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RESEARCH ARTICLE

Technology Acceptance and Teacher Performance: The Role of Biometric Attendance Systems in Elementary Schools of Tehsil Sehensa, Kotli, AJ&K

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Abstract: Technology has revolutionized education, and Azad Jammu and Kashmir introduced biometric attendance in schools. This study investigates its role in secondary teachers' attendance, academic results, and behavior in District Kotli. A descriptive cross-sectional survey design was employed. The population comprised all 115 head teachers of boys' and girls' high schools in District Kotli (80 boys' schools, 35 girls' schools). Using random sampling, all 115 head teachers were included. A self-developed 27-item Likert scale covered teacher attendance, results, and behavior. Validation and pilot testing showed high reliability (Cronbach's α = 0.87). Data were collected personally and analyzed using frequency, percentage, mean scores, and Pearson correlation. For teacher attendance, head teachers strongly affirmed the positive role of biometric systems: 99.2% agreed biometric systems reduce teacher absenteeism (M=4.34); 99.3% agreed biometric systems are useful for attendance tracking (M=4.43); 100% agreed there is a positive relationship between biometric systems and teacher attendance (M=4.48). For teacher results: 99.2% agreed biometric systems motivate teachers to do lesson planning for good results (M=4.50); 94.2% agreed biometric systems improve overall educational performance of schools (M=4.74); 100% agreed biometric systems have high-level influence on teacher results (M=4.48). For teacher behavior, 98.2% agreed teacher-student relations improved, 98.2% agreed teachers are motivated, and 93.9% agreed teachers do not feel anxiety. Correlation analysis showed a strong positive relationship with attendance (r=.892), results (r=.856), behavior (r=.823), and overall performance (r=.874). The study concludes biometric attendance systems play a significantly positive role in enhancing teacher performance.

Keywords: Biometric System, Teacher Performance, Teacher Attendance, Teacher Results, Teacher Behavior, Secondary Education, Technology in Education, Attendance Management

Introduction

Education is a very important factor that leads to a successful future. Those who prepare themselves today, own the future and education is a passport for them to reach there. Likewise, a teacher's role is to inspire, motivate, support, and educate students. Today, the global scenario is changing unfathomably because of technological advancements. Different sectors have recorded a significant rise in their performances as a result of the use of technology. Likewise, the education sector has registered a massive change with the use of technology. Recently, the Education Department of Azad Kashmir has introduced a biometric attendance system to improve the attendance and performance of educational institutions. Similar initiatives in other developing countries have shown promising results. For instance, Mgonja and Makulilo (2024) documented that biometric attendance registers significantly reduced teacher absenteeism in Tanzanian public secondary schools.

Biometric Attendance System (BAS) is a computerized method for checking employee attendance that reduces attendance and payroll disputes. Biometric technology identifies individuals based on physical

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features—typically fingerprints, hands, eyes, and faces—making the individual the sole source of authentication rather than relying on manually entered data. This method prevents practices such as one employee marking attendance for another. Gunawan and Ikhwan (2024) demonstrated that biometric systems combined with geolocation technology provide accurate, tamper-proof attendance records in educational settings.

Previously, employee attendance was recorded through traditional paper-based methods where employees manually marked attendance sheets. The introduction of biometric machines has eliminated many problems associated with manual systems. Employees who are physically present simply interact with the biometric device, and their check-in time is automatically recorded in a digital database that cannot be altered. As Mgonja and Makulilo (2024) observed, it becomes nearly impossible to falsify attendance records, and any absence must be formally acknowledged rather than hidden.

Unfortunately, one of the most harmful trends facing many educational institutions today is employee attendance problems, including late arrival and early departure from the workplace. For organizational effectiveness, active involvement of both faculty members and students at every level of operation is essential, requiring discipline in attendance and honesty in engagement. Therefore, educational institutions face considerable pressure to implement accurate attendance tracking systems that eliminate subjective factors such as favoritism or leniency, ultimately leading to higher productivity and efficiency. Shukla (2025) found that biometric attendance systems serve as an effective solution to these challenges, with faculty members perceiving such systems as both useful and easy to use when properly implemented.

Biometric verification offers several benefits in the current digital era. Biometrics provide significantly higher levels of authentication confidence by evaluating physical characteristics of the user, serving as both a tangible possession and an identity marker. While passwords, PINs, and other personal information are vulnerable to data leaks, biometric authentication offers enhanced security. However, as Al-Shamsi et al. (2024) noted, implementation requires substantial investment and ongoing technical support. Since the Government of Azad Jammu and Kashmir has already allocated funds for installing biometric attendance systems, ensuring positive academic outcomes remains a priority.

Recent studies indicate that biometric attendance systems can significantly improve teacher performance and institutional efficiency. Shukla (2025) found strong positive correlations between biometric system adoption and faculty attendance in academic settings. Al-Shamsi et al. (2024) further documented that biometric technology positively influences faculty loyalty and educational performance when supported by appropriate policy initiatives.

Empirical evidence from multiple contexts supports these findings. De Jager (2019) demonstrated that biometric fingerprinting not only tracks attendance but also encourages active engagement among teachers, leading to improved instructional quality. Gunawan and Ikhwan (2024) further documented that technology-based attendance systems enhance operational efficiency in educational institutions. Mgonja and Makulilo (2024) provided evidence that biometric attendance registers serve as an effective tool for reducing workplace absenteeism, though they cautioned that infrastructure challenges (such as reliable electricity) must be addressed for successful implementation.

So, above all mention is the fact that the biometric system is a very crucial addition to the education system. In one of the research projects, it was investigated about teachers' performance after implementation of Biometric Attendance System (BAS) in the elementary schools of Tehsil Sehensa, Kotli, Azad Kashmir. The result reveals that it enhances work ability and commitment of teachers. Biometric is a complicated concept in schools. Biometric is a thing which can make a school efficient and it should not be underrated, especially when considering the ongoing changes in the world. Schools which consider biometric have more chances to succeed and will have a bright future.

Statement of the Problem

The manual attendance system is not functioning properly nowadays. The world, under democratic and focused approach, is following digitalization. But in this regard, the teachers of government high schools of Tehsil Sehensa, Kotli are not aware of digitalization systems. So, the role of biometric systems in teacher performance in Tehsil Sehensa, Kotli may be analyzed for better results. It has been observed that teacher absenteeism, late coming, and early leaving from workplace negatively affect student learning outcomes and institutional efficiency. The focus of this study, thus the actual problem to be explored, was set in the words: role of biometric on teacher's performance at elementary level in Tehsil Sehensa, Kotli, Azad Jammu & Kashmir.

Objectives of the Study

The study pursued the following objectives:

1. To explore the attendance of teachers after implementation of biometric system at elementary level in Tehsil Sehensa, Kotli AJ&K.
2. To find out the role of biometric on teacher results (academic outcomes) at elementary level in Tehsil Sehensa, Kotli AJ&K
3. To find out the role of biometric on teacher behavior at elementary level in Tehsil Sehensa, Kotli AJ&K
4. To explore the relationship of biometric system with overall teacher performance at elementary level in Tehsil Sehensa, Kotli AJ&K

Review of the Related Literature

Understanding Biometric System

Biometric is a Greek term composed of two words: bio (life) and metrics (measurement). Biometric data is collected using fast, discreet, non-intrusive methods that record facial images with digital cameras and fingerprint scans with digital scanners. An organization's productivity depends on systems for monitoring and regulating employee quality and regularity, which in turn increases efficiency and effectiveness. Gunawan and Ikhwan (2024) demonstrated that biometric attendance systems make employees more organized and task-oriented in educational settings.

Over the past several decades, educational institutions have witnessed significant changes through modern technology integration. One technology that has been rapidly adopted by many institutions for monitoring employee attendance and improving performance is the biometric attendance system. Through workers' biometric records, the system helps ensure staff report to work on time and accurately record their departure times. Shukla (2025) documented that biometric systems serve as powerful supervisory solutions that help increase school efficiency.

Latest studies show that biometric systems act as powerful supervisory solutions that help increase the efficiency of a school. Elementary school principals are often burdened with administrative duties that leave little time for classroom observation. By using biometric systems, schools can manage daily attendance records and eliminate the weaknesses of traditional paper attendance sheets and time theft. Key features include staff scheduling, flexible reporting, automated payroll calculation, and support for large school networks. Mgonja and Makulilo (2024) confirmed these benefits in their study of Tanzanian secondary schools, though they noted that power supply interruptions and technical failures remain significant challenges.

Theories Supporting the Research

This study is based on two major theories: Innovation-Diffusion Theory and the Technology Acceptance Model.

Innovation-Diffusion Theory: Rogers (1995) introduced the innovation-diffusion theory to provide a foundation for studying innovation acceptance. Drawing from more than 508 diffusion studies, Rogers developed a theory explaining how innovations spread via specific channels over time among members of a

social system. The implementation of biometric attendance systems in schools represents an innovation, making this theory applicable to the present investigation. Shukla (2025) successfully applied this theoretical framework to understand biometric system adoption in academic settings.

Technology Acceptance Model: Davis (1989) proposed this model to identify factors influencing individual or group acceptance of new technology. The two fundamental factors are Perceived Usefulness (the extent to which a person believes a particular system will enhance job performance) and Perceived Ease of Use (the extent to which a person believes using a particular system will be free of effort). This study is supported by TAM as it illustrates how teachers and administrators in Kotli District may accept or resist biometric attendance systems based on their perceptions of system usefulness and ease of use. De Jager (2019) and Shukla (2025) both confirmed the applicability of TAM to biometric attendance research in educational contexts.

Benefits of Using Biometric System

Biometric attendance systems offer numerous benefits for managing absenteeism in educational institutions:

Speed and Efficiency: Biometric systems work at a very fast rate; right from the moment the user accesses the system, all pertinent information like time will be automatically recorded. In this way, a great deal of time is saved and also the recorded details are very accurate.

Security and Accuracy: Biometric time attendance is a highly secure system when compared to manual tracking. It is not possible for students to deceive their attendance as only teachers are allowed to have access to the information which is stored in the system, and it is not subject to manipulation.

Monitoring and Tracking: Biometric technology is capable of helping in tracing and monitoring accurately the employee time of arrival and departure as well as attendance which can contribute to preventing time loss by ensuring that employees are arriving at their workplace on time and leaving at the correct time. This will result in a decrease in the number of teacher absenteeism and at the same time it will lead to the students being motivated to work hard as they will have their teachers available for consultation.

System Integration: It is highly probable that existing information systems can be enhanced by the integration of biometric systems thereby making the operations more efficient, quick, accurate, and secure for providing access to people to important information and areas along with other transactions.

Challenges of Biometric System

Without doubt, biometric systems offer a number of benefits; however, there are also challenges which may hinder their implementation and effectiveness:

Education Level: Various aspects including the trust in excellent quality of information derived from biometrics, ease of usage, and the value gained through biometrics are associated with the level of education.

Location: The ease of implementation of biometric varies to a great extent based on location of the biometric technology installation. Availability of infrastructural resources is one of the factors which determine this location.

Cost: Although biometrics technology has many advantages, the expense of purchasing and maintaining a biometric machine is a big concern for using it as a means of monitoring in school management.

Age: Biometric awareness differs where people aged 29-39 years are more knowledgeable about biometrics than the 18-28 years group. The elderly group, 51 and above, may find it difficult to use biometrics.

Data Integrity and Variation Within Persons: Using biometric systems may lead to information deterioration. The change in environment, diseases, aging, stress, training, and occupation are some of the factors that influence one's biometric characteristics and the output of the biometric system.

Biometric and Teacher Performance

The technology that emerges very quickly and becomes widespread always plays a key role in human performance. Many institutions, for their attendance system, have embraced biometric technology as a tool for improving human performance.

Currently, at elementary level schools of Azad Kashmir, teachers' attendance is recorded through biometric system which is resulting in the performance of teachers being significantly enhanced. The academic organizations not only need to possess the attractive and well-organized systems for academic upgradation but also those systems should be capable of modernizing, accelerating and raising academia performance.

Biometric and Teacher's Results: In many institutions and more so in educational institutions, the problems of low attendance and unauthorized absenteeism have been continuing for a long time. Employee identification plays a key role in making sure that the person who physically reports is the one recognized as employee. The biometric system is developed on the human trait identification basis which is then used as a key to recognize and verify the person in the system.

Biometric and Teacher Behavior: Teachers are sometimes motivated to work better and without any delay. Giving teachers the kind of work environment that will help them to do their job better has been one of the methods used to cut down the absenteeism of teachers in schools. Besides, school staff and teachers get along very well, and if also the school leadership is effective, then these factors significantly contribute to shaping teachers' perceptions of the work environment and, consequently, influence their decisions to come to school daily.

Methodology

Research Design

A descriptive cross-sectional survey design was employed in this research to investigate the role of the biometric system regarding teachers' performance at the elementary level in Tehsil Sehensa, Kotli, Azad Jammu and Kashmir.

Participants

The population of the study comprised all 134 head teachers of boys' and girls' high schools in Tehsil Sehensa, Kotli, Azad Jammu and Kashmir. Using census sampling technique, all 134 head teachers were selected as the sample.

Research Instrument

A self-developed five-point Likert scale questionnaire containing 27 items was designed, covering three dimensions: teacher attendance (9 items), teacher results (9 items), and teacher behavior (9 items). The

Likert scale included: Strongly Agree (SA)=5, Agree (A)=4, Undecided (UN)=3, Disagree (D)=2, Strongly Disagree (SD)=1. The instrument was validated by three educational experts from the Department of Education, University of Kotli AJ&K. Pilot testing was conducted by administering the questionnaire to 20 respondents not included in the final sample. Reliability was assessed using Cronbach's alpha statistical technique, yielding a coefficient of 0.87, which was acceptable for further research.

Data Collection and Analysis

Data were collected personally by the researcher from head teachers of elementary schools in Tehsil Sehensa, Kotli, Azad Jammu and Kashmir by administering five-point Likert scale questionnaires. Collected data were analyzed using Statistical Package for Social Sciences (SPSS). Frequency, percentage, mean scores, and Pearson correlation were employed for data analysis.

Results

Table 1

Head Teachers' Perceptions of Biometric System Impact on Teacher Attendance (N=134)

Statement	SA(%)	A(%)	UN (%)	D (%)	SD (%)	Mean
Reduced teacher absenteeism	35.7	63.5	0.0	0.0	0.8	4.34
Influences daily school attendance	52.2	40.0	2.6	0.8	4.3	4.38
Useful for attendance tracking	44.5	54.8	0.0	0.0	0.8	4.43
Forces teachers to stay full-time	45.2	52.2	2.6	0.0	0.0	4.55
More secure than manual system	56.5	42.6	0.0	0.0	0.8	4.55
Positive relationship with attendance	47.8	52.2	0.0	0.0	0.0	4.48
Enables check-and-balance on activities	46.1	49.6	4.3	0.0	0.0	4.42
Increases teacher punctuality	38.3	45.2	1.7	0.0	14.8	4.07
Creates better environment for quality education	60.0	35.7	0.0	0.0	2.6	4.53
Category Mean						4.42

Interpretation of Table 1: Head teachers strongly affirmed the positive role of biometric systems for teacher attendance. An overwhelming 99.2% agreed biometric systems have reduced teacher absenteeism (M=4.34); 92.2% agreed biometric systems influence teachers' daily school attendance decisions (M=4.38); 99.3% agreed biometric systems are useful for attendance tracking (M=4.43); 97.4% agreed biometric systems force teachers to stay full-time at school (M=4.55); 99.1% agreed biometric attendance is more secure than manual tracking (M=4.55); 100% agreed there is a positive relationship between biometric systems and teacher attendance (M=4.48); 95.7% agreed biometric systems enable check-and-balance on teacher activities (M=4.42); 83.5% agreed teachers are more punctual due to biometric systems (M=4.07); and 94.3% agreed biometric attendance creates a better environment for quality education (M=4.53).

Table 2

Head Teachers' Perceptions of Biometric System Impact on Teacher Results (N=134)

Statement	SA (%)	A (%)	UN (%)	D (%)	SD (%)	Mean
Motivates lesson planning for good results	52.2	47.0	0.0	0.0	0.8	4.50
Improved student academic achievements	56.5	26.1	0.8	0.0	16.5	4.23
Improved educational standard	55.7	37.4	3.5	0.0	0.8	4.44
Positively impacts school results	56.3	40.0	0.8	0.0	0.8	4.59
Improved overall educational performance	46.1	48.1	1.7	0.0	2.6	4.74
High-level influence on teacher results	52.2	47.8	0.0	0.0	0.0	4.48
Teacher results improved	47.0	42.2	5.2	0.0	5.2	4.31
Affects teacher performance in results	45.2	47.0	0.0	0.0	7.9	4.30
Forces regular classes for good results	47.0	47.0	1.7	0.0	4.3	4.37
Category Mean						4.44

Interpretation of Table 2: For teacher results (academic outcomes), head teachers strongly affirmed positive impacts: 99.2% agreed biometric systems motivate teachers to do lesson planning for good results (M=4.50); 82.6% agreed biometric systems improve overall student academic achievements (M=4.23); 93.1% agreed

biometric systems improve educational standards (M=4.44); 96.3% agreed biometric systems positively impact government school results (M=4.59); 94.2% agreed biometric systems improve overall educational performance of schools (M=4.74); 100% agreed biometric systems have high-level influence on teacher results (M=4.48); 89.2% agreed teacher results are improved due to biometric systems (M=4.31); 92.5% agreed biometric systems affect teacher performance in results (M=4.30); and 94% agreed biometric systems force teachers to take classes regularly for good results (M=4.37).

Table 3

Head Teachers' Perceptions of Biometric System Impact on Teacher Behavior (N=134)

Statement	SA (%)	A (%)	UN (%)	D (%)	SD (%)	Mean
Friendly behavior toward head teachers	50.4	42.2	3.5	3.5	0.0	4.40
Better behavior toward parents	52.2	40.2	2.6	0.8	4.3	4.38
Improved teacher-student relations	47.8	50.4	1.7	0.0	0.0	4.46
More grateful attitude	43.5	49.5	1.7	0.0	4.3	4.31
Teachers feel motivated	33.0	65.2	1.7	0.0	0.0	4.31
Efforts to make behavior friendly	45.2	50.4	0.8	0.0	3.5	4.37
No anxiety due to biometric system	43.5	50.4	0.0	0.0	6.1	4.31
Happiness after implementation	51.3	40.9	0.8	0.0	7.0	4.37
Good behavior improves classroom environment	41.7	53.0	1.7	0.0	3.5	4.33
Category Mean						4.36

Interpretation of Table 3: For teacher behavior, head teachers reported strong positive impacts: 92.6% agreed teacher behavior toward head teachers is friendlier after biometric systems (M=4.40); 92.4% agreed teacher behavior toward parents is better after biometric systems (M=4.38); 98.2% agreed teacher-student relations improved after biometric systems (M=4.46); 93% agreed teacher attitudes are more grateful after biometric systems (M=4.31); 98.2% agreed teachers are motivated through biometric systems (M=4.31); 95.6% agreed teachers try their best to make behavior friendlier after biometric systems (M=4.37); 93.9% agreed teachers do not feel anxiety due to biometric systems (M=4.31); 92.2% agreed teachers feel happiness after biometric system implementation (M=4.37); and 94.7% agreed teachers' good behavior is more effective for classroom environment (M=4.33).

Table 4

Correlation Between Biometric System and Teacher Performance

Performance Dimension	Pearson Correlation (r)	p	N	Interpretation
Teacher Attendance	.892**	.000	134	Strong
Teacher Results	.856**	.000	134	Strong
Teacher Behavior	.823**	.000	134	Strong
Overall Teacher Performance	.874**	.000	134	Strong

**. Correlation is significant at the 0.01 level (2-tailed).

Interpretation of Table 4: Correlation analysis revealed significant positive relationships between biometric system and all performance dimensions: teacher attendance (r=.892, p<.01), teacher results (r=.856, p<.01), teacher behavior (r=.823, p<.01), and overall teacher performance (r=.874, p<.01).

Discussion

The findings of this study reveal overwhelmingly positive perceptions of biometric attendance systems among head teachers in Tehsil Sehensa, Kotli, with mean scores ranging from 4.07 to 4.74 across 27 items and an

overall mean of 4.41. These results demonstrate that biometric technology has been successfully implemented and widely accepted as an effective tool for enhancing teacher performance across multiple dimensions.

The strong positive responses across all nine attendance-related items (dimension mean = 4.42) confirm that biometric systems effectively address the core problem they were designed to solve: improving teacher attendance. The near-unanimous agreement (99.2%) that biometric systems reduce teacher absenteeism is consistent with research by Mgonja and Makulilo (2024), who discovered that automated attendance systems eliminate the possibility of fraudulent attendance marking in Tanzanian secondary schools. The high mean (4.55) given to security aspects compared to manual tracking reflects head teachers' belief that biometric data is reliable and tamper-resistant. Complete agreement (100%) that there is a positive relationship between biometric systems and teacher attendance supports Shukla's (2025) findings, which documented strong positive correlations between biometric system adoption and faculty attendance in academic settings.

The slightly higher mean for teacher results (4.44) than for attendance (4.42) indicates that head teachers think that the benefits of biometric systems are not limited to teacher presence but also lead to good academic results. Complete agreement (100%) that biometric systems have a high-level impact on teacher results reflects great trust in the technology's educational quality improvement. The fact that 99.2% confirm the motivating effect of biometric systems on teachers to do lesson planning brings out a key psychological factor: consistent attendance leads to teachers being accountable for their instructional quality. A very high mean (4.74) showing overall educational performance improvement, and which is also the highest among all items, is testimony to the fact that head teachers identify holistic advantages from biometric deployment. The 16.5% who strongly disagreed with the idea that student academic achievements improvement is linked with attendance, while still being a small minority, shows that some head teachers believe that student success depends on several factors besides teacher attendance.

The affirmative reactions regarding all nine behavior-related items (dimension mean = 4.36) have pointedly indicated that biometric systems do indeed lead to better interpersonal relationships within schools. What stands out is the almost universal consent (98.2%) that teacher-student relations have become better, which is very important as positive teacher-student relationships are the backbone of quality teaching and learning. The fact that a large number (92.6%) also strongly recognize that teachers behave kindlier towards head teachers implies that having an objective way of tracking attendance through biometric systems is leading to fewer conflicts. Manually recording attendance gives head teachers the responsibility of physically watching and questioning teachers regarding their absences, which is often a source of tension in relationships. The result that 98.2% believe teachers are inspired by means of biometric systems, and the fact that only 65.2% of them agree rather than strongly agree, could mean that the motivation here is largely extrinsic.

The 6.1% who strongly disagreed regarding anxiety and 7.0% regarding happiness indicate that a small number of teachers may experience negative emotional reactions to biometric monitoring. Shukla (2025) noted similar findings, observing that some faculty members express concerns about data privacy and the perception of being constantly monitored. De Jager (2019) also acknowledged that while biometric systems improve attendance, the extrinsic motivation they provide may not foster intrinsic engagement for all teachers.

Strong linkage was discovered through correlation analysis between the biometric system and all performance dimensions, with coefficients ranging from r=.823 to r=.892. These results are consistent with innovation-diffusion theory (Rogers, 1995), which maintains that adoption and acceptance of the biometric system innovation at these schools have been successful. They also support the technology acceptance model (Davis, 1989) making it clear that teachers see the system as a tool that helps in enhancing attendance,

academic results, and behavior. Additionally, Al-Shamsi et al. (2024) found that biometric technology positively influences faculty loyalty and educational performance when supported by appropriate policy frameworks. The strong correlation coefficients (ranging from r=.823 to r=.892) in the present study align with these previous investigations.

Conclusions

This study looked at how a biometric system can influence the performance of teachers at the elementary schools in Tehsil Sehensa, Kotli, Azad Jammu and Kashmir. The findings suggest that biometric attendance technologies have a great impact on the enhancement of teacher performance in three key areas: teacher attendance, teacher results (academic outcomes), and teacher behavior.

It was found that the biometric systems are quite effective in tackling the issue of teacher absenteeism; indeed, all the head teachers interviewed agreed that these systems work in changing the attendance patterns in a positive way. Besides, teachers are compelled to be punctual, stay the entire school day, and they are prevented from altering the attendance records once the information is entered into the system. This is likely to raise the standard of education by ensuring the teachers are available and that they can devote their whole attention to the teaching process.

Furthermore, these systems are a source of academic improvements because they keep teachers on their toes, getting them prepared to take lessons, helping them to be regular in their classes and focusing on the students' achievement. Without doubt, head teachers believe that these systems help in raising the teaching standards, being instrumental in the school results, and enhancing the educational performance as a whole, though they are aware that a mere presence does not automatically mean good results. The majority, however, agrees that being there regularly is an important factor in giving the students a better chance of learning.

The technology has an impact also on teacher behavior which makes teacher-head teacher relations friendlier, parent-teacher relations better, and teacher-student relations easier. Teachers are displaying attitudes of being more thankful, higher levels of motivation, and conscious efforts to lift their behavior. Actually, the impartial, fair nature of biometric tracking cuts down on any conflicts and leads to a more positive school climate.

Correlation analysis also provided evidence for a strong positive association between biometric system and every performance dimension: teacher attendance, teacher results, teacher behavior, and overall teacher performance. These results are in line with the theory of innovation diffusion and the technology acceptance model and suggest that biometric systems have been successfully adopted and are perceived as both useful and easy to use by users.

Discipline should not be equated only with controlling behavior but to the contrary, it should be seen as a way of creating a person's character and promoting their prosocial development. Indeed, the results reveal the importance of a well-rounded approach to discipline that includes a definite and clear system of rules, using positive behavioral strategies, developing close teacher-student relationships, parents becoming part of the partnership, students being involved in the formation of the rules, and finally, making counseling a support avenue.

Implications for Practice

For Teachers

Teachers may recognize biometric systems as tools that support their professional practice by ensuring fair and accurate attendance recording, eliminating concerns about favoritism or unfair treatment. With regular attendance ensured by the system, teachers may focus their energy on improving instructional quality and student engagement. The improved attendance enabled by biometric systems provides opportunities to build

stronger relationships with students, parents, and colleagues. Teachers should view biometric systems as supportive of their professional development rather than as punitive monitoring tools.

For School Administrators

School administration may use attendance data constructively to support teachers rather than punish them, identifying patterns of absenteeism and working with teachers to address underlying causes. If they find out that certain teachers have very low attendance, then they can work together to find out the reasons behind it and provide them with support in other ways besides just punishing them. Administrators don't have to give up on awarding and recognizing teachers with really good attendance, because combining that with the positive motivational effects of biometric systems can produce very good results. Whereas biometric systems are making attendance records more accurate, administrators, on the other hand, have to keep on making good relationships with teachers and thus make the technology become something that adds value to human connection and support rather than something that replaces them. In order to maintain trust, administrators should also make sure that the systems do not break down unnecessarily.

For Education Departments and Policymakers

Education departments should consider the use of biometric systems in all schools as a viable policy change, given the overwhelmingly positive results from the current pilots. The technology not only succeeds in tackling attendance-related problems but also has a knock-on effect of educational enhancement at large. When planning, apart from the capital costs, governments should also give thought to maintenance, ongoing technical support, and backup power facilities.

Biometric attendance records must go hand-in-hand with other elements of teacher performance evaluation that collectively drive a teacher's career development, identifying high-performers and setting the stage for accountability. While the majority of teachers have a positive attitude towards the use of biometric systems, the minority that experiences anxiety or unhappiness needs to be given consideration by the education sector by offering them counseling, support, and at the same time providing them with opportunities to give feedback throughout the process.

For Future Researchers

Teacher voices should be included in future studies rather than just head teacher perceptions and that too only in a few districts. There is a need for comprehensive research with a combination of methodologies, including interviews and focus groups, tracking of changes over time, direct measurement of student achievement, comparative studies of contextual factors (government vs. private, urban vs. rural, boys vs. girls), etc. Besides research on cost-effectiveness and sustainability, there also needs to be work done on integrating biometric systems with teacher training such as broad-based teacher development initiatives.

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