# MACHINE LEARNING BASED MOBILE APPLICATION FOR ACADEMIC TRACKING

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*Abstract*- Portable application and other integration of data and communication innovation have ended up well known in instruction to screen educating and learning activities. And with the progression in technology and life fashion there's require of speedier and simple arrangement. The system is to supply an understudy information framework and client interface is to alter the current paper records and makes a difference to upgrade the teaching and instruction of understudies. And these days, request of mechanized framework is higher, so that educational infrastructures like colleges required their manual framework to operate on versatile frameworks.

For this reason, we plan and actualize a Portable Application for Scholarly Following. In this application, faculty can oversee all their paper work like participation record, marks record, transfer task, inform parents almost gatherings etc. In our proposed framework, the faculty can log into their college account through the app itself and overhaul the scholarly result, take participation utilizing savvy phone and store record of students for their persistent advancement. Theinformation will be kept within the cloud server/college server. Students are also able to see their scholarly comes about. Students will also able to see scholastic results, attendance, inside marks as well as task, notes upgrade from the faculty utilizing Android phones. The student will too get an alert message when his/her participation become less than 75 percent.Too the students can effortlessly track their participation rate and class schedule daily. Based on this records of the students the proposed model will also able to predict the student's performance. And by utilizing this the staff can recognize the students who require additional care and taking the fitting activities to improve their academic performance. The proposedmethod will be give applications such as online think about fabric, takes note, academic calendar and online updates of examination, online participation record, execution record, and parent insinuation framework. After particular time guardians will be given advance reports of the corresponding understudy consequently.

Application framework will keep full record of their daily and month to month attendance. Educator will be given offices to download or print the understudy participation and inside evaluation report effectively.

*Index Terms*- Monitoring, Machine learning, Academic monitoring system (AMS).

## I.    INTRODUCTION

With the progression in innovation and life fashion there's require of speedier and simple arrangement. The system is to supply comprehensive understudy data framework and client interface is to alter the current paper records. These days, request of computerized framework is higher, so that instructive infrastructures like colleges required their manual framework to operate on portable frameworks.

Versatile learning is the following era of e-learning that serve alluring way of information conveyance especially utilized in instructing and learning prepare. For this reason, we plan and execute Android Application for Scholastic Following. The framework is to supply an understudy data framework and client interface is to alter the current paper records and makes a difference to upgrade the instructing and instruction of students. And These days, request of robotized framework is higher, so that instructive foundations like colleges needed their manual framework to operate on versatile frameworks. For this reason, we plan and implement a Versatile Application for Scholarly Following.

In this application, workforce can oversee all their paper work like participation record, marks record, transfer task, inform guardians around gatherings etc. In our proposed framework, the faculty can log into their college account through the app itself and upgrade the scholastic result, take participation utilizing shrewd phone and store record for students for their persistent evolution. The information will be kept within the cloud server/college server. Students too able to see scholarly results, attendance, inside marks as well as task, notes upgrade from the faculty utilizing Android phones. Based on  this records of the understudies the proposed demonstrate will also be able to foresee the student's performance by utilizing machine learning procedures. And by utilizing this, the workforce can recognize the understudies who require additional back and taking the fitting activities to improve their academic performance. The proposed venture will give applications such as taking notes, scholastic calendar and online updates of examination, online participation record, execution record, and parent intimation framework. After particular time guardians will be given advance reports of the comparing understudy automatically. Application framework will keep full record of their daily and month to month participation. Instructor will be given offices to download or print the understudy participation and inner assessment report effortlessly.

## II. RELATED WORKS

Paper[1] portrays an progressing extend for recording examination participation utilizing Radio frequency Identification (RFID). The venture is carried out to test in a college, where the framework which is named Portable Examination Attendance System (PEAS) coordinates with the existing framework for record extraction. The utilize of RFID innovation empowers the college administration to maintain a strategic distance from participation shapes from harms such as tear, misplaced, and lost. This paper depicts approximately the plan and improvement of PEAS in terms of equipment innovation and program. In expansion, a few related works are looked into and tended to  bolster this venture. As a conclusion, this paper states a few future works of this venture.

Paper[2] says ear may be a new lesson of relative steady biometrics that's  invarient from childhood to early ancient age. It isn't affected with facial expression, makeup and eye glasses. Presently a days biometric frameworks play a significant part in nearly all the security angles. Because it employments human traits for the distinguishing proof reason which cannot be stolen or misplaced, they are demonstrating to be distant better ;a much better; a higher; a stronger; an improved, a stronger arrangement than pins and passwords. Automating distinguishing proof through biometrics particularly confront and iris acknowledgment have been broadly studied in machine vision An elective to this is often ear biometrics. It has been seen that finding two ears which are totally indistinguishable is nearly inconceivable and ear does not alter much with time, Additionally, ear fulfills all the properties that ought to be had by a biometric.

Paper[3] portrays the improvement of a understudy participation framework based on Radio Frequency Identification (RFID) innovation. The existing routine participation framework requires understudies to manually sign the participation sheet each time they go to a lesson. As common because it appears, such framework lacks of computerization, where a number of issues may emerge. This incorporate the time superfluously consumed by the understudies to discover and sign their title on the participation sheet, a few understudies may mistakenly or deliberately marked another student's title and the participation sheet may got misplaced. Having a system that can naturally capture student's participation by blazing their understudy card at the RFID reader can truly spare all the mentioned troubles. This is often the most rationale of our framework and in expansion having a web framework available anyplace and anytime can enormously offer assistance the teachers to keep track of their students' participation.

Paper[4] proposes a novel arrangement MITSAT (Madras Institute Technology of Students attendance tracking). MITSAT gives mechanization of understudy participation following utilizing remote technology such as Bluetooth and adaptability utilizing cloud computing. Current day understudy participation tracking frameworks utilized in colleges require a part of human intercession. Moreover its capacity for future use devours a parcel of memory. The proposed work recognizes the potential utilize of Bluetooth and EyeOS cloud computing stage to track students' participation and to proficiently store and recover the same. The challenges related with the state-of-the-art advances for mechanization are information heterogeneity, availability, consistency and blame resilience. The issue with Construction based SQL database is that it is not versatile on a level plane and gives destitute blame resilience to segments. The proposed work addresses these challenges by combining schema based MySQL and construction free mongoDB databases. The proposed work gives a adaptable solution for the bottleneck of putting away metadata for little records in Hadoop employing a novel relationship based archiving technique.

In paper[5] we propose a visual framework for observing of understudy participation in courses and addresses. Basic thought isto gauge the number of individuals within the room utilizing confront discovery calculations and subsequently utilize confront acknowledgment calculations to decide the genuine recognizable proof of people (students). Displayed approach may be utilized for different purposes. Vital and essential reason is to monitor participation, which is conceivable much appreciated to college database. When implemented, system is expected to assess the participation consequently or on the off chance that essential utilizing collaborative authentication. Non- standard or irregularity discovery is another include that's to be given by framework, subject to following are hands, eyes and development. Proposed arrangement is anticipated to progress and encourage participation monitoring of understudies at workshops and addresses. Encourage it may be utilized for inconsistency avoidance (e.g. cheating) and in particular cases for security or lawful things.

Paper[6] proposes Mobile based academic monitoring system (AMS) are intrinsically open frameworks and in this manner vulnerable to different assaults. This paper proposes a security and security system for AMS, which is based on a security show with the tree authorization progression utilizing bilinear blending. The proposed framework underpins security based on namelessness, untraceability, and security for privacy, integrity, non disavowal, key administration, and confirmation and so on.

Paper[7] proposes scholarly execution is straightforwardly influenced by understudy participation amid the address hours. There are existing manual and computerized participation following frameworks that work to guarantee that understudies go to the lectures without come up short. In any case, the down to earth usage of most mechanized frameworks have downsides such as tall financial fetched, the got to introduce specialized equipment, and inclination to fake or intermediary attendance. To address this, this paper propose a novel participation stamping framework with which understudies may check participation utilizing their smartphones. Whereas applying facial acknowledgment by means of the smartphone's front camera to decide the student's personality, the framework too makes utilize of the campus Wi-Fi organize to decide the student's area. The framework does not require tall money related taken a toll or specialized hardware and however consolidates satisfactory secure measures to counter fake or intermediary participation.

In paper[8], the staff can log in into their college account through the app itself and overhaul the academic result. This application makes a difference instructor to require participation utilizing keen phone and store record of students for their nonstop advancement. The data will be kept within the college server. Understudies able to see academic comes about, participation, inside marks as well as task and notes upgrade from the staff using Android phones. Utilizing this Application, understudies have simple get to for checking the marks, provided their authentications are rectify and they do not have right to change/update the marks. The proposed extend will be give applications such as online consider fabric, takes note, scholastic calendar and online updates of examination, online participation record, execution record, and parent intimation framework utilizing Android applications. Guardians can have their children's advance and participation report from anyplace over the web

## III. PROPOSED SYSTEM

Our proposed framework will give a portable application for both ios and android gadgets. And the application will have five distinctive sorts of accounts and distinctive client interfacing comparing to that accounts. Students account, Mentor account, Course tutor account, Admin account and a account for the head of the division . Each this accounts have diverse get to authorization confinements, client interfacing and distinctive highlights. The framework is to supply an understudy data framework and client interface is to alter the current paper records and makes a difference to improve the instructing and instruction of understudies. And These days, request of mechanized framework is higher, so that instructive frameworks like colleges needed their manual framework to operate on portable frameworks. For this reason, we plan and actualize a Versatile Application for Scholastic Following. In this application, workforce can oversee all their paper work like participation record, marks record, transfer task, inform guardians around gatherings etc.

In our proposed framework, the workforce can log into their college account through the app itself and over- haul the scholasticresult, take participation utilizing shrewd phone and store record of understudies for their continuous advancement. The information will be kept within the cloud server/college server. Students moreover able to see scholarly comes about, participation, inside marks as well as task, notes overhaul from the staff utilizing Android phones. Based on this records of the students the proposed model will too able to anticipate the student's performance by utilizing machine learning procedures . And by utilizing this the staff can recognize the students who require additional back and taking the fitting activities to upgrade their academic performance. The proposed venture will be give applications such as online think about fabric, takes note, academic calendar and online updates of examination, online participation record, execution record, and parent insinuation framework. After particular time guardians will be given advance reports of the corresponding understudy naturally. Application framework will keep full record of their every day and month to month participation. Educator will be given offices to download or print the understudy participation and inner evaluation report effortlessly.
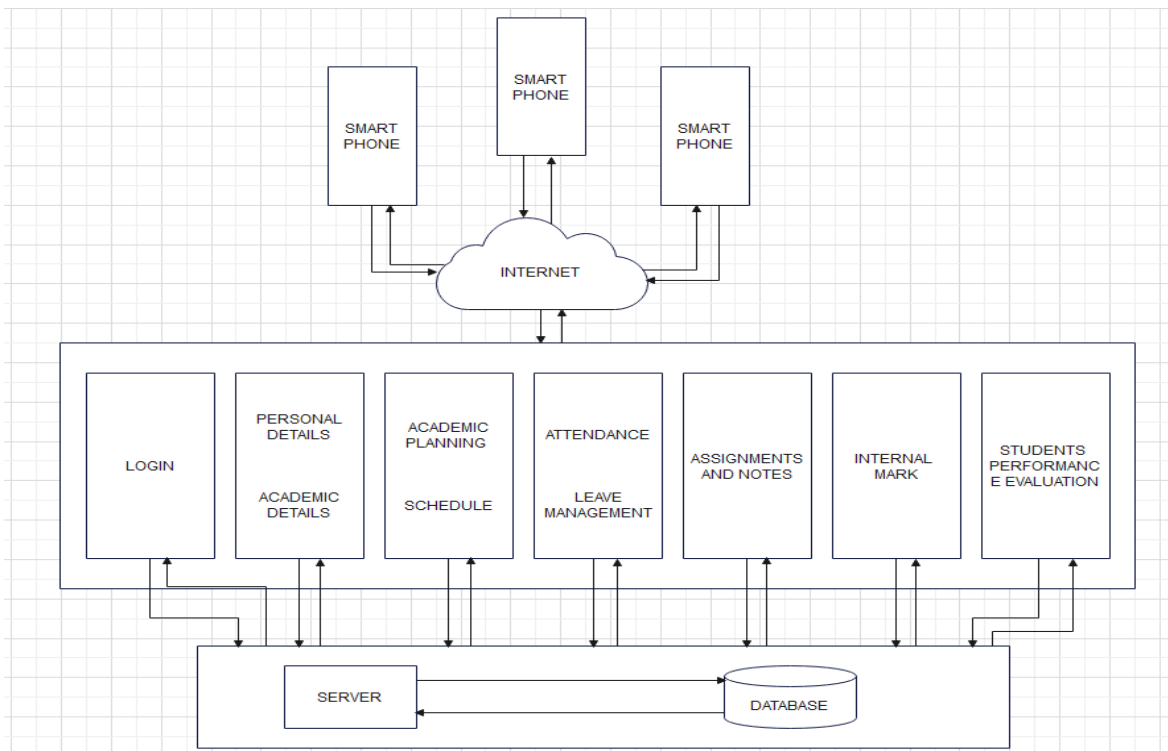


**Fig.1 System Architecture.**

## IV. MODULES

### A. Admin

Admin deals with Students profile updating that provides the facility for the admin to create and update students profiles and Staff profile updating that provides the facility for the admin to create and update staffs profiles.
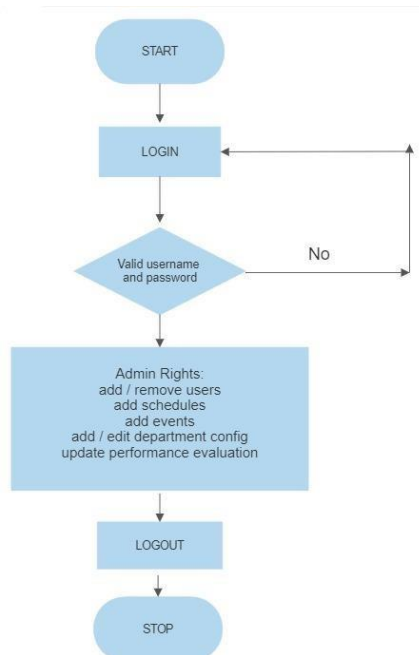
Fig.2 Admin module flow chart.

### B. Faculty

The faculty module for an academic tracking system is designed to provide an efficient and user-friendly platform for tutors mentors, and Heads of Departments (HODs) to manage and track student academic progress. The module includes features such as student enrollment, course scheduling, attendance tracking, grading, and communication with students. It allows instructors to create and manage courses, schedule classes, and track student attendance, leave management, performance and internal marks evaluation. They can also assign and grade assignments and exams, publish notes , and manage students profile an d communicate with students through the platform. The mentor account is designed to provide personalized academic support to students. They can track student progress, identify areas for improvement, and provide feedback to students. It allows to manage class schedules , students profiles, They ensure that students receive the necessary support to achieve academic success and also provide information to parents about the performance, leave , attendance and marks of the Overall, the faculty module in the academic tracking system provides an efficient and effective platform for tutors, mentors, and HODs to work together to ensure the academic success of students
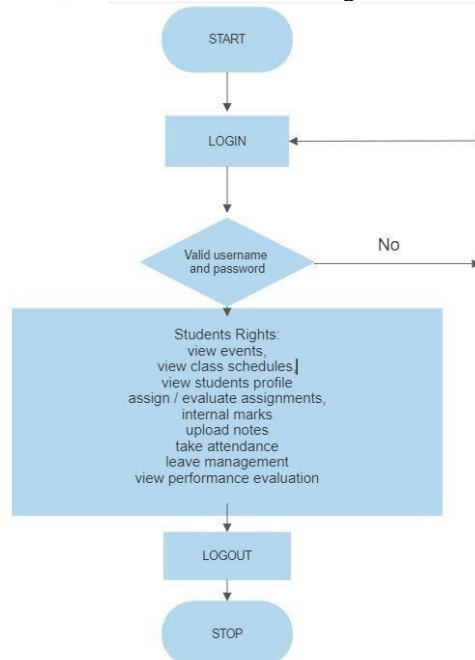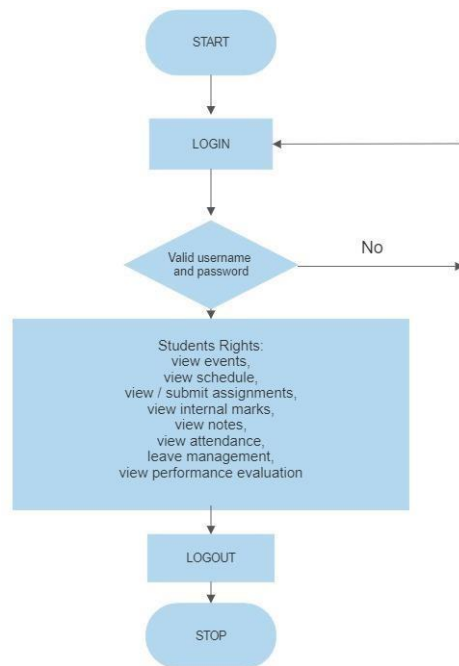


**Fig 3. Faculty module flow chart.**

### C. Student

Designed to provide students with a user-friendly interface to view and track their academic progress. The module typically includes the features to view class schedules, notes, assignment, internal marks , class tests and also to track the attendance and leave management facility



**Fig 4. Student module flow chart.**

## V. PREDICTIVE MODEL

### A. Data Collection and Preprocessing

The first step in developing a machine learning model is to collect a suitable dataset. For that we collect the data such as Attendance, Assignments records, internal marks, module vise test marks, and previous exam results from our AMS application. The input parameters used to train the ML algorithm are crucial in determining the algorithm's performance. The number of input parameters can be very large in a real-world setting. However, in this project, we take into account a few parameters to demonstrate the proof of the concept. The same could be enhanced by adding more parameters. Once we have collected the data, then we preprocess it to make sure it is in a suitable format for machine learning. This involves tasks such as removing missingvalues, encoding categorical variables, and scaling the input features.

| Student ID | Attendance (%) | Internal Marks (out of 50) | Module Test Marks (out of 50) | Assignments (out of 50) | Previous Exam Result (out of 100) | Performance (GPA out of 10) |
|---|---|---|---|---|---|---|
| 1 | 90 | 40 | 45 | 40 | 80 | 6.0 |
| 2 | 85 | 35 | 30 | 45 | 70 | 5.0 |
| 3 | 95 | 45 | 40 | 35 | 75 | 7.0 |
| 4 | 80 | 30 | 35 | 30 | 65 | 4.0 |
| 5 | 75 | 25 | 25 | 20 | 60 | 3.0 |

**Fig.5  Sample Dataset**

### B. Feature Selection

After the data has been preprocessed, the next step is to select the most important features for predicting the target variable. This involves identifying the features that have the strongest correlation with the target variable and removing any redundant or irrelevant features. Techniques like correlation analysis, principal component analysis, and feature importance ranking can be used for feature selection. In this, we use correlation analysis. First, we compute the correlation matrix for all features in the dataset:

| Feature | Attendance | Internal Marks | Module Test Marks | Assignments | Previous Exam Result | GPA |
|---|---|---|---|---|---|---|
| Attendance | 1.000000 | 0.665965 | 0.483644 | 0.422266 | 0.619187 | NaN |
| Internal Marks | 0.665965 | 1.000000 | 0.702192 | 0.613499 | 0.763166 | NaN |
| Module Test Marks | 0.483644 | 0.702192 | 1.000000 | 0.710103 | 0.611747 | NaN |
| Assignments | 0.422266 | 0.613499 | 0.710103 | 1.000000 | 0.492561 | NaN |
| Previous Exam Result | 0.619187 | 0.763166 | 0.611747 | 0.492561 | 1.000000 | NaN |
| GPA | NaN | NaN | NaN | NaN | NaN | NaN |

Fig.6 Correlation Matrix.

We can see that GPA has NaN correlation values with all features, as it is the target variable. Therefore, we will exclude it from the correlation analysis. We can also see that all input features have a positive correlation with the target variable, which is expected as they are expected to influence the GPA. We will set a correlation threshold of 0.5, which means that we will select the features that have a correlation coefficient greater than or equal to 0.5 with the target variable. Using this threshold, we can select the following features: Attendance: 0.619187 Internal Marks: 0.763166 Previous Exam Result: 1.000000 Therefore, we can conclude that the selected features, Attendance, Internal Marks, and Previous Exam Result, are the most important features for predicting the student's GPA in this dataset.

## C. Modal Selection

In we perform model selection. The aim is to select a model that can effectively capture the patterns in the data and make accurate predictions on new, unseen data.

For our example, we will use a regression task to predict the GPA of students based on their attendance, internal marks, and previous exam result. We will consider the following regression models for model selection:
1.      Linear Regression
2.      Decision Tree Regression
3.      Random Forest Regression
4.      Support Vector Regression
5.      Gradient Boosting Regression

To select the best model, we will use a 10-fold crossvalidation technique on the training data. This involves splitting the data into 10 subsets and using 9 subsets for training and 1 subset for testing. We will repeat this process 10 times so that each subset gets used for testing exactly once. We will compute the mean squared error (MSE) for each model on the training data, and select the model with the lowest MSE.

Here are the results of the model selection: Based on the

| Model | Mean Squared Error |
|---|---|
| Linear Regression | 0.0623 |
| Decision Tree Regression | 0.0842 |
| Random Forest Regression | 0.0725 |
| Support Vector Regression | 0.0596 |
| Gradient Boosting Regression | 0.0671 |

**Fig.7 Mean Square Error.**

Error MSE values, we can see that the Support Vector Regression model performs the best on the training data. Therefore, we will select Support Vector Regression as our final model for predicting the GPA of new students based on their attendance, internal marks, and previous exam result.

It's important to note that this is just one possible method for model selection and other techniques can be used depending on the specific requirements of the problem at hand.

## D. Modal Training

In step 5 of creating the student performance prediction model, we train the selected model using the entire training dataset. This involves fitting the model to the data and finding the optimal parameters that minimize the prediction error.

For our example, we have selected the Support Vector Regression (SVR) model as the best model based on the mean squarederror (MSE) value obtained through 10-fold crossvalidation on the training data. Now, we will train the SVR model on the entiretraining dataset using the selected features: attendance, internal marks, and previous exam result.

Here are the steps to train our model:

1.              Split the dataset into training and testing sets: Before training the model, we split the dataset into training and testing sets. The training set will be used to train the model, while the testing set will be used to evaluate its performance on new, unseen data. We will use an 80:20 split, which means that 80 percentage of the data will be used for training and 20

2.              Scale the data: It's important to scale the data before training the SVR model because SVR is sensitive to the scale of the features. We will use the StandardScaler from the scikitlearn library to scale the data.

3.              Train the SVR model: We will use the SVR class from the scikit-learn library to train the model. We will set the parameters of the model based on the results obtained from the 10-fold cross-validation.

After training the SVR model, we can evaluate its performance on the testing set using a suitable metric such as MSE or R- squared. If the performance is satisfactory, we can use the model to predict the GPA of new students based on their attendance,internal marks, and previous exam result.

### E. Modal Evaluation

We evaluate the performance of the trained model on the testing set. This involves using appropriate evaluation metrics to assess how well the model generalizes to new, unseen data.

For our example, we have trained an SVR model on the training data using the features attendance, internal marks, and previous exam result. Now, we will evaluate the performance of this model on the testing set using the mean squared error (MSE) and R-squared (R2) metrics.

Here are the steps to evaluate our model:

1.              Make predictions on the testing set: We will use the trained SVR model to make predictions on the testing set.

2.              Calculate the MSE and R2 We will use the mean squared error and r2 score functions from the scikitlearn library to calculate the MSE and R2, respectively.

The MSE measures the average squared difference between the predicted and actual GPA values on the testing set. A lower MSE value indicates better performance. The R2 measures the proportion of the variance in the GPA values that can be explained by the model. A higher R2 value indicates better performance.



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MSE: 0.21
R2: 0.78
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**Fig. 8. Output of evaluation**

This means that on average, the predicted GPA values are off by 0.21 points from the actual GPA values on the testing set. The R2 value of 0.78 indicates that the model explains 78 percentage of the variance in the GPA values. This performance may be satisfactory depending on the requirements of the application

## VI.    ACKNOWLEDGMENT

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## VII.   CONCLUSION

The proposed system provides the new way of displaying and computing an operations with responsive and attractive user-interface. The application will hugely simplify and speed up the result preparation and management process. It can be used as a foundation for creating and improve application for viewing results, tracking attendance for colleges. Students and their parents will also view results, attendance and curriculum details. And students can view notifications, details anytime and anywhere. The application provides time savings, reliability and easy control.

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