah, 2023; Hamad et al., 2022; Ahmad, Sewani, & Ali, 2024). Furthermore, the alignment of these systems with external activities like professional development or exams supervision is challenging due to the rigid structure of biometric attendance systems (Jarrah et al., 2020). These issues may also frustrate and lead to teachers' resistance, who may feel their professional needs and context are not considered by the policy makers while adopting biometric technologies (Alrai, 2018). Moreover, biometric controls can also create anxiety and 'tattletale' culture among teaching staff that can hinder their participation in CPD initiative (Knott, 2021; Ali et al., 2023).

Conversely, Continuous Professional Development (CPD) plays a crucial role in enhancing teachers' skills, knowledge, and classroom practices. CPD also helps teacher stay updated with educational standards and trends that ultimately benefit students learning outcomes (Nawaz, et al., 2023). Apart from knowledge and skills development, CPD opportunities foster collaboration among teachers, creating a sense of community and learning experiences that enhance teaching practices (Allison, 2023; Jabeen, Ali, & Ahmad, 2023). There are different CPD models implemented around the world that are based on the teachers' needs, geographical accessibility and resources availability. However, the implementation of such systems within the context of cluster-based Continuous Professional Development activities poses unique challenges that require careful consideration. This research paper aims to explore the perspectives of teachers in Sindh province of Pakistan regarding the alignment of biometric attendance systems with cluster-based CPD activities. When recalling literature regarding the integration of biometric systems, the most pressing issue revolves around attendance (Imran, Sultana, & Ahmed, 2023). For instance, in Sindh, teacher's attendance is recorded through biometric system that requires thumb impression, requiring their physical presence. Nonetheless, these biometric systems may record teachers as absent when they attend CPD sessions outside their designated schools, generating login and logout discrepancies that lead to frustration (Mahajan & Raj, n.d). This gap creates administrative problems and, in some cases, lowers the effectiveness of CPD initiatives (Dewi et al, 2024; Ali, Ahmad, & Sewani, 2022). However, challenges arise when these systems are implemented without considering broader systemic dynamics. Herzberg's Two-Factor Theory (1959) distinguishes between hygiene factors and motivators in the workplace. According to his study, hygiene factors such as polices, supervisions and working conditions do not directly enhance motivation but can cause dissatisfaction if they are inadequate. Motivators including professional growth, recognition and job satisfaction, drive long term engagement and performance (Herzberg, Mausner, & Snyderman, 1959; Ahmad, Noorani, & Ali, 2024; Raza & Ahmed, 2017). For the problem of this study, biometric attendance policies, administrative procedures and enforcement mechanism act as hygiene factors as their rigid implementation is leading to dissatisfaction among teachers (Aslam, Iqbal, & Ahmed, 2022). On the other hand, CPD opportunities, skills development, and professional recognition serve as motivators that enhance teacher engagement and commitment but misalignment between these factors such as strict attendance requirements conflict with CPD participation and creating tension, affecting teachers' motivation and participation in professional development. These issues need attention as demotivated teachers may affect students learning. For instance, teachers' discouraging attitude is a significant factor to contribute demotivation of students (Tang & Hu, 2022; Dilshad, Shah, & Ahmad, 2023; Haider, Ahmad & Ali, 2024). Research indicates that demotivated teacher and their styles can significantly affect student academic outcomes and psychological wellbeing (Akram, Fatima & Ahmad, 2024; Aelterman at al., 2023; Imran et al., 2023). Thus, the cycle of demotivation and frustration that can negatively affect students learning outcomes needs to be addressed.

Al-Shamsi et al (n.d.) opine that it is the responsibility of the institutions' management that embraces the use of biometric systems to create an environment where biometric systems are used for improvement only rather than control. If this paradigm is adopted, there is a likelihood that teacher motivation would be increased leading to improvement of the educational system (Akram, Ahmad, & Sewani, 2024; Phulpoto, Oad, & Imran, 2024). In the same breadth also Guerrero et al (2013) observes that attendance reporting and attendance checklist is important however the two must be integrated with other elements like teacher motivation programs (Silva, 2024). Hence, biometric system technology is important to track employees' attendance but there is a need to integrate this system in the current education system of Sindh, particularly in cluster-based CPD model so teachers are motivated to participate and learn effectively during these CPD sessions. Though these theories help us identify the importance of factors that motivate or demotivate the teachers and the challenges in integrating technologies in education, particularly for teacher attendance to ensure regularity but there is a gap that how these both can be aligned for the education models like Sindh. This study will help in identifying the challenges that work as a barrier in aligning the biometric attendance systems with current cluster based CPD model so teachers can benefit from the professional development opportunities without any hesitation (Nawaz, et al., 2016).

Research Methodology (President)

The study employs a qualitative research design to delve deep to understand the lived experiences of teachers who have participated in the CPD programs (STA-DEEP Project). Data was collected through semi-structured interviews. The participants included mentee teachers, guide teachers, and subject coordinators. Purposive sampling was used to ensure that the participants have relevant experience with both CPD and biometric attendance system. Data was analyzed using thematic analysis, where recurring themes and patterns were identified. Manual coding was employed to organize and interpret the data effectively that allowed for an in-depth understanding of the challenges in integrating biometric with CPD activities and potential solutions.

Data Collection

Data was collected through semi structured interviews and document analysis. Approximately 10 in depth interviews were conducted with the participants that include 04 mentee teachers, 03 guide teachers, and 03 subject coordinators. The study sample included only those districts and teacher where the STA-DEEP project CPD activities were carried out and the sample was directly involved in implementation. Non-CPD participants and those who do not have biometric systems installed in STA-DEEP districts were excluded. The structured interviews allowed flexibility, enabling participants to express their views openly while ensuring that key research questions are addressed. These interviews focused on participants' experience with biometric attendance, attending CPD activities, and challenges they encountered in implementation.

Data Analysis

The collected data through interviews was analyzed using a combination of thematic and narrative analysis to uncover patterns, themes and insights related to aligning biometric attendance systems with cluster based CPD activities. Thematic analysis was done by transcribing the audios recordings and field notes from interviews ensuring accurate representation of participants' responses. The next step was assigning codes to text related to challenges, experiences and motivational factors. These codes were synthesized into boarder themes such as compliance

challenges, administrative hurdles and proposed recommendations. This interpretation highlighted practical insights and policy implications. The narrative analysis focused on individual experiences, offering detailed exploration of systemic gaps and success. This combined approach, supported by NVivo software provided a comprehensive understanding of the challenges and opportunities associated with biometric attendance systems and will suggest strategies to enhance the effectiveness of CPD activities by aligning biometric attendance systems with the CPD initiatives for teachers' active participation (Nawaz, et al., 2024).

Ethical Consideration

This study adhered to the ethical research practices to ensure the safety, dignity and rights of participants. The key ethical consideration included; informed verbal consent was taken before the interviews and the participants were provided detailed information about the study, including purpose, procedures and potential risks. Participation in the study was entirely voluntary and participants had the right to withdraw at any stage.

Findings and Discussion

The current CPD model in Sindh is implemented through different donor funded projects. During the implementation of these projects, the alignment of biometric systems with the cluster based CPD activities raised significant concerns regarding teacher engagement, administrative efficacy, and the overall effectiveness of CPD program. The lived experiences of teachers, including Mentee Teachers (MT), Subject Coordinators (SCs) and Guide Teachers (GTs) were captured through interviews. These interviews identified key challenges that were faced by them due to biometric attendance compliance during CPD cycles and how it has affected their motivation and participation in professional development initiatives. The insight derived from these interviews aim to inform education departments seeking to optimize the alignment of biometric attendance systems with CPD activities (Ismat, et al., 2016).

Objective 1: To explore the lived experience of teachers (GTs, SCs and Mentee teachers) regarding biometric attendance compliance during CPD activities.

Theme 1: Stress and Anxiety due to Biometric Attendance Compliance

A very significant and recurring theme identified in the interview was the stress teachers experienced due to compliance of biometric attendance. One participant shared, "We used to be in mental stress whenever we had training sessions, went for follow up or school visits" (interview 1). This anxiety was due to the fear of being marked absent in their home school while they are out at hub schools for their CPD cycles.

The constant fear of attendance undermined the overall value of the training sessions, resulting in reducing perceived benefits. Though, they were on official duties but having their attendance record marked as absent was the major reason for their worry. One participant expressed concern, "If biometric is done in our school, how do we get our attendance counted in the system as technically we are not absent and still on duty." (interview 1). This fear of absenteeism causes stress and they do not attentively or partially attend the CPD activities, this highlights systemic inefficiencies that need to be addressed to ensure seamless CPD participation (Prakasha, et al., 2024).

A recent study also indicates that rigid biometric systems in educational settings often lead to increased stress and anxiety among teachers, particularly when it is forced rather than supportive (Ali, Mustafa & Khan, 2018; Ahmad, Mankash, & Sewani, 2024). Similarly, research by Thomas and Zacharias (2022) also highlights that biometric attendance systems are effective for accountability but can create significant psychological burden if not implemented with flexibility and clear communication through guidance and counseling (Ahmad, Sewani, & Khoso, 2024).

Theme 2: Disruption to CPD Participation

Another significant challenge that emerged as a barrier to effective CPD participation is due to biometric attendance compliance is the CPD schedule. The teachers described the difficulty of balancing biometric attendance and attending CPD sessions. One teacher explained, “We had to leave the session, go back to the school for biometric attendance, and return to the session.” (interview 9), emphasizing the disruption caused by the need to mark attendance in person (Nawaz, et al., 2024). Such logistical burden affects the CPD experience and reduce overall impact and effectiveness. As mentioned by the teachers, time management also became an issue, with participants recounting the stress of “constantly rushing and managing between training sessions and marking attendance at home school.” (interview 3). These disruptions point to pressing need for a more integrated and flexible attendance system that can minimize unnecessary interruptions. A study by Darling-Hammond, Hyler and Gardner (2020) also emphasis that effective professional development required uninterrupted engagement and time for reflection, which is often compromised by logistical challenges.

Objective 2: To identify administrative challenges in aligning biometric systems with cluster-based CPD model.

Theme 1: Lack of Flexibility in the Biometric System

Another most significant administrative challenges identified was the lack of flexibility within the biometric system. The current biometric system is not flexible as it has been designed and deployed without considering the CPD activities so when the teachers leave them homeschool to attend the CPD session, they are marked absent due to geo-coordinates. This rigidity of the biometric system creates a conflict between compliance and CPD participation, reducing the potential benefit of professional development activities. Moreover, the binary nature of the attendance system only distinguishes between present and absent and fails to account for the dynamic schedule that CPD activities often require as per the cluster-based CPD model in Sindh. One participant noted, “Biometric attendance system either mark you present or absent, with no flexibility for training days”. (interview 6). For instance, the effectiveness of biometric systems is highly dependent on the robustness of technology, suggesting that any shortcomings in the technology could hinder its performance and efficiency (Namiti & Ondiek, 2020; Ahmad, Sewani, & Ali, 2021). This rigidity highlights the need for a more flexible and updated system that comes with different options to accommodate the varying demands of CPD specifically when the teachers are off site for CPD session in the hub school.

Theme 2: Insufficient Administrative Support

Yet another challenge brought out by the respondents was the lack of administrative support concerning the coordination of biometric attendance with CPD calendars. The administrative support at two levels was mentioned by the participants; head teacher and monitoring assistant (Ahmad, et al., 2016). It was notable that where head teachers were supportive, they coordinated

with the monitoring assistant and CPD venue coordinators to ensure the mentee teachers mark their attendance. whereas, at some places where this support was not provided the teachers faced problems as mentioned by one participant, “There was no proper communication with biometric team to account for training schedules.” (interview 8). Moreover, it was also mentioned by the participant that majority of the head teachers were unable to deal with the biometric problems adequately, as one of the participants remarked, “Head teachers lack the authority to make mentees accountable or address biometric issues affectively.” (interview 6). There is a need to recognize that administrative support can enhance or hinder the adoption of effective use of biometric systems, if supported, it can significantly enhance the chances of successful implementation and acceptance through effective leadership (Namiti & Ondiek, 2020; Ahmad, Ali, & Sewani, 2021;

Ahmad, & Hamid, 2021; Khoso, Oad, & Ahmad, 2023). In regards to educational development through professional enhancement policies, research done by Fullan and Quinn (2020) also highlighted the need for effective supportive structures and periodical progress reporting that in this case will support Provincial Institute of Teacher Development (PITE) to regularly monitor administrative support and timely address the concerns (Imran & Akhtar, 2023).

Objective 3: To investigate how biometric attendance system influence teachers’ motivation and engagement during CPD activities.

Theme 1: Demotivation Due to Attendance Issues

The findings also indicates that biometric attendance system has ensured the accountability and regularity of the teachers but also led to demotivation among the teachers due to its punitive consequences of non-compliance. Several teachers expressed their concerns about salary deduction for repeated absenteeism, with one participant stating, “If marked absent twice, salaries can be withheld, affecting motivation” (Interview 2). This financial penalty has created an atmosphere where teachers prioritize their attendance marking rather than attending their CPD sessions losing their focus on the actual training. One participant shared, “The constant concerns about the attendance distracted us from focusing on the training sessions,” (interview 5). These findings suggest that the current biometric system is affecting the goals it aims for the CPD activities and that is to enhance teachers’ knowledge and skills as mentioned by Ryan and Deci (2020) on self-determination theory, highlights those strict measures, such as salary deductions can undermine intrinsic motivation and reduce engagement in professional development activities (Ahmad, Bibi, & Imran, 2023). Similarly, research by Hanushek and Woessmann (2021) found that systems that only focuses on accountability can have a reverse effect on performance.

Theme 2: Positive Outcomes of Accountability

Despite all these challenges, there were some positive outcomes associated with the current biometric system mentioned by the teachers. Notably, most of the participants reported that due to biometric they have been punctual and accountable with one teacher commenting, “Biometric attendance has made us all more punctual and accountable.” (interview 6). These findings indicate while the biometric systems have limitations but it also fosters a sense of responsibility among teachers and will benefit more if aligned with CPD activities. As a study by Duflo et al. (2021) also found out that in low resources settings monitoring of attendance can improve attendance and accountability. Similarly, well implemented accountability systems can lead to positive behaviors changes among educators (Kremer et al., 2020; Ahmad et al., 2024).

Conclusion

The analysis of the findings highlights the importance of biometric system and CPD and their integration in a manner that not only facilitates the teachers for their participation but also improves their professional development. When the logistical, administrative and motivation problems are resolved, the education departments can further enhance the biometric systems, making it more adaptable for the professional development needs of the teachers. Implementing flexible biometric systems, updating policies to address the attendance tracking challenges, deploying portable biometric devices at CPD venue and generating real time report through portal to track attendance, making it possible to take measures to address the challenges. This will not only improve teacher's attendance but also motivate teachers and foster a culture of professional growth to improve the students learning outcomes in Sindh province.

Future studies may explore the impact of integrated biometric attendance with CPD participation and teachers' engagement (Ahmad et al., 2023; Hafeez, Iqbal, & Imran, 2021). The research should also explore the impact of administrative support, particularly support provided to teachers at leadership level, examine behavioral and motivational factors that influence teachers' participation in CPD activities and comparative analysis of different biometric systems implemented in education across Pakistan and their effectiveness. Additionally, future studies may focus on assessing the financial and operational feasibility of deploying biometric systems at CPD venue, AI blockchain for efficient monitoring and modification of CPD model by conducting CPD activities at teachers homeschools.

Recommendations for System Improvement

Based on the findings, several key recommendations emerge for improving the alignment between biometric attendance systems and CPD activities:

1. There is a dire need to introduce a flexible attendance system to facilitate the teachers in all conditions whether they are in a training or at routine duty outside the schools. It can help teachers to attend the CPD without any fear. As reported, a significant number of teachers remained absent during CPD sessions due to the fear of absenteeism. Contactless-biometric system is a feasible option to resolve this issue.
2. Some modification in the current biometric system can be done by adding an 'on duty' option in the biometric systems to mark teachers who are attending CPD sessions in the hub school.
3. A mobile biometric device at the CPD venue (hub school) can be deployed that is integrated with the GPS tracking for authentication.
4. Another important recommendation is, the alignment of different data collection systems within education departments. There is a need to link cluster-based CPD attendance with the Sindh Education Management Information System (SEMIS) or any other centralized database to ensure accurate tracking. Currently, Education department in Sindh is using QR Code or OTP-based system at CPD venues for quick check-ins. This will help in reducing the dependency on the school-based biometric systems.
5. Deploying a portable biometric device at the CPD venue can also ensure the teachers and trainers not only mark their attendance but also attend their sessions. This data can be uploaded in the real time with the current database to maintain transparency.
6. The biometric or geo-fencing system should be modified to 'accept the geo-coordinates of the training center' or be adjusted to mark the teacher as 'On Training' instead of absent.

7. The 'MPS system' should be configured to recognize and accept the 'geo-coordinates' of the training location where the teacher is attending.
8. CPD Participants should have to be incentivize as a reward to motivate other teachers to participate in the CPD training sessions. Incentives actively attract the participants to join the training session rather penalizing the teachers who are attending the CPD sessions i.e., certificate for completing certain numbers of CPD sessions.
9. At the policy level, Provincial Institutes of Teacher Education should have an active CPD portal that updates the training status of each cluster and generate the reports on the provided data in the real time. This will help the district officials to track CPD participation and identify gaps so they are addressed.
10. A mandatory training for the biometric teams may be organized as an awareness step to introduce the new systems for dynamic attendance of the school teachers specially helping the teachers who are attending the CPD sessions.
11. It is also important to always pilot any new change in biometric attendance systems before a full-scale rollout to oversee implementation challenges and address challenges proactively.

References

1. Abdullah, R. (2023). The Jordanian Teachers' Resistance to the Use of the Fingerprint Attendance System: Critical Analysis and Resolution From an Educational Leadership Perspective. *Journal of Higher Education Theory and Practice*, 23(1). <https://doi.org/10.33423/jhetp.v23i1.5802>
2. Ahmad, N., Ali, Z., Saba, F., Yaqoob, N., & Ullah, N. (2023). Teachers' Perceived Knowledge of Self-Concept and Its Influence on Their Teaching Practices. *International Journal of Multicultural Education*, 25(2), 152–166.
3. Ahmad, N., Ali, Z., & Sewani, R. (2021). Secondary School Teachers' Perceptions of their Head Teachers Instructional Leadership and its Effect on Teachers' Professional development in Karachi Pakistan. *Journal of Development and Social Sciences*, 2(3), 362–377. [http://doi.org/10.47205/jdss.2021\(2-III\)31](http://doi.org/10.47205/jdss.2021(2-III)31)
4. Ahmad, N., Bibi, N., & Imran, M. (2023). EFFECTS OF TEACHER'S MOTIVATION ON STUDENTS' ACADEMIC PERFORMANCE AT PUBLIC SECONDARY SCHOOLS IN KARACHI PAKISTAN. *AITU Scientific Research Journal*, 1(2), 20–32.
5. Ahmad, N., & Hamid, S. (2021). An analysis of instructional leadership practices of primary school head-teachers on teacher effectiveness: A qualitative study of teachers' perceptions. *PAKISTAN LANGUAGES AND HUMANITIES REVIEW*, 5(2), 193–209. [http://doi.org/10.47205/plhr.2021\(5-II\)2.16](http://doi.org/10.47205/plhr.2021(5-II)2.16)
6. Ahmad, N., Iqbal, S., Ali, Z., Jabeen, R., & Imran, M. (2024). Bridging the Gap: Secondary School Teachers' Perspectives on Behavioral Barriers to Academic Success. *Al-Qanṭara*, 10(2), 144-162.
7. Ahmad, N., Mankash, M. A., & Sewani, R. (2024). The Dynamic Link between Teacher Effectiveness and Student Success in Secondary Education in Karachi. *Journal of Social & Organizational Matters*, 3(2), 14–26. <https://doi.org/10.56976/jsom.v3i2.61>
8. Ahmad, N., Noorani, Z. & Ali, Z. (2024). Factors Influencing on Job Satisfaction of Secondary School Teachers in Karachi Pakistan. *Research Journal for Societal Issues*, 6(2), 138–152. <https://doi.org/10.56976/rjsi.v6i2.213>
9. Ahmad, N., Sewani, R., & Ali, Z. (2024). The use of Smartphones in Shaping of Students' Academic Performance at Secondary School level. *Journal of Social Sciences Development*, 6(2), 128–141. <https://doi.org/10.53664/JSSD/03-02-2024-11-128-141>

10. Ahmad, N., Sewani, R., & Ali, Z. (2021). Impact of head-teachers' instructional approaches on teachers competencies at campus schools in Karachi. *Pakistan Social Sciences Review*, 5(IV), 131–146. [http://doi.org/10.35484/pssr.2021\(5-IV\)10](http://doi.org/10.35484/pssr.2021(5-IV)10)
11. Ahmad, N., Sewani, R., & Khoso, F. J. (2024). Assessing Secondary School Teachers' Perceptions of Counseling and Guidance in Karachi, Pakistan. *Global Social Sciences Review*, IX(I), 134-144. [https://doi.org/10.31703/gssr.2024\(IX-I\).12](https://doi.org/10.31703/gssr.2024(IX-I).12)
12. Akram, M., Ahmad, N., & Sewani, R. (2024). Comparing Special Education Teachers' Psychological Wellbeing Based on their Demographics. *International Journal of Social Science Archives*, 7(3), 23-32.
13. Akram, M., Fatima, S. A., & Ahmad, N. (2024). Comparing Students' Science Motivation and their Achievement in Science Subjects at Secondary Level. *Global Social Sciences Review*, IX(II), 72-83. [https://doi.org/10.31703/gssr.2024\(IX-II\).08](https://doi.org/10.31703/gssr.2024(IX-II).08)
14. Ali, Z., Ahmad, N., & Sewani, R. (2022). Examining Elementary School Teachers' Professional Proficiencies With Technology Integration And Their Impact On Students' Achievement. *Journal of Positive School Psychology*, 6(7), 2950–2968.
15. Ali, A., Mustafa, J., & Khan, I. U. (2018). Relationship of Biometric Attendance System with Performance, Job Related Stress and Satisfaction of University Teachers in Pakistan. *Liberal Arts and Social Sciences International Journal (LASSIJ)*, 2(2), 42–49. Retrieved from <https://ideapublishers.org/index.php/lassij/article/view/39/37>
16. Ali, Z., Ullah, N., Ahmad, N., Yaqoob, N., & Saba, F. (2023). Teachers' Perceptions of Curriculum Change and the Need of Professional Development for Effective Teaching Practices. *Multicultural Education*, 9(1), 83–90.
17. Allison, J. (2023). Classifying the Characteristics of Effective Continuing Professional Development (CPD) for Computer Science Teachers in the 16-18 Sector. *ACM Transactions on Computing Education*, 23, 1 - 30. <https://doi.org/10.1145/3582275>.
18. Alrai, A. (2018). Resistance to Change: The Case of Biometric Attendance Systems in Jordanian Schools. *Educational Leadership Review*, 19(1), 112-130.
19. Al-Shamsi, I. R., Shannaq, B., Adebiaye, R., & Owusu, T. (n.d.). Exploring biometric attendance technology in the Arab academic environment: Insights into faculty loyalty and educational performance in policy initiatives. *Journal of Educational Technology Systems*.
20. Aslam, R., Iqbal, S., & Ahmed, N. (2022). Impact of Entrepreneurship Education on Students' entrepreneurial Inclination: A Case of Public Sector Universities. *Pakistan Journal of Educational Research*, 5(1), 51–65.
21. Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2020). *Effective Teacher Professional Development*. Learning Policy Institute.
22. Dewi, I., Miftahuddin, Y., Triseptiyadi, F., Vito, N., Naufal, M., & Fahreza, A. (2024). Effect of internal monitoring system on government school teachers' attendance, attitudes, and performance. *REKA ELKOMIKA: Jurnal Pengabdian kepada Masyarakat*, 5(2), 135–144.
23. Dias, P., Ring, H., Rothbard, V., Siwach, G., Toungui, A., & de Hoop, T. (2023). Case study of the use of biometrics in Impact Network schools in rural Zambia. *Impact Network*.
24. Dilshad, S. A., Shah, R., & Ahmad, N. (2023). Implementation of Single National Curriculum at Primary Level: Problems And Practices In District Khushab. *Journal of Positive School Psychology*, 7(4), 465–476.
25. Duflo, E., Hanna, R., & Ryan, S. (2012). Incentives Work: Getting Teachers to Come to School. . <https://doi.org/10.1257/aer.102.4.1241>.
26. Fullan, M., & Quinn, J. (2020). *Leading in a Culture of Change*. Jossey-Bass.
27. Guerrero, G., Leon, J., Zapata, M., & Cueto, S. (2013). Getting teachers back to the classroom: A systematic review on what works to improve teacher attendance in

- developing countries. *Journal of Development Effectiveness*, 5(4), 466–488. <https://doi.org/10.1080/19439342.2013.864695>
28. Hafeez, A., Iqbal, S., & Imran, M. (2021). Impact of Devolution of Power on School Education Performance in Sindh after 18th Constitutional Amendment. *Journal of Development and Social Sciences*, 2(4), 273-285.
 29. Haider, K., Ahmad, N., & Ali, Z. (2024). Problems and challenges faced by non-Muslim students in achieving higher education at universities of Pakistan: An evaluative study. *Spry Contemporary Educational Practices*, 3(1), 265–290. <https://doi.org/10.62681/sprypublishers.scep/3/1/15>
 30. Hamad, A., & Al-Momani, M. (2022). Teachers' Perspectives on the Implementation of Biometric Attendance Systems in Education: A Qualitative Study. *International Journal of Educational Management*, 36(4), 789-802.
 31. Hanushek, E. A., & Woessmann, L. (2021). The economic impacts of learning losses. *OECD Education Working Papers*, 225.
 32. Herzberg, F., Mausner, B., & Snyderman, B. B. (2011). *The motivation to work* (Vol. 1). Transaction publishers.
 33. Imran, M., Ahmad, N., Al-Harthy, A. A. Q., & Jat, Z. G. (2023). Early Identification and Intervention: Amplifying the Voice of Slow Learners. *AITU Scientific Research Journal*, 1(4), 17–25.
 34. Imran, M., & Akhtar, N. (2023). Impact of Ethical Leadership Practices on Teachers' Psychological Safety and Performance: A Case of Primary School Heads in Karachi-Pakistan. *Academy of Education and Social Sciences Review*, 3(2), 172-181.
 35. Imran, M., Sultana, Z., & Ahmed, S. (2023). THE INFLUENCE OF STUDENT-TEACHER INTERACTIONS ON SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE. *Benazir Research Journal of Humanities and Social Sciences*, 2(1).
 36. Jabeen, M., Ali, Z., & Ahmad, N. (2023). Factor Effecting on Quality Teaching Learning at Public Sector Schools in Karachi Pakistan. *Journal of Educational Research and Social Sciences Review (JERSSR)*, 3(1), 92–98.
 37. Jarrah, A., & Al-Qudah, M. (2020). Aligning Professional Development with Technological Innovations: Challenges and Opportunities. *Journal of Professional Development in Education*, 46(3), 345-360.
 38. Khoso, F. J., Oad, L., & Ahmad, N. (2023). Exploring Teachers' Perspectives on Effective Leadership Styles at Secondary Level in Karachi, Pakistan. *Voyage Journal of Educational Studies*, 3(4), 209–226. <https://doi.org/10.58622/vjes.v3i4.104>
 39. Khoso, Z. A., Siddiqui, M. A., Tagar, A. A., & Tagar, H. K. (2019). An evaluation of Sindh schools education system: Problems and possibilities. *Advances in Social Sciences Research Journal*, 6(3).
 40. Knott, D. L. (2021). Teacher professionalism in light of biometric controls on teacher mobility and autonomy. The Qualitative Report, 26(7), 2111-2126. <https://doi.org/10.46743/2160-3715/2021.4608>
 41. Kremer, M., Chaudhury, N., Rogers, F. H., Muralidharan, K., & Hammer, J. (2020). Teacher absence in developing countries: A review of the literature. *Journal of Economic Literature*, 58(3), 719–760.
 42. Miller, R. T., Murnane, R. J., & Willett, J. B. (2008). Do teacher absences impact student achievement? Longitudinal evidence from one urban school district. *Educational Evaluation and Policy Analysis*, 30(2), 181-200.
 43. Namiti, A., & Ondiek, C. O. (n.d.). Adoption of biometric system to manage teachers' absenteeism for improvement of teachers' performance: A case study for Karuri High School in Kiambu County, Kenya. *University of Nairobi*.

44. Necochea-Chamorro, J. I., Sotelo Asalde, C. M., Loli Nuñez, M. E., & Vasquez Valencia, Y. R. (n.d.). Systematic literature review: Biometric technology applied to educational institutions. *Universidad César Vallejo*.
45. Phulpoto, S. A. J., Oad, L., & Imran, M. (2024). Enhancing Teacher Performance in E-Learning: Addressing Barriers and Promoting Sustainable Education in Public Universities of Pakistan. *Pakistan Languages and Humanities Review*, 8(1), 418-429.
46. Raj, M., & Mahajan, T. (2021). Study of Opinions Related to the Use of Bio- Enabled Attendance System for Improving Punctuality Among Teachers. *MIER Journal of Educational Studies Trends and Practices*, 11(1(a) SPL), 41–52. [https://doi.org/10.52634/mier/2021/v11/i1\(a\)SPL/1911](https://doi.org/10.52634/mier/2021/v11/i1(a)SPL/1911)
47. Raza, S., & Ahmed, N. (2017). Measuring Employees' Commitment through Job Satisfaction: Perception of Public Primary School Teachers. *Bulletin of Education and Research*, 39(1), 129–144.
48. Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary educational psychology*, 61, 101860.
49. Singh, S. (2024). BIOMETRIC ATTENDANCE SYSTEM. *INTERANTIONAL JOURNAL OF SCIENTIFIC RESEARCH IN ENGINEERING AND MANAGEMENT*. <https://doi.org/10.55041/ijsrem35127>.
50. Thomas, A., & Zacharias, S. (2022). A Study on Job Stress Due to Biometric Attendance Punching. *Academy of Entrepreneurship Journal*, 28(S3), 1–10. Retrieved from <https://www.abacademies.org/articles/a-study-on-job-stress-due-to-biometric-attendance-punching-14440.html>
51. Nawaz, H., Juve, G., Da Silva, R. F., & Deelman, E. (2016, May). Performance analysis of an I/O-intensive workflow executing on google cloud and amazon web services. In *2016 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)* (pp. 535-544). IEEE.
52. Azeema, N., Nawaz, H., Gill, M. A., Khan, M. A., Miraj, J., & Lodhi, K. (2023). Impact of Artificial Intelligence on Financial Markets: Possibilities & Challenges. *Journal of Computing & Biomedical Informatics*, 6(01), 287-299.
53. Nawaz, H., Maqsood, M., Ghafoor, A. H., Ali, S., Maqsood, A., & Maqsood, A. (2024). Huawei Pakistan Providing Cloud Solutions for Banking Industry: A Data Driven Study. *The Asian Bulletin of Big Data Management*, 4(1), 89-107.
54. Nawaz, H., Sethi, M. S., Nazir, S. S., & Jamil, U. (2024). Enhancing national cybersecurity and operational efficiency through legacy IT modernization and cloud migration: A US perspective. *Journal of Computing & Biomedical Informatics*, 7(02).
55. Prakasha, G. S., Lapina, M., Balakrishnan, D., & Sajid, M. (Eds.). (2024). *Digital Technologies in Modeling and Management: Insights in Education and Industry: Insights in Education and Industry*. IGI Global.
56. Ahmad, M., Ali, A., Nawaz, H., Arslan, M., & Kumar, N. (2024). Optimizing Integrated Spatial Data Management Through Fog Computing: A Comprehensive Overview. *Digital Technologies in Modeling and Management: Insights in Education and Industry*, 263-283.
57. ISMAT, S., ULLAH, A., WAQAR, M., QURESHI, M., NAWAZ, H., & LODHI, K. (2023). EFFECTS OF E-BANKING ON CONSUMER SATISFACTION AND ITS POTENTIAL CHALLENGES: A CASE OF PRIVATE BANKS IN PUNJAB. *Bulletin of Business and Economics (BBE)*, 12(2), 381-388.
58. Silva, L. C. S. (Ed.). (2024). *Perspectives on Innovation and Technology Transfer in Managing Public Organizations*. IGI Global.