



# Masroofi

## IT 497: Graduation Project Report Product Release-2

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# Masroofi

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**Abstract (English):** Despite the rapid technological advancements in Saudi Arabia, schools still lack the implementation of online payment solutions, which leads to repeated errors, wasted time and effort, and poses a significant challenge to achieving efficiency and digital transformation in the education sector. This report proposes "Masroofi", which is an online school cashless payment management system using facial recognition technology. "Masroofi" provides parents, canteen moderators, and school administrators with a unified platform to manage school payments, canteen orders, as well as school activities, and student information. The Agile methodology was used to gradually build the system using HTML, CSS, JavaScript, PHP, and Python, while data was collected through interviews and surveys with parents and schools. The results showed that traditional payment methods lead to delayed payments, crowded canteens, and more. Over 40% of schools struggle to collect payments from students, while 99% of parents prefer cashless payment systems. "Masroofi" addresses these issues through facial recognition technology, which provides a more secure, efficient, and convenient payment method. Using "Masroofi" can lead to more effective school financial management and improved communication with parents. The system offers a solution for managing all payment-related activities in schools, including preordering meals to reduce congestion in canteens. With the growing need for secure and efficient digital solutions for managing school expenses. "Masroofi" comes as an ideal choice for Saudi schools. This system provides an easy-to-use and reliable solution for managing financial affairs more efficiently and securely, helping to improve administrative processes and save time and effort.

**Abstract (Arabic):** رغم التطور التقني السريع في المملكة العربية السعودية، لا زالت المدارس تفتقر إلى تطبيق حلول وأنظمة الدفع الإلكتروني، الأمر الذي يؤدي إلى تكرار الأخطاء وتبذيد الوقت والجهد، ويمثل تحدياً كبيراً أمام تحقيق الكفاءة والتحول الرقمي في القطاع التعليمي. يقترح هذا التقرير نظام "Masroofi" وهو نظام لإدارة المدفوعات غير التقليدية للمدارس عبر الإنترنت باستخدام تقنية التعرف على الوجه. يقدم مصروفي لأولياء الأمور ومشرفي المقاصف ومديري المدارس منصة موحدة لإدارة المدفوعات المدرسية وطلبات المقاصف، بالإضافة إلى الأنشطة المدرسية ومعلومات الطلاب. تم استخدام **Agile** لبناء النظام بشكل تدريجي باستخدام لغات **HTML, CSS, JavaScript, PHP, Python**

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بينما تم جمع البيانات من خلال المقابلات والاستطلاعات مع أولياء الأمور والمدارس. وبينت النتائج أن طرق الدفع التقليدية تؤدي إلى تأخير الدفع، وازدحام المقاصف، وغيرها... حيث يعاني أكثر من 40% من المدارس من صعوبة تحصيل المدفوعات من الطلاب، بينما يفضل 99% من أولياء الأمور أنظمة الدفع غير النقية. يعالج نظام "مصروفي" هذه المشكلات من خلال تقنية التعرف على الوجه، والتي توفر طريقة دفع أكثر أماناً وفعالية وملاءمة. يمكن أن يؤدي استخدام "مصروفي" إلى إدارة مالية مدرسية أكثر فعالية وتحسن التواصل مع أولياء الأمور. يوفر نظام مصروفي حل لإدارة جميع الأنشطة المتعلقة بالدفع في المدرسة، بما في ذلك الطلب المسبق للوجبات لتقليل الازدحام في المقاصف. مع تزايد الحاجة إلى الحلول الرقمية الآمنة والفعالة في إدارة المصروفات المدرسية، يأتي نظام "مصروفي" كخيار مثالي للمدارس السعودية، حيث يوفر هذا النظام الإلكتروني حل سهل الاستخدام وموثوقاً به لإدارة الشؤون المالية بطريقة أكثر كفاءة وأماناً، ويساعد على تحسين العمليات الإدارية وتوفير الوقت والجهد.

**Keywords:** School Management, Canteen Management, Cashless Payments, Face Recognition Technology, Wasting Management, Online Payments, Face Detection, School's canteen, Pre-orders, School Activities, Agile methodology.



## 1 Introduction

Cash payments are disappearing day by day as the process of counting and obtaining cash has become increasingly difficult. Currently, online/cashless/contactless transactions are the preferred method. The number of digital payment transactions in the Kingdom jumped by 75% in 2020 as Saudi consumers adopted online shopping during the (COVID-19) pandemic. While cash withdrawals from ATMs and other payment points declined by 30% [1]. However, the education sector is still a step behind, and most school payments are still cash-based. Saudi Arabia currently has 30,625 schools, 26,248 (86%) of which are public and 4,377 (14%) are private [2]. Recent statistics indicate that Saudi Arabia has 6.4 million students [3]. The education is going digital in every aspect of its operations. The e-learning market will double in the next four years since schools have had to adapt to online learning.

One of the main reasons why people prefer online payments is that online payments save them time. It eliminates the need to carry cash or checks. Using cash just adds more security risks and creates a hassle for everyone. Online payments are not just convenient in the sense of transaction speed. They generally eliminate the need for people to waste their time and wait in line to pay. Using online payments, schools will no longer have to worry about managing transactions themselves.

Currently, there are only two ways in which children can pay for their school meals or other activities: cash or coupons [4]. Because people no longer use cash. Parents struggle with giving their children cash for school purchases every day. School finances must be organized properly to make informed decisions. Managing finances in schools is tough, especially when students depend on your decisions. Student tuitions and other school activities, such as trips, uniforms, etc., are the school's primary sources of income [5].

Masroofi will be the first Saudi online school payment system that will serve both public and private schools. With Masroofi, parents can immediately make payments. This allows schools and parents to communicate and pay without the child having to give cash. This increases credibility and relieves parents of providing cash constantly.



## 1.1 Problem

In today's world, online payments are widespread and are used by everyone, in all sectors and for all purchases. The majority of people avoid places that don't accept online payments, and only use cash as a payment method.

The education sector in Saudi Arabia does not yet accept online payments for its services. It causes parents to be burdened and anxious by the constant need to provide cash for their children's school expenses. A general characteristic of children is that they are irresponsible and do not value money, which results in their money being lost or damaged. Besides the expense, a parent must read, fill out, and sign the necessary school forms. Due to their busy schedules, parents spend a lot of time filling out their child's forms.

Manually collecting cash and papers from students is inefficient and time-consuming. Keeping track of financial transactions in Excel sheets is exhausting and error prone. It costs schools not just money, but also losing parent trust. Also, the use of cash in the school canteen leads to crowding, which is a problem that occurs in every school canteen. The current method of keeping track of canteen stock and inventory involves manual writing on papers, which increases the likelihood of errors. Moreover, the school canteen does not take into account the allergies of students, which can be potentially harmful to their health.

By implementing Masroofi, Saudi Arabia schools will finally be able to participate in the 2030 vision by replacing cash payments with online payment methods. Hence, both parents and schools should have a system for managing all payment-related activities at school. As well as keeping parents informed about their children's payments at the school canteen. By doing so, the school will have a better understanding of its financial situation.



## 1.2 Solution

Masroofi is a (mobile-friendly) web-based platform that aims to transform the traditional school payment system into a cashless payment system. Unlike other payment management systems, we do not use any tangible devices such as smart bracelets, barcodes, etc. That would require additional school or parent costs. Instead, we will use face recognition and pre-ordered meals to speed up the payment process in schools' canteens.

From the parent's point of view:

- Parents can manage all their children in all schools using one account.
- Parents can deposit into their children's wallets, eliminating the hassle of providing cash and change every day.
- Parents are notified by email when their child's wallet is almost empty.
- Parents can set a daily limit for their children's canteen purchases.
- Parents can track their children's canteen purchases history.
- Parents cannot order an item that their child is allergic to from the canteen. Similarly, children cannot purchase any allergy-causing items from the school canteen.
- Parents can order meals in advance. Also, view the canteen order status (Awaiting, Received, Refunded). A refund canteen order means that the student did not receive his order, or the parent cancelled the order. The order price will be refunded to the child wallet.
- Parents can cancel their canteen and uniforms orders.
- Parents can approve, register, and pay for their children's school trips and clubs.
- Parents can order and pay for their children's school uniforms. Also, view the uniform order status (Awaiting, Received, Refunded). A refund uniform order means that the parent cancelled the uniform order. The order price will be refunded to the child wallet.

From the school point of view:

- Pre-ordered meals and face recognition will be used to solve canteen overcrowding.
- Schools will be able to manage the canteen's stock and sales completely. Additionally, schools can view details about every canteen item, including the box, the number of



products in each box, the expiration date, and any wasted product (a wasted canteen product means a box has expired and not all products in the box have been purchased).

- Schools can manage and add students, set allergy information and transfer students to the next grade.
- Schools can set maximum limit for student wallet balances, eliminating input errors.
- Schools can manage all school trips, clubs and view registered students.
- Schools can manage the school's uniforms, view and confirm student's uniform orders.
- Schools will no longer need to print papers and collect them back from students.
- Schools can track and visualize their finances using a financial dashboard.

Masroofi will serve both public and private schools, but we do not want to increase the cost for schools and parents. Hence, we will build a mobile friendly website to make school management easier and not require parents to have smartphones. As a result of this project Saudi Arabia schools will be able to keep up with the current technological development.

### 1.2.1 Scope

Masroofi is a web-based application that is integrated with the MySQL database. It is an online payment system that allows parents to make payments for their children's school needs, such as school clubs, trips, uniforms, and meals. Additionally, parents can view the history of their children's canteen payments. Through a dashboard, schools can manage their students' payments and gain a better understanding of their finances. Using facial recognition technology and pre-ordered meals, the canteen crowd will be reduced. When a student's face is recognized, the price will automatically be withdrawn from their registered wallet. Neither names nor cash will be required from the students. By doing so, the payment process in the school canteen will be facilitated. A school can also manage its canteen inventory and sales fully and take student allergies into consideration. The website will be English-only, as it aims to serve to both public and private schools, including international schools. To ensure accessibility for non-Arabic speakers, our website, Masroofi, has been designed to use simple, easily understandable language.



### 1.3 Product vision statement

For schools and parents who want to forget paper-based communication, cash-handling, and manual record. Masroofi is a web-based cashless payment system. Unlike other online school payment systems, we do not use smart bracelets, instead we use facial recognition and pre-ordered meals. We also support all kinds of schools (private and public). Parents and schools can set a limit on the wallet. Schools can manage their canteen inventory and sales.

### 1.4 Software Process

We used the agile development methodology to build our software. As shown in Figure 1 the working process is divided into short time boxes, thus offering the real results and feedbacks truly fast.

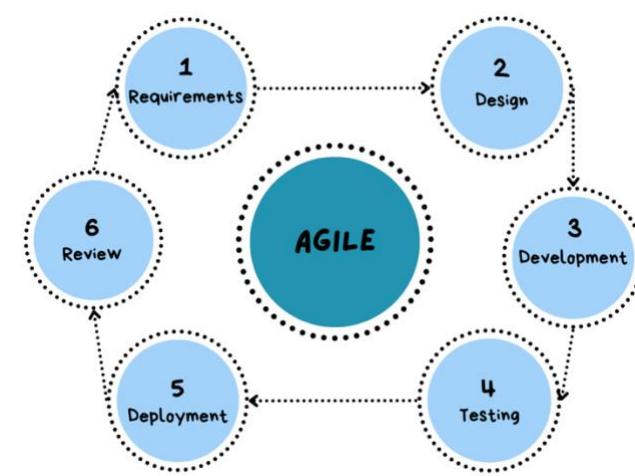


Figure 1 Software Process

In our project, there were five sprints and two releases. Table 1 represent the software tools we used to develop the project. Table 2 detail the steps/stages we followed in each sprint to develop the entire project.



Software/Hardware Tools	Description
Google Forms	Allows us to create and publish online surveys. And gather information from users during the requirements gathering phase of the project.
MAMP	Allows us to test the web project on local machine before deploying it to a live server. It includes the Apache web server, the MySQL database server, and the PHP programming language.
Visual Code Studio.	We used VS code editor to complete our project because it supports many programming languages and has many features.
Python	A high-level, general-purpose programming language that is widely used for web development, data analysis, and machine learning.
Figma	Web-based interface design tool. We used it to design MASROOFI interface. It allows for team collaboration in the design process and for easy handoff to developers.
PhpMyAdmin	web-based tool for managing MySQL databases. It used to create and modify database tables, run SQL queries, and perform database management tasks.
Microsoft Office	We used it for creating and editing documents, spreadsheets, and presentations.
Zoom	Video conferencing tool that can be used for remote meetings and collaboration.
Creately	Online diagramming and flowcharting tool. it allows to create and collaborate on diagrams, flowcharts
Draw. Io	Web-based and desktop application that allows to create diagrams, flowcharts.
Canva	Graphic design tool that allows you to easily create professional looking designs.
Overleaf	Overleaf is a collaborative cloud-based LaTeX editor used for writing, editing, and publishing scientific documents.

Table 1 Software/Hardware Tools



Sprint #	Steps/Stages
Sprint 0 ( <b>Release 1</b> )	1- Collect requirements to fully understand the problem. 2- View similar platforms. 3- Download and setup software. 4- Write the product backlog for each sprint.
Sprint 1 ( <b>Release 1</b> )	5- Design pages for sprint-1 features. 6- Develop sprint-1 features. 7- Test sprint-1 features. 8- Deploy and review sprint-1 features.
Sprint 2 ( <b>Release 2</b> )	9- Analyze, adjust, and understand sprint-1 feedback. 10- Design pages for sprint-2 features. 11- Develop sprint-2 features. 12- Test sprint-2 features. 13- Deploy and review sprint-2 features.
Sprint 3 ( <b>Release 2</b> )	14- Analyze, adjust, and understand sprint-2 feedback. 15- Design pages for sprint-3 features. 16- Develop sprint-3 features. 17- Test sprint-3 features. 18- Deploy and review sprint-3 features.
Sprint 4 ( <b>Release 2</b> )	19- Analyze, adjust, and understand sprint-3 feedback. 20- Design pages for sprint-4 features. 21- Develop sprint-4 features. 22- Test sprint-4 features. 23- Deploy and review sprint-4 features.
Sprint 5 ( <b>Release 2</b> )	24- Test overall user experience. 25- Website Hosting and deployment.

Table 2 Development Steps



## 1.5 Main contribution

Our solution Masroofi will contributes to Saudi vision by enhancing the digital transformation of the education sector. It will transform the traditional school payment system into a cashless payment system. So that it can keep up with the rapid changes in the Kingdom's online payment systems. In addition, it will provide outstanding solutions to help build a cashless society, keeping pace with local and international growth.

Unlike other market solutions, Masroofi uses facial recognition to reduce crowding in school canteens. This will be accomplished without the use of tangible devices that are vulnerable to damage and theft. Additionally, Masroofi provides schools with dashboards and figures showing their financial status, managing canteen inventory and take students allergies into consideration.

## 1.6 Summary

This report provides an overview of the system's design and development, including its background, literature review, methodology, requirements, and user interactions. It also includes a discussion of the system's data design, interface design, and implementation. The report concludes with an evaluation of the system, including user acceptance testing, and a discussion of the system's quality attributes. Finally, the report includes a conclusion and suggestions for future work, as well as acknowledgements, achievements and references. Overall, the report describes the process from start till end of creating the system.



## 2 Background

### 2.1 Online Payments

Online payments refer to the electronic exchange of currency through the internet. These payments usually consist of the transfer of monetary funds from a customer's bank or debit or credit card account, into the seller's bank account, or from an online payment system that is linked to both the buyer and seller's bank accounts in exchange for products or services [6]. There are three components of any web payment processing platform [7]:

- **Merchant account.** This is a bank account that enables online payment processing for internet businesses. You can receive a merchant account via a payment processing company, an independent contractor, or a large bank. Without it, you would have nowhere to keep the money your customers pay you.
- **Payment processor.** A payment processing company or financial institution handles the transactions between your customers' banks and your bank. One essential function of the payment processor is security. It is the responsibility of a payment processor to check whether card information is correct and to protect you from fraudulent activities. They also take care of various errors, accidental transactions, and incorrect charges.
- **Payment gateway.** A payment gateway is a mediator between all transactions on your website and the payment processor. It connects your merchant account with credit and debit card issuers like Mastercard and Visa. You need a payment gateway because security measures forbid transferring data directly from bank to bank [6].

#### 2.1.1 Terms Related to Online Payment:

- **Cardholder Verification Method (CVM):** Type of verification method used to confirm a payment instrument, such as a credit card, being used in a purchase is in the possession of its owner.
- **Card security code (CVC, CVV, CID):** The 3- or 4-digit numeric code that is printed on a card in addition to the card number. The security code is used in card-not-present transactions to verify the identity of a cardholder.
- **Contactless or Near Field Communication (NFC):** Contactless payments allow your shoppers to make payments without inserting or swiping their card.



### 2.1.2 Masroofi Payments

Masroofi uses a payment gateway to process payments. The primary thing that attracts customers towards an online site is the trust, and payment gateway is one of the most important factors that help in building trust. There are multiple payment gateways available in Saudi Arabia. Table 3 below compare the most popular payment gateways in Saudi Arabia.

	 PAYFORT®	 PayTabs Simple and Trusted Payments	 HYPER PAY	 MOYASAR
Description	PayFort is one of the most widely used online payment platforms not only in e-commerce in Saudi Arabia but in almost all countries of the Arab world and was established in 2004 [8].	The PayTabs payment gateway is one of the most popular payment gateways in Saudi Arabia. One of the most significant characteristics that makes it the preferred payment method is that it accepts 168 different currencies. It also deals with nearly all Saudi banks [8].	Hyperpay is one of the fastest growing payment gateways in Saudi Arabia and was established in 2014 [8].	Moyasar Payment Gateway is one of the most popular online payment channels in Saudi Arabia and the Arab world. It is used by the most popular online stores. Moyasar API is available in two modes: live mode and test mode for experimentation and test purposes. [8].
Advantages	Cash on delivery option, high-level security.	Setup is fast, deals with all banks in Saudi Arabia.	Invoicing system, transfer funds.	Dashboard reports, transaction refunds
Disadvantages	Monthly charges for different currencies.	Collecting amounts may be weekly when using STC pay	Charges on each transaction using a Visa Card or MasterCard	Charges on each transaction.
Used By	Amazon.	سلة, zid	Saudi Electronic University, SMASCO	المؤسسة الخيرية لرعاية الأيتام, Classera.

Table 3 Payment Gateway Comparison

**Conclusion:** As a payment gateway, we chose Moyasar because it offers several useful features. It accepts credit cards and bank transfers of all types. As well, it is controlled and supervised by the Saudi Central Bank. As our project has not been released yet and we are not dealing with real money, Moyasar is the only gateway that offers test accounts.



## 2.2 Facial Recognition

Facial recognition offers several benefits in the identity verification process for remote entry such as [9]:

- A fastest process: facial recognition allows for fast and smooth remote identity verification.
- User experience: facial recognition systems offer a unique, smooth, and fast user experience, avoiding the need for time-consuming office visits and wait times.
- Security: Like fingerprints or voice, each face is unique and has inimitable characteristics. Facial recognition systems, programs, or software compare through facial biometrics and facial recognition algorithms.

### Face Detection Vs. Face Recognition

Although the terms face detection and face recognition are often used together, facial recognition is only one application of face detection. Facial recognition is used for unlocking phones as well as for biometric verification. The banking, retail and transportation security industries employ facial recognition to reduce crime and prevent violence [9]. Face recognition involves more than detecting a human face. It involves identifying its identity. The process uses a computer application that captures a digital image of an individual's face and compares it to images in a database of stored records.

### Face Detection

Face Detection is the first and essential step for face recognition, and it is used to detect faces in the images. It is a part of object detection and can use in many areas such as security, biometrics, law enforcement, entertainment, personal safety, etc.

### Face Recognition

## STEPS IN FACIAL RECOGNITION TECHNOLOGY

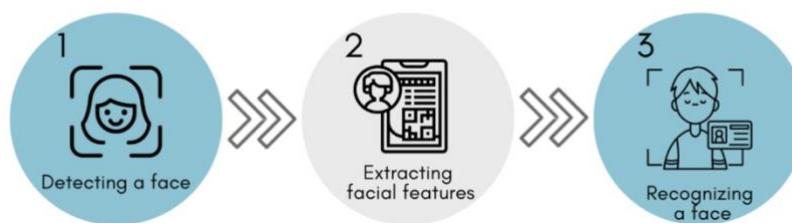


Figure 2 Face Recognition steps



Facial recognition involves analyzing and biometrically identifies facial vectors and features, matching them with pre-enrolled individuals. By using an individual's physical characteristics, which are almost impossible to replicate [10]. The general steps of face recognition are shown in Figure 2. Biometric technology proves a better choice than traditional security methods that are easily lost or stolen, such as personal identification cards, passwords/PINs, and keys. When analyzing a face image, the process typically follows the following steps:

- **Face detection:** This is the first step in the process. It involves identifying the location and boundaries of a face in an image.
- **Face alignment:** This step involves aligning the face image so that the eyes, nose, and mouth are aligned in a consistent way. This is often done to make it easier to compare faces and extract features.
- **Feature extraction:** This step involves extracting distinctive features from the face image, such as the shape of the eyes or the texture of the skin. These features can be used to identify specific individuals or to classify faces into different categories.
- **Representation:** In this step, the extracted features are converted into a compact representation, which makes it easier to compare faces. There are a variety of ways to create a compact representation of extracted features, including Dimensionality reduction, Encoding and Hashing.
- **Comparison:** In this step, the compact representations of the faces are compared to determine if they match. This can be done using a variety of techniques, such as calculating the Euclidean distance between the representations or using a machine learning classifier.
- **Decision:** Based on the comparison results, a decision is made about whether the faces match or not. If the faces are determined to be a match, the face recognition system outputs a positive identification. If the faces are determined not to be a match, the face recognition system outputs a negative identification.



### 2.2.1 How Masroofi will Use Face Recognition

In our project, we used image capture for face recognition. Facial recognition uses computer-generated filters to transform face images into numerical expressions (encoding), that can be compared to determine their similarity [10]. We worked on 3 different phases in order to create a highly accurate face recognition system:

#### 1. Recognizable Student Photo

Because our face recognition system compares the captured image of the student's face with the student's images stored in Masroofi database. We must ensure that the parent uploads a recognizable and formal image of the student. This will facilitate accurate face recognition later. Detailed steps are outlined in the Figure 3 below.

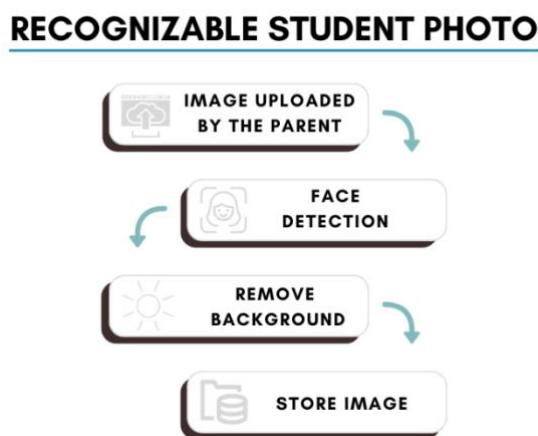


Figure 3 Recognizable Student Photo

- 1- Parent uploads his child's photo. The image format must be of image type format. Standard Image size should not exceed 2MB [11].
- 2- Detecting faces using Python CV2 face detection library and Cascade Classifier algorithm. The uploaded image should contain only one face. When only one face is detected in the image, the image proceeds to the next step. If not, a parent will need to upload another image.
- 3- The student's image must be formal. The next step is to remove the background from any uploaded image. [Using Python Rembg tool](#).
- 4- The last step is to store the recognizable, formal student photo in the database.



## 2. Face Capture

Once we have verified that all uploaded student photos are recognizable and stored on Masroofi database. The second phase involves capturing student faces from the canteen side. When a student wants to buy something from the school canteen, the canteen moderator uses the canteen device webcam. We used Webcam.js. It is a JavaScript library that allows us to capture an image from the webcam and store it in a temporary folder to use it in the comparison for recognition process.

### Encoding:

Encoding is the process of converting data from one format into another. In the context of face recognition, encoding refers to the process of converting extracted features from a face image into a numerical representation that can be more easily compared to other face images.

Example of how encoding work [12]:

- 1- Extract features from a face image, such as the shape of the eyes, the size of the nose, and the texture of the skin.
- 2- Convert each feature into a numerical value. For example, the shape of the eyes might be represented by a set of X and Y coordinates, the size of the nose might be represented by a single number, and the texture of the skin might be represented by a set of numbers representing the intensity of different color channels.
- 3- Combine the numerical values for each feature into a single vector. For example, the vector might consist of the X and Y coordinates for the eyes, the size of the nose, and the intensity values for the skin texture.
- 4- Use this vector as a compact representation of the face image, making it easier to compare to other face images.

### Feature Extraction

Next, once a face is detected and the primary characteristics of the face are evident from the image, the necessary features for face recognition can be extracted. That includes, but is not limited to, the measurements of the eyes, nose, mouth, and so on. This step will go on to help find similar matches of the extracted features from the student's photo that is saved in Masroofi database.



### 3. Face Recognition

Finally, the image of the student we want to recognize that is stored by the webcam will be compared with the images of the students stored on the Masroofi database. We used Python Face Recognition library along with compare\_faces that compare a list of face encodings against a candidate encoding to see if they match. Additionally, face\_encodings that return the 128-dimension face encoding for the face in the image. By recognizing a student's face, the canteen moderator is able to access the sales page with the student's information. Once the moderator confirms the purchase, the money will be withdrawn immediately from the student's wallet. Figure 4 below illustrates phases 2 and 3.

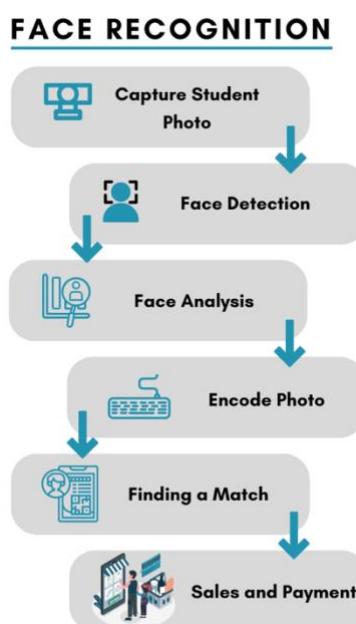


Figure 4 Face Recognition

- 1- Student image is captured through the canteen moderator webcam.
- 2- Detects and locates the face in the image.
- 3- Identify the facial landmarks that are key to distinguishing student face.
- 4- Transform the face into a set of digital information (encode data) based on the student's facial features.
- 5- Student's faceprint is then compared against a database of other known students faces. If the student's faceprint matches an image in a facial recognition database, then a determination is made.
- 6- Student can pay right away.



To evaluate the best face recognition library for the project, five options were considered:

#### **1- Python face\_recognition:**

- face\_recognition uses a deep neural network to perform face detection and recognition. The library is built on top of dlib, a popular C++ library for machine learning [13]. It can detect faces in images and videos and can compare them to a database of known faces to identify the person.
- It is easy to use, and it has many functionalities like face recognition, face detection, facial landmark detection, and face alignment.
- It has a simple and intuitive API.
- It requires a relatively powerful machine to run, and it is also a relatively large library.
- The library uses a deep learning-based model that is trained on a dataset of over three million faces

#### **2- Python OpenCV:**

- OpenCV is a popular open-source library for image processing and computer vision. It has a wide range of features, including face detection and recognition.
- It is a powerful library, it can be used for a wide range of tasks such as image processing, object detection, and video analysis.
- It has a steeper learning curve than face\_recognition and it's also a relatively large library.
- It is more complex than face\_recognition, which makes it more difficult to use.

#### **3- PHP-Face-Detection:**

- PHP-Face-Detection is a PHP library that uses the OpenCV library to detect faces in images. It can detect one or multiple faces in an image and can return the coordinates of the detected faces.
- It's a simple library, easy to use, and has a small file size.
- It's limited to face detection only; it doesn't provide face recognition functionality.

#### **4- Face-API.js:**

- Face-API.js is a JavaScript library for facial recognition that runs directly in the browser. It is easy to use and does not require any additional installations.



- It is perfect for web developers, and it is easy to integrate with web applications.
- It requires internet connection, and it is not as accurate as other libraries.

#### 5- Microsoft Azure Face API:

- Azure Face API is a cloud-based service provided by Microsoft that allows developers to easily add facial recognition capabilities to their applications.
- It is easy to use and does not require any additional installations.
- It is a paid service and may be more expensive than other options.

**Conclusion:** The above five libraries were evaluated for the project. The PHP-Face-Detection library is used to detect faces in images but lacks the face recognition features required for this project. However, both face\_recognition and OpenCV are powerful libraries that can be used for a wide range of tasks related to computer vision, including the detection and recognition of faces. Compared to OpenCV, Face\_recognition is more specialized in face recognition tasks. Face-API.js and Microsoft Azure Face API were found to be easy to use and integrate with web applications, but they were less accurate, and more expensive. Multiple problems were encountered during the evaluation when using OpenCV with the PHP project, such as the inability to access the default camera with the VideoCapture(0) function. These issues were attributed to factors such as permissions, compatibility, installation, and hardware. As a result, it was decided to use the face\_recognition plus OpenCV libraries for the project. Face\_recognition has a simple and intuitive API, is specialized in face recognition, and relies on deep learning, which allows for high performance and accuracy. In addition, it is less computationally intensive than OpenCV, which may lead to better performance in PHP environments. While OpenCV will only be used to create a frame to draw a rectangle around the recognized face and add the label (filename which is the student ID) of the matched image.



## 2.3 General Business Structure of Canteen

School canteens may operate under a variety of management structures, depending on the individual characteristics and needs of the school. Most canteens in schools are run under the direction of the school council. There are several ways in which schools may provide food service for students. As an example, school cafeterias, vending machines, food carts, or partnering with local community resources [14]. Canteen moderators are individuals who are responsible for selling food and drink items to school students on a regular and recurring basis. Canteen moderators' responsibility and operations are:

- Check the quantity and quality of stock.
- Make sure items are not past their expiration dates.
- Store chilled or frozen products immediately.
- The new stock should be placed at the back of refrigerators and shelves when restocking to ensure that older stock is used first.
- Make sure the canteen has enough stock. The ordering list can be used to check current stock and record what needs to be reordered.



### 3 Literature Review

There are many online school management payment systems available on the market. We will look at some of the most common systems in this section. According to our search we concluded that education is going digital in every aspect of its operations. The e-learning market will double in the next four years since schools have had to adapt to online learning. Not only that, but over 5.2 billion people worldwide use online payments. These two stats foreshadow a future where most education transactions take place online [10].

Currently, all software is available world-wide, and Saudi Arabia has not yet launched an online school payment solution that is available to every school. Also, the majority of the software we found was in the UK where cashless payment systems are used in almost every school, whether it be public or private.

#### 3.1 Competitive Product Analysis

##### 3.1.1 Eduspot [15]

eduspot is a school web-based software solution in the UK. They support schools with efficient software solutions. They help parents engage with teachers and they digitally collect permission & information. It provides virtual parents' evenings. It has a mobile version to ease communication between parents and teachers. It is also an online payment portal, parents can pay for school dinners, uniforms, and school trips using the app, the website, or via their local pay-points.

##### 3.1.2 PaySchools [16]

PaySchools is used in USA, they have two different web-based systems. PaySchools Central is the system used for everyday management and payment towards meal plans, events, and school fees. QuikPay is the system that receives applications for free and reduced lunches. They have a mobile application available on android and apple devices.

##### 3.1.3 ParentPay [17]

ParentPay is an online system in the UK, it allows parents to make online payment, parent and school communications, income management reporting, meal & kitchen management for schools. Including payments for trips, school meals, donations, exams, and uniform. It requires a Direct Debit mandate to be authorized by the parent bank before payments can be collected (up to three working days normally or six working days for initial setup).



### 3.1.4 OnlineSchoolFees [18]

OnlineSchoolFees is a web-based system in USA, it allows school and district administrators to collect payments from parents for a variety of areas including activity fees, school supplies, and more. They collect payments for all kinds of categories, such as sports, tests, school apparel, yearbooks, clubs, after-school activities, labs, field trips and many more. OnlineSchoolFees can also track ticket purchases for events, along with donations and fundraisers.

### 3.1.5 OSP [19]

OSP is an accounting system designed to help UK school districts accept, track, and analyze all school-related fees. Parents have the option of paying school fees with a card. OSP Allow families to pay for everything from gym clothes to cafeteria debts. OSP tracks all cash and checks collected by teachers, staff, and volunteers by having them easily record all transactions through online teacher receipting. They accept credit card payments in-person using any mobile device, Sell and redeem digital tickets to sporting events, plays, and any other events. Permit students to register, pay, and access course information online.

### 3.1.6 مصروف [20]

“**مصروف**”, is an application and platform connected through an electronic bracelet for students to facilitate the purchase and payment of the canteen or the rest of the school sales. The system contains four applications, including the “Parents” application. They will charge the student balance through Visa or Apple Pay on the parent's device. Additionally, parents can view updates, approve activities, and pay school activity fees online. The system also contains the application of the "canteen", which allows the student to buy through the bracelet by scanning it on the mobile of the canteen employee.



### 3.2 Comparison Between Masroofi and Competitive Systems

Feature/Software	eduspot	PaySchools Central	Onlineschoolfees	OSP by edlio	ParentPay COUNT ON US	MASROOFI
Pay for school activities and meals.	✓	✓	✓	✓	✓	✓
Managing the school canteen inventory and sales.						✓
The school can set a limit amount to add to the student wallet.						✓
School has a financial dashboard.			✓			✓
Students face recognition for payment and identification.						✓
Parents can track recent payments activities.		✓			✓	✓
Parents set daily limit for their child's purchases.			✓			✓
Parents can manage all his children in one account, even if they attend different schools.	✓				✓	✓
Take students' food allergies into consideration when purchasing from the canteen.				✓		✓

Table 4 Competitive Comparison

**Summary:** Masroofi was compared with several similar software systems. Table 4 shows the results. As مصروف has not been published yet, there are not enough recourses. Therefore, we found that our system would be the leading solution for Saudi Arabia schools. In Saudi Arabia, there is no other software that offers cashless online payment systems. Additionally, we manage the canteen's sales and inventory. Using our solution, students can pay for their meals using facial recognition, thereby reducing crowding in the canteen.



## 4 System Design and Development

### 4.1 Methodology

#### 4.1.1 Agile Approach

The approach we use to develop our software is the Agile approach. The Agile approach is a set of values and principles that guide the development process. It emphasizes flexibility, collaboration, and rapid iteration [21]. Using the Agile approach, our software was developed in small increments, with each increment building upon the previous ones. This enables us to provide working software quickly, as well as the ability to adapt any change in the requirements and priorities. The Agile approach also emphasizes collaboration between our team members. This allows for better communication and more streamlined development process. This helps us ensure that the system meets the needs and is delivered in a timely manner.

#### 4.1.2 Scrum Framework

The Scrum framework is a specific implementation of the Agile approach to software development. It is designed to help teams deliver working software quickly and adapt changing requirements and priorities. In the Scrum framework, there are three main roles: the Scrum Master, the Product Owner, and the Development Team. The Scrum Master is responsible for ensuring that the team follows the Scrum framework and removes any barriers to progress. The Product Owner is responsible for defining and prioritizing the work that needs to be done. The Development Team is responsible for doing the work and delivering working software [21].

Table 5 below shows our scrum team.

Scrum Team	
Product Owner:	Dr. Nourah AlRossais Dr. Wejdan AlKhaldi
Developers:	Nouf AlFulaij Hutoon AlOmran Noura AlSultan Seba AlAhmadi
Scrum Master (SM):	Dr. Hend AlRasheed
Stakeholders:	Gp2 committee

Table 5 Scrum team



There are five events in the scrum framework: the Sprint, the Sprint Planning, the Daily Scrum, the Sprint Review, and the Sprint Retrospective. During the sprint the scrum team creates work and provides value to the product. The sprint planning includes the development team and product owner. They work together to identify high value work. The daily scrum is a 15-30 minute daily meeting of the team to discuss the progress so far. The sprint review showcases the work that has been done within the sprint to the stakeholders. The Sprint Retrospective is a meeting where the team reflects on their process and identifies ways to improve. There are also three artifacts in the Scrum framework: the Sprint Backlog, the Product Backlog, and the Increment. The Sprint Backlog is the list of work that the team has committed to completing during the current sprint. The Product Backlog is the list of all the work that needs to be done to complete the project. The increment is the sum of all work completed during a sprint, plus all previous increments [21].

As a Masroofi team practicing Agile principles and using the Scrum framework, we followed these roles, events, and artifacts to deliver working software in small increments. We have worked collaboratively, adapting to changing requirements and priorities as needed, and regularly reflecting on our process to identify areas for improvement. We also maintained transparent and open communication, using various scrum events to ensure that everyone is on the same page and that the team is making progress.

### 4.1.3 Tools

Jira and GitHub are both tools that can be used to help manage and track the development of a software project. We use Jira<sup>7</sup> to track and prioritize tasks, assign work to team members, and monitor progress. GitHub<sup>8</sup> is a version control system that allows to collaborate on code and track changes to the codebase over time. It was particularly useful for our team because it allowed multiple people to work on the same codebase without interfering with each other's work. GitHub also makes it easy to review and merge changes, and it provides a centralized repository that makes it easy to access the latest version of the code.

<https://2022-1st-gp12.atlassian.net/jira/software/projects/GP/boards/1/roadmap?shared...&atOrigin=eyJpIjoiNGJhZm12NjBkNmQ0NGU4ODgyNTQwMWVhZWI5MGJmZTMiLCJlJpIjoiJ9>

8 <https://github.com/HutoonAlomran/2022-GP1-12>



## 4.2 System Requirements

### 4.2.1 System Users

MASROOFI has three types of users:

- 1- **School administrator:** Responsible for managing school trips, clubs, uniforms, and managing the school's finances. Regarding their education level, they must be experts in management and should be familiar with websites on an average level. They also must have math skills.
- 2- **Parents:** Their knowledge of technology is usually limited to basic concepts and that is all they need to know.
- 3- **The school canteen moderator:** Responsible for managing the canteen inventory, sales, and orders. Therefore, they must be an expert in management. Also, they should be familiar with websites and how school's canteen work.

### 4.2.2 Requirements Elicitation and Analysis

We conducted interviews and distributed questionnaires as part of our effort to gather requirements for our project. The interviews included two parents, one private school, and one public school. The questionnaires were sent to two groups: parents and school administrators. We selected parents from diverse backgrounds to get a more comprehensive view of their daily challenges and needs related to school payments. We received 21 responses to the questionnaire from schools of various types, with 66.7% being public schools and 33.3% being private. Most of the participating schools were located in Riyadh. The questionnaire was posted online using Google forms and collected data for a week starting on September 15, 2022. It aimed to help us understand the problems schools and parents encounter with school payments and the feasibility of implementing our system.



The details of this questionnaire are listed in **APPENDIX A:** school's questionnaire.

As a result of the school's questionnaire, the following results have been obtained:

- 66.7% of schools have more than 300 students, 23.8% have more than 100 students, and 9.5% have more than 200 students.
- The most common methods of communication with parents are SMS messages and WhatsApp groups.
- Almost half of the schools find it difficult to collect money from students.
- Almost all of the schools manage their canteens manually and most accept cash for purchases.
- The majority of schools prefer to use a dashboard to keep track of their finances.
- About 43% of school staff are intermediate technology users, 33% are beginners, and 24% are advanced users.

The details of this questionnaire are listed in **APPENDIX B:** parent's questionnaire.

As a result of the parent's questionnaire, the following results have been obtained:

- The majority of parents (82%) have higher education, while 15% have middle or high school education.
- More than half of the parents' children attend private schools, while the rest attend public schools.
- Many parents said they would use cashless payment systems for their children's school expenses.
- About 42% of parents have difficulty enrolling and paying for their children's school activities.
- Over 40% of parents are notified about their children's school events and activities through WhatsApp groups.
- Most parents prefer online payments because they are convenient.



Listed in **APPENDIX C:** parent's interview.

From their answers, we concluded:

- All of the parents interviewed prefer to have a daily spending limit for their children's canteen purchases.
- They commonly face problems with reading, filling out and sign school forms.
- They think that having a record of their children's school expenses will help them keep track of their spending.
- They find the system being described as useful and appreciate its features, such as the ability to pre-order meals.

In order to obtain more accurate results, we also conducted online interviews with two types of schools, one public and one private.

Listed in **APPENDIX D:** school's interview.

From their answers, we concluded:

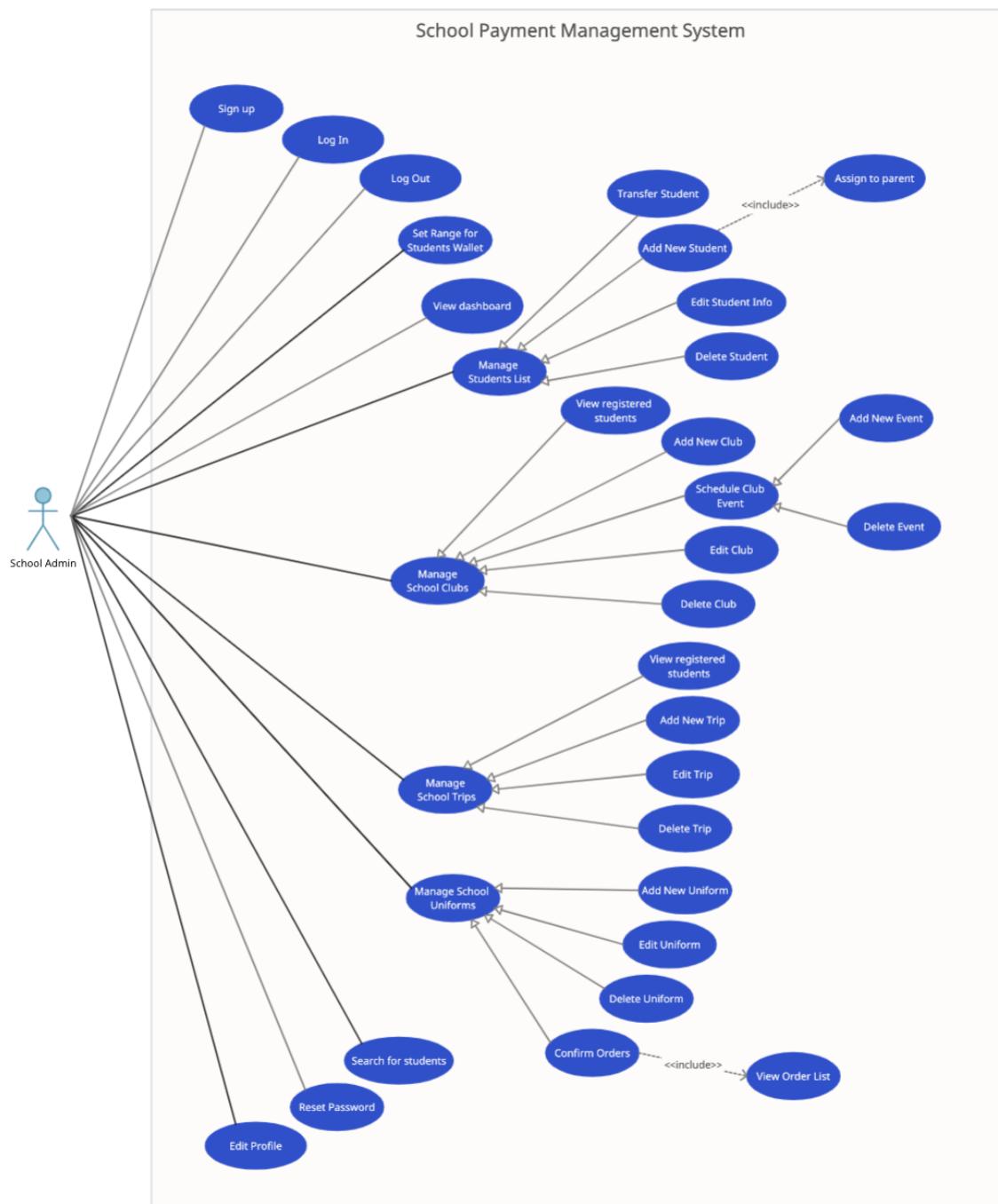
- Both private and public schools still use paper-based communication, which is inefficient and costly.
- Some public schools, particularly, have limited budgets for trips and other activities and may ask parents to volunteer when facing financial difficulties.
- The only way for schools to communicate with parents is through SMS messages and WhatsApp groups.
- The recess period is not long enough for students to buy from the crowded canteen.
- All of the interviewed schools manage their canteens manually and only accept cash payments.



#### 4.2.3 User Interactions

Use-case diagrams describe the high-level functions and scope of the system. These diagrams also identify the interactions between the system and its users. Since we have 3 different users, Figure 5 shows the school use case diagram, Figure 6 shows the parent use case diagram, and Figure 7 shows the canteen moderator use case diagram.

- **School Use Case Diagram**



**Figure 5 School UCD**



- Parent Use Case Diagram

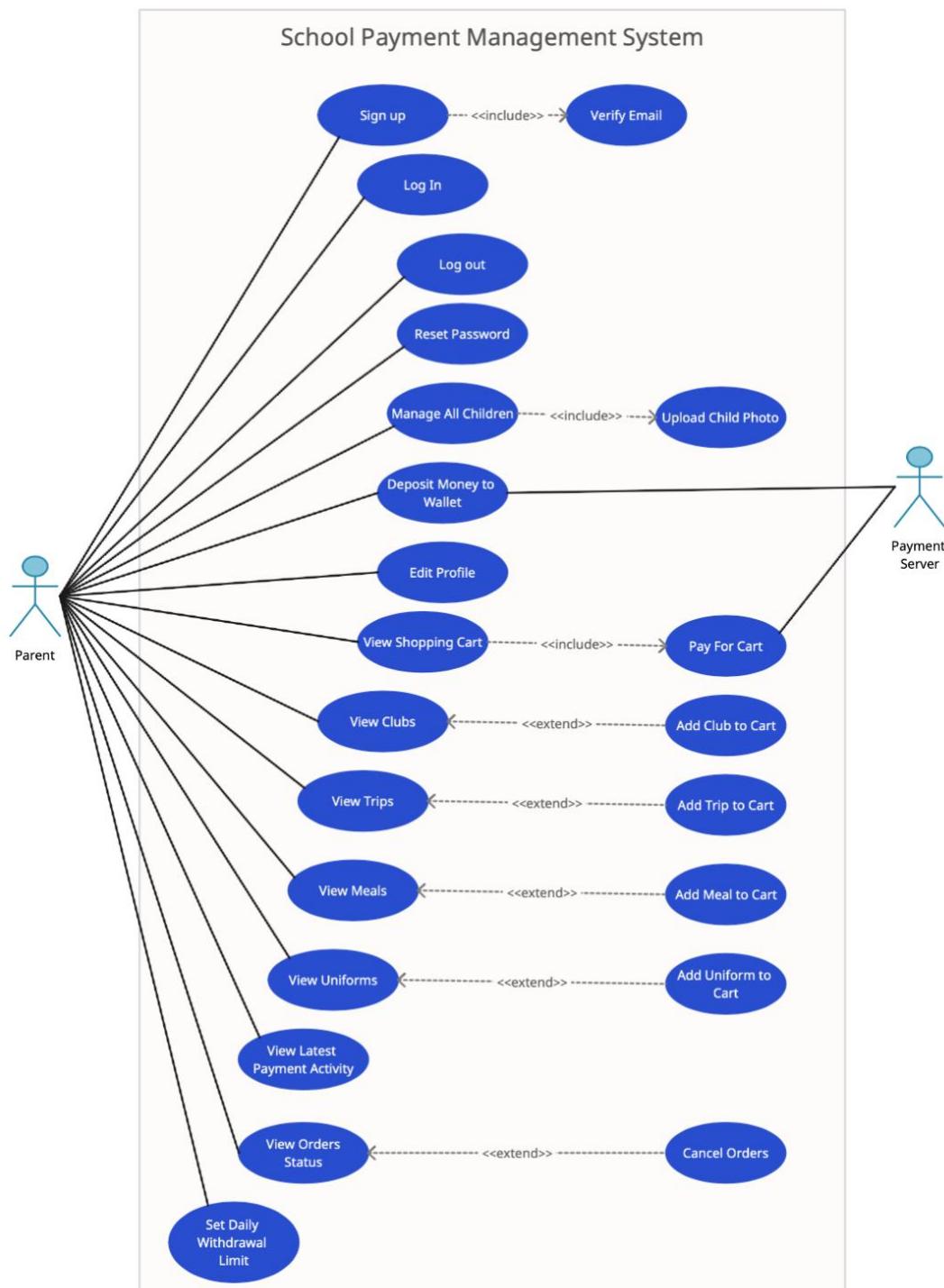
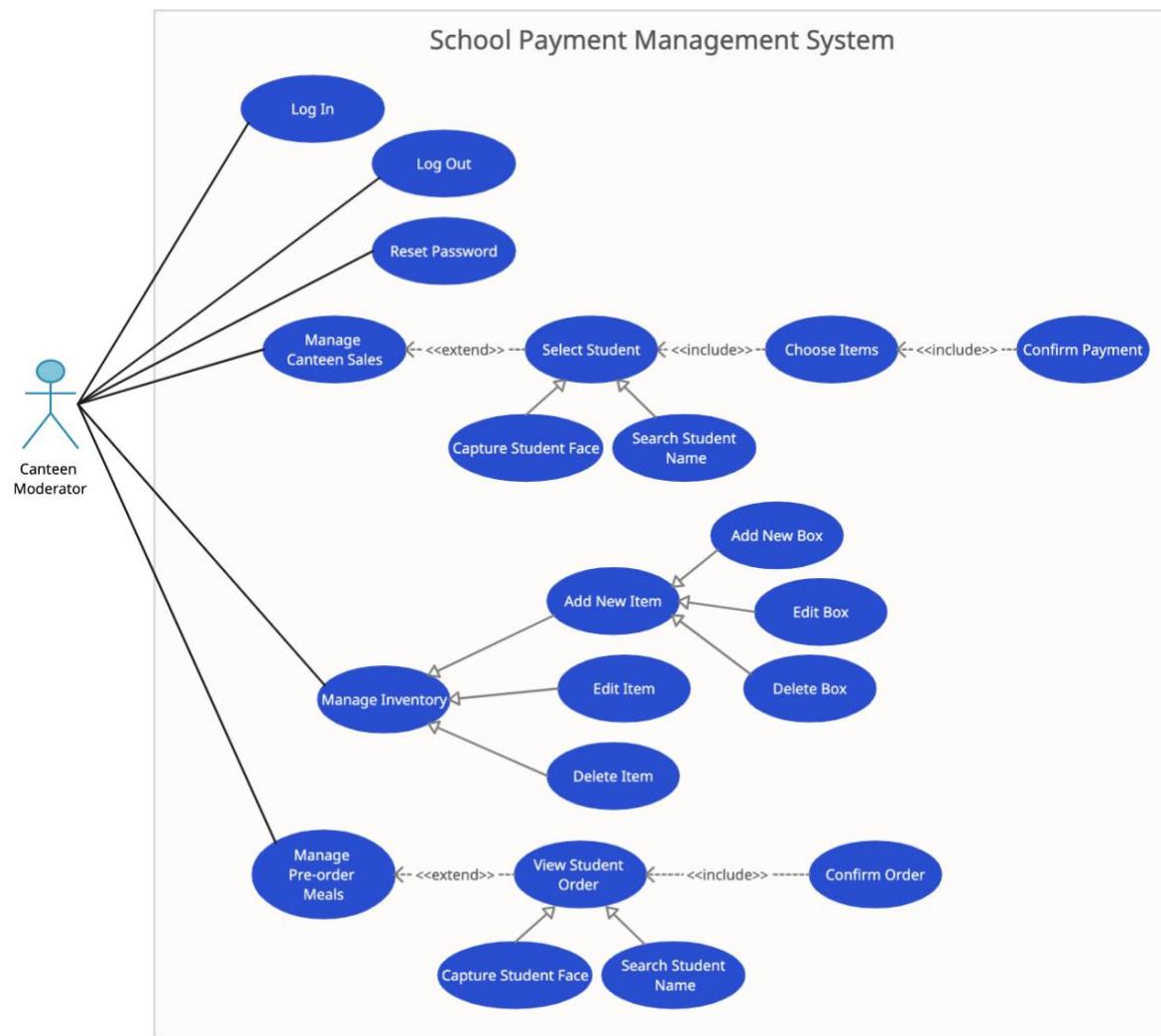


Figure 6 Parent UCD



- Canteen Moderator Use Case Diagram



**Figure 7 Canteen UCD**



#### 4.2.4 Roadmap and Product Backlog

##### Roadmap

A roadmap is a high-level overview of the project that outlines the goal and vision for the product. It typically includes a timeline of when different features or milestones will be delivered. The roadmap for our software product that is divided into two releases and four sprints is shown in table 6.

Release-1		
<b>Sprint-0</b>	September 11 – September 29	<ul style="list-style-type: none"><li>-Download and setup software tools (e.g., Jira, GitHub, VCS).</li><li>-Collect data to fully understand the problem.</li><li>-Research, planning and view similar platforms.</li><li>-Write the product backlog.</li><li>-Define the product scope.</li></ul>
<b>Sprint-1</b>	October 9 – November 1	<ul style="list-style-type: none"><li><b>-Build the website interface.</b></li><li><b>-Add the main features:</b><ul style="list-style-type: none"><li>School register/log-in/log-out.</li><li>Parents register/log-in/log-out.</li><li>Allow school to add /delete/ edit students.</li><li>Allow school to add/delete/edit trips, clubs, and uniforms.</li><li>Allow the canteen moderator to manage the canteen inventory.</li></ul></li><li><b>-Testing.</b></li></ul>
Release-2		
<b>Sprint-2</b>	December 4 – December 22	<ul style="list-style-type: none"><li><b>-Additional features will be added:</b><ul style="list-style-type: none"><li>Allow parents to add money to their child's virtual wallet.</li><li>Allow parents to view, add to cart and pay for school clubs.</li><li>Allow parents to pre-order, pay and cancel canteen orders.</li><li>Allow parents to view, add to the cart and pay for trips.</li><li>Allow parents to view, add to cart, pay and cancel uniforms orders.</li></ul></li><li>Allow the canteen moderator to manage canteen sales.</li><li>Allow the canteen moderator to view canteen orders and confirm orders when they are received.</li><li>Allow schools to view the registered students on each club trip.</li><li>Allow schools to view uniform orders and confirm orders when they are received.</li><li><b>-Testing.</b></li></ul>



Release-2		
<b>Sprint-3</b>	December 23 – January 12	<p><b>-Additional features will be added:</b></p> <p>Allow parents to edit their profiles.</p> <p>Allow schools to view their financial dashboard.</p> <p>Allow parents to view recent payment activities.</p> <p>Allow schools to search for students by name.</p> <p>Allow school to filter student list by grade.</p> <p>Allow schools to edit their profile including the school's canteen moderator's information.</p> <p>Allow parents to track canteen and uniforms orders.</p> <p><b>-Testing.</b></p>
<b>Sprint-4</b>	January 13 – February 12	<p><b>-Additional features will be added:</b></p> <p>Allow parents to limit their children's daily canteen purchases.</p> <p>Allow schools to set a range on how much students can deposit into their wallets.</p>
<b>Sprint-5</b>	February 24 – May 14	<p><b>-Deployment.</b></p> <p><b>-Test overall user experience.</b></p>

Table 6 Roadmap



## Product Backlog

Product backlog shown in Table 7 refers to a prioritized list of functionalities of our product.

ID	PBI	Size	Type	Status	Acceptance Criteria
1	As a school admin I want to be able to register in the system so that I can use all the features that the system provides.	4	Feature	Done	<p>As a school admin, when I try to register in the system, enter all the required information. And click on "submit". The system should indicate that I have successfully registered in the system. and the school information will be saved in the system database.</p> <p>As a school admin, when I try to register in the system and forget to fill in the required information then click "submit". The system should display an error message that indicates which field to fill.</p> <p>As a school admin, when I try to register in the system. And upload an image of my school logo the system must approve it. However, if I do not upload the logo, the default image will be used instead.</p> <p>As a school admin, when I try to register in the system. And fill in the school's name field with characters that are less than 5 and more than 30 characters. The system should display an error message indicating that the accepted entry is only letters (either case), numbers, and underscore. No less than 5 and no more than 30 characters.</p> <p>As a school admin, when I try to register in the system. and fill the school's pin field with less than 5 characters and more than 20. The system should display an error message indicating that the accepted entry is only letters (either case), numbers, and underscore. No less than 5 and no more than 20 characters.</p> <p>As a school admin, when I try to register in the system. and fill the school's pin field with an existing school pin. The system should display an error message indicating the school pin is already taken and ask me to choose another pin.</p> <p>As a school admin, when I try to register in the system. and fill the school's password field with less than 8 characters or not contain at least one lowercase and uppercase letters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p> <p>As a school admin, when I try to register in the system. and fill the school's confirm password field with less than 8 characters or not contain at least one uppercase and one lowercase letters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I try to register in the system and the password and confirm password fields do not match. The system should display an error message indicating that the school passwords do not match.</p> <p>As a school admin, when I try to register in the system. And fill in the school mobile number filed with letters or less than 10 numbers. The system should display an error message indicating that the only accepted entry is 10 numbers and if it is a telephone number include your region code.</p> <p>As a school admin, when I try to register in the system. And fill in the school national address filed with more\less than 4 letters first then 4 numbers. The system should display an error message indicating that the only accepted entry is 8 characters and only 4 letters first then 4 numbers.</p> <p>As a school admin, when I try to register in the system. And fill the email field with wrong format. The system should display an error message indicating that the email format is not accepted it must contain <a href="mailto:characters@domain.xyz">characters@domain.xyz</a>.</p> <p>As a school admin, when I try to register in the system. and fill the school's email field with an existing school email. The system should display an error message indicating the email is already taken and ask me to choose another email.</p> <p>As a school admin, when I try to register in the system. And I didn't select any option from school level, gender, grade section. The system should display an error message indicating that the fields are required.</p> <p>As a school admin, when I try to register in the system and create the canteen account. Then, fill the canteen moderator's pin field with less than 5 characters and more than 15. The system should display an error message indicating that the accepted entry is only letters, numbers, and underscore, no less than 5 and no more than 15 characters.</p> <p>As a school admin, when I try to register in the system and create the canteen account. Then, fill the canteen's pin field with an existing canteen pin. The system should display an error message indicating the canteen pin is already taken and ask me to choose another pin.</p> <p>As a school admin, when I try to register in the system and create the canteen account. Then, fill the canteen's password field with less than 8 characters or not contain at least one uppercase and lowercase letters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I try to register in the system and create the canteen account. Then, fill the canteen's confirm password field with less than 8 characters or not contain at least one lowercase and uppercase letters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p> <p>As a school admin, when I try to register in the system and fill the canteen moderator's information. Then, fill in the canteen's moderator first name field with numbers or any other characters. The system should display an error message indicating that the accepted entry is only letters (either case), no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I try to register in the system and fill the canteen moderator's information. Then, fill in the canteen's moderator last name field with numbers. The system should display an error message indicating that the accepted entry is only letters (either case), no less than 5 and no more than 30 characters.</p> <p>As a school admin, when I try to register in the system and fill the canteen moderator's information. Then, fill in the canteen's moderator pin field with characters that are less than 4 or more than 8. The system should display an error message indicating that the accepted entry is only letters (either case) and numbers no less than 4 and no more than 8 characters. (Moderator pin is a code to allow the canteen moderator to login to canteen account by his own credentials).</p>
2	As a parent I want to be able to register in the system so that I can access my children's accounts.	4	Feature	Done	<p>As a parent, when I try to register in the system. Enter all the required information. And click "submit". The system should indicate that the registration is successful, and a verification link has been sent to my email and my information is saved on the parent table in the database.</p> <p>As a parent, if I verify my account using the link sent to my email. The parent table in the database should be updated and I can now log in to my account.</p> <p>As a parent, when I try to register in the system and forget to fill in the required information and then click "submit". The system should display an error message that indicates which field to fill.</p> <p>As a parent, when I try to register in the system and fill in the national id field with letters or less than 10 numbers. The system should display an error message indicating that the only accepted entry is 10 numbers.</p> <p>As a parent, when I try to register in the system. and fill the national id field with an existing national id in the parent table in the database. The system should display an error message indicating that I have already registered in the system and ask me to log in.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a parent, when I try to register in the system. and fill the national id field with non-existing national id in the student table in the database. A message should display indicating that I am not a parent to any student at any school and I am not allowed to register in the system.</p> <p>As a parent, when I try to register in the system. and fill in the first name field with numbers or letters less than 5 or more than 30 letters. The system should display an error message indicating that the accepted entry is only letters (either case), no less than 5 and no more than 30 characters.</p> <p>As a parent, when I try to register in the system. and fill in the last name field with numbers or letters less than 5 or more than 30 letters. The system should display an error message indicating that the accepted entry is only letters (either case), no less than 5 and no more than 30 characters.</p> <p>As a parent, when I try to register in the system. And fill the parent email field with wrong format. The system should display an error message indicating that the email format is not accepted it must contain characters@domain.xyz.</p> <p>As a parent, when I try to register in the system, fill out the email field with a different email than the one registered in the student table. The system should display an error message indicating that I should enter the right email registered in my child school.</p> <p>As a parent, when I try to register in the system. and fill in the phone number filed with letters or less than 10 numbers or starting with other than 05 or 011. The system should display an error message indicating that the only accepted entry is 10 numbers, starting with 05 or 011.</p> <p>As a parent, when I try to register in the system. and fill the password field with less than 8 characters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p> <p>As a parent, when I try to register in the system. and fill the confirm password field with less than 8 characters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p> <p>As a parent, when I try to register in the system and the password and confirm password fields do not match. The system should display an error message indicating that the passwords do not match.</p>
3	As a school admin I want to be able to log in to my account so	3	Feature	Done	As a school admin when I open the “log in” page and fill in the “school pin” and “password” fields with my authentication credentials and I click the log-In button then the system should display me a success message and log me in to my school account.



ID	PBI	Size	Type	Status	Acceptance Criteria
	that I can manage the school activities.				<p>As a school admin, when I open the “log in” page and fill in the “pin” field with a wrong school pin. The system should display an error message indicating that the pin does not exist.</p> <p>As a school admin, when I open the “log in” page and fill in the “password” field with incorrect password. The system should display an error message indicating that I have entered incorrect password.</p>
4	As a canteen moderator I want to be able to log in to my account so that I can manage the school canteen.	3	Feature	Done	<p>As a canteen moderator when I open the “log in” page and fill in the “Canteen pin”, “password”, “Select a moderator” and “moderator pin” fields with my authentication credentials and I click the log-In button then the system should display me a success message and log me into the canteen sales page.</p> <p>As a canteen moderator, when I open the “log in” page and fill in the “Canteen pin” field with the wrong school pin. The system should display an error message indicating that the pin does not exist.</p> <p>As a canteen moderator, when I open the “log in” page and fill in the “password” field with an incorrect password. The system should display an error message indicating that I have entered an incorrect password.</p> <p>As a canteen moderator, when I open the “log in” page and fill in the “Moderator pin” field with an incorrect pin. The system should display an error message indicating that I have entered an incorrect pin.</p>
5	As a canteen moderator I want to be able to log out of my account so that I can keep the canteen account secure.	3	Feature	Done	As a canteen moderator if I click on the logout button the system should show me a confirmation message to make sure I really want to log out. If I click cancel the system should keep me on the same page I am on. If I click ok the system should inform me that I have been logged out successfully and redirect me to the website landing page.
6	As a school admin I want to be able to log out of my account so that I can keep the school account secure.	3	Feature	Done	As a school admin if I click on the "log out" button, the system is expected to display a confirmation message to ensure that I intend to log out. If I select "cancel," the system will leave me on the current page. However, if I select "ok," the system will notify me that I have been successfully logged out and redirect me to the index page of the website.
7	As a parent I want to be able to log in to my	3	Feature	Done	As a parent when I open the “log in” page and fill in the “email” and “password” fields with my authentication credentials and I click the log-In button then the system



ID	PBI	Size	Type	Status	Acceptance Criteria
	account so that I can view all my children's profiles.				<p>should display me a success message and log me in to the parent index page.</p> <p>As a parent when I open the "log in" page and fill in the "email" and "password" fields with my authentication credentials and I have not yet verified my account, then click the log-In button the system should display me an error message indicating that I must verify my account first to log in.</p> <p>As a parent, when I open the "log in" page and fill in the "email" filed with a wrong email. The system should display an error message indicating that the email does not exist.</p> <p>As a parent, when I open the "log in" page and fill in the "password" filed incorrect password. The system should display an error message indicating that I have entered incorrect password.</p>
8	As a parent I want to be able to log out of my account so that I can keep my account secure.	3	Feature	Done	As a parent if I click on the "log out" button, the system is expected to display a confirmation message to ensure that I intend to log out. If I select "cancel," the system will leave me on the current page. However, if I select "ok," the system will notify me that I have been successfully logged out and redirect me to the index page of the website.
9	As a school admin I want to securely reset my password, so that I can change my password for security reasons or in case I forgot my previous password.	4	Feature	Done	<p>As a school admin, if I open "log in" page and click on Forgot Password the system should direct me to reset password page.</p> <p>As a school admin, when I go the "reset password" page and enter my email the system should inform me that a reset password link has been sent to my email.</p> <p>As a school admin, when I go the "reset password" page and enter wrong email the system should display an error message indicating that the email is not found.</p> <p>As a school admin, if I clicked on the reset password link that I have received on my email, the system should redirect me to the change password page. And ask me to fill the new password and confirm new password. If I click on the update password button the system should show me a message indicating that the password has been changed and the password in the school admin table is updated in the database. Then redirect me to the school log in page.</p> <p>As a school admin, if I entered different password in the password and confirm password fields the system should show an error massage indicate that the passwords do not match.</p> <p>As a school admin, if I left the passwords fields empty the system should show an error massage indicate that the passwords fields are required.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I try to use a password reset link to change my password and then try to use the same link to update my password again, the system should show an error message saying that I cannot change the password because the previous token has been replaced with a new one after the first password change.</p>
10	As a canteen moderator I want to securely reset my password, so that I can change my password for security reasons or in case I forgot my previous password.	4	Feature	Done	<p>As a canteen moderator, if I open “log in” page and click on Forget Password the system should direct me to reset password page.</p> <p>As a canteen moderator, when I go the “reset password” page and enter the school email the system should inform me that a reset password link has been sent to my email.</p> <p>As a canteen moderator, when I go the “reset password” page and enter wrong email the system should display an error message indicating that the email is not found.</p> <p>As a canteen moderator, if I clicked on the reset password link that I have received on the school email, the system should redirect me to the change password page. And ask me to fill the new password and confirm new password. If I click on the update password button the system should show me a message indicating that the password has been changed and the password in the canteen moderator table is updated in the database. Then redirect me to the canteen moderator log in page.</p> <p>As a canteen moderator, if I entered different password in the password and confirm password fields the system should show an error message indicate that the passwords do not match.</p> <p>As a canteen moderator, if I left the passwords fields empty the system should show an error message indicate that the passwords fields are required.</p> <p>As a canteen moderator, when I try to use a password reset link to change my password and then try to use the same link to update my password again, the system should show an error message saying that I cannot change the password because the previous token has been replaced with a new one after the first password change.</p>
11	As a parent I want to securely reset my password, so that I can change my password for security reasons or in case I forgot my previous password.	4	Feature	Done	<p>As a parent, if I open “log in” page and click on Forget Password the system should direct me to reset password page.</p> <p>As a parent, when I go the “reset password” page and enter my email the system should inform me that a reset password link has been sent to my email.</p> <p>As a parent, when I go the “reset password” page and enter wrong email the system should display an error message indicating that the email is not found.</p>



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					<p>As a parent, if I clicked on the reset password link that I have received on my email, the system should redirect me to the change password page. And ask me to fill the new password and confirm new password. If I click on the update password button the system should show me a message indicating that the password has been changed and the password in the parent table is updated in the database. Then redirect me to the parent log in page.</p> <p>As a parent, if I entered different password in the password and confirm password fields the system should show an error message indicate that the passwords do not match.</p> <p>As a parent, if I left the passwords fields empty the system should show an error message indicate that the passwords fields are required.</p> <p>As a parent, when I try to use a password reset link to change my password and then try to use the same link to update my password again, the system should show an error message saying that I cannot change the password because the previous token has been replaced with a new one after the first password change.</p>
12	As a school admin I want to be able to add students so that the school staff can manage the school's student.	4	Feature	Done	<p>As a school admin, when I open the "add new student" page. Enter all the required information. And click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Ok" the system should indicate that I have successfully added the student. Then redirect me to the student's page. And a new record should be added to the student database table with a unique student ID as a primary key.</p> <p>As a school admin, when I open the "add new student" page. Enter all the information. And click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Cancel" the system should keep me on the same page without adding the student.</p> <p>As a school admin, when I open the "add new student" page and fail to fill in the required information. And click on "submit". The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I open the "add new student" page and fill in the first name field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I open the "add new student" page and fill in the middle name field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I open the "add new student" page and fill in the last name field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I open the "add new student" page and fill in the student national ID filed with letters or less than 10 numbers. The system should display an error message indicating that the student's national ID should contain numbers and 10 digits only.</p> <p>As a school admin, when I open the "add new student" page and fill in the student national ID with a national ID of a student who is already added to the same school. And click on "submit". The system should display an error message indicating that the student is currently enrolled (added) in the school.</p> <p>As a school admin, when I open the "add new student" page and fill in the student national ID filed with a national ID of a student who is added to another school. And click on "submit". The system should display an error message indicating that the national ID number belongs to an active student in another school. and a message to solve the issue, with the school's name and contact number where the student is added in.</p> <p>As a school admin, when I open the "add new student" page and fill in the other allergies field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I open the "add new student" page and fill in the parent national ID field with letters or less than 10 numbers. The system should display an error message indicating that the parent national ID should contain numbers and 10 digits only.</p> <p>As a school admin, when I open the "add new student" page and fill in the parent phone number filled with letters or less than 10 numbers or starting with other than 05, 011. The system should display an error message indicating that the parent phone number should contain numbers and 10 digits only, starting with either 05 or 011.</p> <p>As a school admin, when I open the "add new student" page and fill in the parent email filled with wrong format. The system should display an error message indicating that the email format is not accepted it must contain <a href="mailto:characters@domain.xyz">characters@domain.xyz</a></p> <p>As a school admin, when I open the "add new student" page. Enter all the required information. And click on the "Cancel button". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Cancel" the</p>



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					<p>system should keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I open the "add new student" page. Enter all the required information. And click on the "Cancel button". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Ok" the system should redirect me to the student's page.</p>
13	As a school admin I want to be able to delete students so that the school students list can be up to date.	3	Feature	Done	<p>As a school admin, if I try to delete a student. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Ok". The system should indicate that the student has been deleted successfully. And redirect me to the students' page. And the student record should be deleted from the student's table.</p> <p>As a school admin, if I try to delete a student. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Cancel". Then The system should keep me on the same page, without deleting the student.</p>
14	As a school admin, I want to be able to transfer the students to the next grade level so that the school students list can be up to date.	3	Feature	Done	<p>As a school admin, if I try to transfer the students to the next grade level from June until the end of September, and I had not transferred them before in the same period of this year. And click on the (transfer the students to the next grade level) button. The system should display a confirmation message indicating that all students will be transferred to the next grade, and graduates will be deleted from the system. With two options (Cancel) or (Ok). If I click on "Ok". The system should indicate that all students have been transferred to the next grade level successfully. And redirect me to the students' page. And all the student's grades should be changed to the next grade level in the student's database table.</p> <p>As a school admin, if I try to transfer the students to the next grade level from June until the end of September, and I had not transferred them before in the same period of this year. And click on the (transfer the students to the next grade level) button. The system should display a confirmation message indicating that all students will be transferred to the next grade, and graduates will be deleted from the system. With two options (Cancel) or (Ok). If I click on "Cancel". The system should keep me on the same page without transferring the students to the next grade level.</p> <p>As a school admin, if I try to transfer the students to the next grade level from June until the end of September, and I had transferred them before in the same period of this year. And click on the (transfer the students to the next grade level) button. The system should display an alert indicating that the service is only available from June until the end of September. If I click on "Ok". The system should keep me on the same page without transferring the students to the next grade level.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, if I try to transfer the students to the next grade level in the period from October to the end of May. And click on the (transfer the students to the next grade level) button. The system should display an alert indicating that the service is only available from June until the end of September. If I click on “Ok”. The system should keep me on the same page without transferring the students to the next grade level.</p>
15	As a school admin I want to be able to edit students' info so that I can keep student profiles up to date.	3	Feature	Done	<p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. The system displays a pre-filled form. When entering all the required new information and click on “submit”. The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on “Ok” the system should indicate that I have successfully updated the students' information. Then keep me on the same page. And the student's information should be updated in the form and the database.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. The system displays a pre-filled form. When entering all the required new information and click on “submit”. The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on “cancel” the system should keep me on the same page without updating the students' information.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fails to fill in the required information. And click on “submit”. The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the first name field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the middle name field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the student national ID filed with letters or less than 10 numbers. The system should display an error message indicating that the student's national ID should contain numbers and 10 digits only.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the student's national ID with a national ID of a student who is already added to the same school. And click on "submit". The system should display an error message indicating that the modified national ID number belongs to an active student in the same school.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the student national ID filed with a national ID of a student who is added to another school. And click on "submit". The system should display an error message indicating that the modified national ID number belongs to an active student in another school. and a message to solve the issue, with the school's name and contact number where the student is added in.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the other allergies field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. And fill in the parent's national ID filed with letters or less than 10 numbers. The system should display an error message indicating that the parent national ID should contain numbers and 10 digits only.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. If the parent is not registered in the system yet And I fill in the parent phone number field with letters or less than 10 numbers or starting with other than 05, 011. The system should display an error message indicating that the parent phone number should contain numbers and 10 digits only, starting with either 05 or 011.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. If the parent is not registered in the system yet and I fill in the parent email field with the wrong format. The system should display an error message indicating that the email format is not accepted it must contain <a href="mailto:example@domain.xyz">example@domain.xyz</a>.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. If the parent is registered in the system, I will not be able to edit his email or national id and an alert message will display indicating that only registered parent is able to edit his email and his national id.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. Enter all the</p>



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					<p>required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Cancel" the system should keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I choose a student to edit his information. And click on the (pencil) icon. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Ok" the system should redirect me to the student's page.</p>
16	As a school admin, I want to be able to view student information so that I can make sure all the information is clear.	2	Feature	Done	<p>As a school admin, when I choose a student to view his information. And click on the (eye) icon. The system should display all the student information.</p> <p>As a school admin, when I choose a student to view his information. And click on the (eye) icon. The system should display all the student information. When I click on "Close" the system should redirect me to the student's page.</p>
17	As a school admin I want to be able to add the school clubs so that I keep the parents updated.	3	Feature	Done	<p>As a school admin, when I open the "add new club" page. Enter all the required information. And click "submit button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on Cancel. The form should not submit, and the adding should be cancelled, Then the system redirects me to the website new club's page. And Nothing change in the club table in the database.</p> <p>As a school admin, when I open the "add new club" page and fail to fill in the required information. The system should display an error message that indicates which field to fill and the conditions for this field. And redirect me to the website new clubs' page.</p> <p>As a school admin, when I open the "add new club" page. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on OK the system should redirect me to the website club's page. And Nothing change in the club table in the database.</p> <p>As a school admin, when I open the "add new club" page. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on cancel the system should redirect me to the website new club's page. And I can continue to fill the form.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I open the "add new club" page. Trying to add same name, start /end date, short description, details, skills and days as in the club database for same school, The system should display an error message that indicates this club is already exist, then redirect me to the website new club page.</p> <p>As a school admin, when I open the "add new club" page. Enter all the required information Without Adding Grade and Grade section. And click "submit button ". The system should display confirmation message with two options (OK) and (Cancel), if I click on OK The system should indicate that I have successfully added a club for ALL grades and Grades sections. Then redirect me to the website club's page. And a new record should be added in the club 's table in database.</p> <p>As a school admin, when I open the "add new club" page. Enter all the required information and Adding Grade and Grade section, click "submit button ". The system should display confirmation message with two options (OK) and (Cancel), if I click on OK The system should indicate that I have successfully added a club for specific Grades and Grades sections. Then redirect me to the website club's page. And a new record should be added in the Club's Grade Table and Club table in database.</p> <p>As a school admin, when I open the "add new club" page and fill in the club's name field with less than 5 characters or more than 50 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p> <p>As a school admin, when I open the "add new club" page and fill in the club's name field with other characters than numbers, letters, and spaces. The system should display an error message indicating that the accepted entry are just numbers, letters, and spaces.</p> <p>As a school admin, when I open the "add new club" page and fill the short description field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I open the "add new club" page and fill the club details field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I open the "add new club" page and fill the skills field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I open the "add new club" page and fill the agreement field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I open the "add new club" page and fill in the price field with letters or less than 1 digit or negative value. The system should display an error message indicating that the only accepted entry is number and at least 1 digit and no less than 0 value.</p> <p>As a school admin, when I open the "add new club" page and fill in the end date field with more than one year from the start date. the system should display an error message indicating that the maximum period for the club is one year. (As we have asked a lot of schools, a one-year maximum period for clubs is a widely accepted and practical approach that ensures student engagement, promotes leadership turnover, and optimizes the use of limited resources.)</p> <p>As a school admin, when I open the "add new club" page and not select any days from the days section. the system should display an error message indicating that to choose at least one.</p> <p>As a school admin, when I open the "add new club" page and fill in the to (start time) field with time that is before the from field (end time). the system should display an error message indicating that the End time should not be before the start time.</p>
18	As a school admin I want to be able to view specific club details so that I can make sure all the information is clear.	2	Feature	Done	As a school admin, if I try to View specific club details and click on the (View) button. The system should redirect me to the Specific club details page that contain information about the chosen club.
19	As school admin I want to be able to add events for a specific club so that club details are more organized.	3	Feature	Done	<p>As a school admin, when I press the schedule button next to specific club it will open "calendar club page" with all Events That already has been added for this specific club. And when I Enter all the required information. And click "submit". The system should display confirmation message with two options (OK) and (Cancel) if I click on OK the System Should indicate that I have successfully added an event. Then redirect me to the website calendar club's page. And a new record should be added in the club's event table in the database with the club event id (ceid) as primary key</p> <p>As a school admin, when I press the schedule button next to specific club it will open "new event page" with all Events That already has been added for this specific club. And when</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>I enter all the required information. And click "submit". The system should display confirmation message with two options (OK) and (Cancel) if I click on Cancel. The form should not submit, and the adding should be cancelled, Then the system redirects me to the website calendar club's page. And Nothing change in the Event table in the database.</p> <p>As a school admin, when I press the schedule button next to specific club it will open "new event page" with all Events That already has been added for this specific club. and fail to fill in the required information. The system should display an error message that indicates which field to fill and the conditions for this field. And redirect me to the website add calendar page.</p> <p>As a school admin, when I press the schedule button next to specific club it will open "new event page" with all Events That already has been added for this specific club. Trying to add same name, details and days of the week as in the club_event table in the database to specific club in same school. The system should display an error message that indicates this event for this club is already exist Then redirect me to the website calendar club's page.</p> <p>As a school admin, when I press the schedule button next to specific club it will open "new event page" with all Events That already has been added for this specific club. Trying to add event for this specific club and select days of the week same as any event this club has in same school. The system should display an error message that indicates that you I have conflicts in events then redirect me to the website calendar club's page.</p> <p>As a school admin, when I want to add new event for specific club, If the date of the club has passed, the "add new event" button should be disabled, and the I should not be able to click on it, the "add new event" button should only be enabled if the date of the club is in the future.</p> <p>As a school admin, when I open the "calendar club" page and fill in the event's name field with less than 5 characters or more than 20 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 20 characters.</p> <p>As a school admin, when I open the " calendar club " page and fill the details field with less than 5 characters or more than 30 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 30 characters.</p> <p>As a school admin, when I open the " calendar club " page and fill in the event's name field with other characters than numbers, letters, and spaces. The system should display an error message indicating that the accepted entry are just numbers, letters, and spaces.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I open the " calendar Club " page and fill in the event's details field with other characters than numbers, letters, and spaces. The system should display an error message indicating that the accepted entry are just numbers, letters, and spaces.</p>
20	As school admin I want to be able to delete events for a specific club so that parents do not get confused about what events are available now	3	Feature	Done	<p>As a school admin, if I try to delete a specific club's event and click on the delete button. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Ok. The system should indicate that the club's event was successfully deleted, then redirect me to the calendar club's page and the event record for the specific club should be deleted from club_event database.</p> <p>As a school admin, if I try to delete specific club's event. And click on the delete button. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Cancel. Then The system should redirect me to calendar club's page. and nothing change in club_event table in the database.</p>
22	As a school admin I want to be able to view specific trip details so that I can make sure all the information is clear.	2	Feature	Done	<p>As a school admin, if I try to view specific trip details and click on the (View) button. The system should redirect me to the specific trip details page that contains information about the chosen trip.</p>
23	As a school admin I want to be able to add the school uniforms so that I keep the parents updated.	3	Feature	Done	<p>As a school admin, when I open the "add uniform" page. Enter all the required information. And click "submit". The system should show a conformation massage with two option "OK", "Cancel" and when I click "Ok" the system should indicate that I have successfully added a uniform and display a confirmation message. Then redirect me to the website uniform page. And a new record should be added to the uniform table in the database with the uniform ID as a primary key.</p> <p>As a school admin, when I open the "add uniform" page. Enter all the required information. And click "submit". The system should show a conformation massage with two option "OK", "Cancel" and when I click "cancel" the system should redirect me to the website new uniform page. And nothing changes in the uniform table.</p> <p>As a school admin, when I open the "add uniform" page and fail to fill in the required information. The system should display an error message that indicates which field to fill. And redirect me to the website add uniforms page.</p> <p>As a school admin, when I open the "add uniform " page and fill in the uniform name field with less than 5 characters or more than 32 characters. The system should display an error message indicating that the accepted entries are no less than 5 characters and no more than 32 characters.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I open the "add uniform" page and choose a duplicate size for the same uniform. The system should not add a duplicate size.</p> <p>As a school admin, when I open the "add uniform" page and fill in the price field with letters or more than 5 digits or negative value. The system should display an error message indicating that the only accepted entry number at least 1 digit and at most 5 digits and no less than 0 value.</p> <p>As a school admin, when I open the "add uniform" page. Enter information of an existing uniform with the same grade, name, and size. And click "submit". The system should indicate and display an error message that the uniform already exists. Then redirect me to the website uniform page.</p> <p>As a school admin, when I open the "add new uniform" page. Enter all the required information. And click on the "Cancel button". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on Cancel the system should keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I open the "add new uniform" page. Enter all the required information. And click on the "Cancel button". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on Ok the system redirects me to the uniform's page, and nothing change on the uniform table on the database.</p> <p>As a school admin, when I open the "add uniform" page and fill in the Quantity field with letters. The system should display an error message indicating that the only accepted entry is number at least 1 digit and minimum value is 1.</p> <p>As a school admin, when I open the "add uniform" page and not select grade or size. The system should display an error message indicating I should choose one option.</p> <p>As a school admin, when I open the "add uniform" page and want to see the size Guide the system should show me size guide button when I click it the system should display Masroofi size guide for each grade.</p>
24	As a school admin I want to be able to add the school trips so that I keep the parents updated.	3	Feature	Done	<p>As a school admin, when I open the "add new trip" page. Enter all the required information. And click "submit button". The system should display confirmation message with two options (OK) and (Cancel) if I click on Cancel. The form should not submit, and the adding should be cancelled, Then the system redirects me to the website new trip's page. And Nothing change in the trip table in the database.</p> <p>As a school admin, when I open the "add new trip" page. Enter all the required information Without Adding Grade and Grade section. And click "submit button". The system should display confirmation message with two options (OK) and (Cancel), if I click on OK The system should indicate</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>that I have successfully added a trip for ALL grades and Grades sections. Then redirect me to the website trip's page. And a new record should be added in the trip 's table in database.</p> <p>As a school admin, when I open the "add new trip" page. Enter all the required information and Adding Grade and Grade section, click "submit button ". The system should display confirmation message with two options (OK) and (Cancel), if I click on OK The system should indicate that I have successfully added a trip for specific Grades and Grades sections. Then redirect me to the website trip's page. And a new record should be added in the trip's Grade Table and trip table in database.</p> <p>As a school admin, when I open the "add new trip" page and fail to fill in the required information. The system should display an error message that indicates which field to fill with the conditions for this field. And redirect me to the website add trip page.</p> <p>As a school admin, when I open the "add new trip" page. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on OK the system should redirect me to the website trip's page. And Nothing change in the trip table in the database.</p> <p>As a school admin, when I open the "add new trip" page. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on cancel the system should redirect me to the website new trip's page. And I can continue to fill the form.</p> <p>As a school admin, when I open the "add new trip" page. Trying to add same name, date, start / end time, description, details and terms &amp; conditions as in the trip table in the database for same School The system should display an error message that indicates this trip is already exist, then redirect me to the website new trips page.</p> <p>As a school admin, when I open the "add new trip" page and fill in the trip name field with less than 5 characters or more than 50 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p> <p>As a school admin, when I open the "add new trip" page and fill in the trip's name field with other characters than numbers, letters, and spaces. The system should display an error message indicating that the accepted entry are just numbers, letters, and spaces.</p> <p>As a school admin, when I open the "add new trip" page and fill the short description field with less the 5 characters or more than 500 characters. The system should display an error</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I open the "add new trip" page and fill the skills field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin when I open the "add new trip" page and fill the details field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I open the "add new trip" page and fill the agreement field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p> <p>As a school admin, when I open the "add trip" page and fill the terms and condition field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p> <p>As a school admin, when I open the "add new trip" page and fill in the price field with letters or less than 1 digit or negative value. The system should display an error message indicating that the only accepted entry is number and at least 1 digit and no less than 0 value.</p> <p>As a school admin, when I open the "add new trip" page and fill in the End time field with time that before the start time or the difference between the start and end time is less than one hour. The system should display an error message indicating that the End time should be after start time and the difference between them is at least one hour then redirect me to website add new trip page.</p>
25	As a school admin I want to be able to delete trips so that the parents do not get confused about what trips are available now.	3	Feature	Done	<p>As a school admin, if I try to delete a trip. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Ok. The system should indicate that the trip was successfully deleted. And redirect me to the trips page. And the trip record should be deleted from trips table in the database.</p> <p>As a school admin, if I try to delete a trip. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Cancel. Then The system should redirect me to the trips page. and nothing change in trip table in the database.</p> <p>As a school admin, if I try to delete a trip that have students register in. And click on the (trash) icon. The system should</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					display an error message indicate that you cannot delete trips that have students register on it. Then The system should redirect me to the trips page. and nothing change in trip table in the database.
26	As a school admin I want to be able to delete clubs so that parents do not get confused about what clubs are available now.	3	Feature	Done	<p>As a school admin, if I try to delete a club. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Ok. The system should indicate that the club was successfully deleted. And redirect me to the club's page. And the club record should be deleted from club's dataset.</p> <p>As a school admin, if I try to delete a club. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Cancel. Then The system should redirect me to the club page. And nothing changes in the club table in the database.</p> <p>As a school admin, if I try to delete a club that have students register in. And click on the (trash) icon. The system should display an error message indicating that you cannot delete club that have students register. Then The system should redirect me to the club's page. and nothing changed in club table in the database.</p>
27	As school admin I want to be able to delete uniforms so that parents can pay for available uniforms.	3	Feature	Done	<p>As a school admin, if I try to delete a uniform. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (cancel). If I click on Ok. The system should indicate that the uniform was successfully deleted. And redirect me to the uniforms page. And the system should update the uniforms table in the database.</p> <p>As a school admin, if I try to delete a uniform. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (cancel). If I click on cancel. Then The system should redirect me to the uniforms page. And nothing changes in the uniform table.</p> <p>As a school admin, if I try to delete a uniform that has pre orders. And click on the (trash) icon. The system should display an error message indicating that this uniform has pre orders. Then The system should redirect me to the uniforms page. And nothing changes in the uniform table</p>
28	As a school admin I want to be able to edit clubs' info so that I can keep clubs list up to date.	3	Feature	Done	As a school admin, when I choose a club to edit that has specific grade and grade section. The system displays a pre-filled form. When entering all the required new information and click on submit button the system should display confirmation edit message with two options (OK) and (Cancel) if I click on OK the System Should indicate that I have successfully edited a club for specific grade and grade section. Then redirect me to the website edit club's page. And the club records should be updated with the new information in the club table in the database.



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I want to edit club, If the date of the club has passed, the pencil button for editing should be disabled, and I should not be able to click on it.</p> <p>The pencil button should only be enabled if the date of the club is in the future.</p> <p>As a school admin, when I choose a club to edit. The system displays a pre-filled form. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on Cancel. The form should not be submitted, and the Editing should be cancelled, Then the system redirects me to the website edit club's page. And Nothing change in the club table in the database.</p> <p>As a school admin, when I choose a club to edit. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on OK the system should redirect me to the website club's page. And Nothing change in the club table in the database.</p> <p>As a school admin, when I choose a club to edit. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on cancel the system should redirect me to the website edit club's page for the chosen club. And I can continue to fill in the form.</p> <p>As a school admin, when I choose a club to edit that does not have specific grade and grade section. The system displays a pre-filled form. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on OK the System Should indicate that I have successfully updated a club for ALL grade and grade sections Then redirect me to the website club's page. And the club records should be updated with the new information in club table in the database.</p> <p>As a school admin, when I choose a club to edit. And fail to fill in the required information. The system should display an error message that indicates which field to fill and the conditions for this field. And redirect me to the website edit club's page.</p> <p>As a school admin, when I choose a club to edit that have Specific grade and grade sections. if I try to delete a grade and grade section. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Cancel. Then The system should redirect me to the edit club's page. and nothing changes in club_grade table in the database.</p> <p>As a school admin, when I choose a club to edit that have Specific grade and grade sections. if I try to delete a grade and grade section. And click on the (trash) icon. The system</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Ok. The system should indicate that the grade and grade section was successfully deleted. And redirect me to the edit club's page. And the grade and grade section record should be deleted from club_grade table in the database.</p> <p>As a school admin, when I choose a club to edit. Trying to update the chosen club with same name, short description, details and skills as in the club database for same school. The system should display an error message that indicates this club is already exist, then redirect me to the website new club page.</p> <p>As a school admin, while editing a club, if I attempt to update the date of the chosen club, the system should disable the field to prevent any changes. (Disabling the date field during club editing prevents accidental changes and maintains data consistency as the date is linked to other aspects of the club "events", potentially causing confusion and errors. This ensures the admin is aware of the potential impact and takes appropriate steps before making any changes.)</p> <p>As a school admin, while editing a club, if I attempt to update the start and end time of the chosen club, the system should disable these fields to prevent any changes. (Disabling the date field during club editing prevents accidental changes and maintains data consistency as the time is linked to other aspects of the club "events", potentially causing confusion and errors. This ensures the admin is aware of the potential impact and takes appropriate steps before making any changes.)</p> <p>As a school admin, when I choose a club to edit. And fill in the club's name field with less than 5 characters or more than 50 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p> <p>As a school admin, when I choose a club to edit. And fill in the club's name field with other characters than numbers, letters, and spaces. The system should display an error message indicating that the accepted entry are just numbers, letters, and spaces.</p> <p>As a school admin, when I choose a club to edit. And fill the short description field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I choose a club to edit. And fill the club details field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p>



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					<p>As a school admin, when I choose a club to edit. And fill the skills field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I choose a club to edit. And fill the agreement field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I choose a club to edit. and fill in the price field with letters or less than 1 digit or negative value. The system should display an error message indicating that the only accepted entry is number and at least 1 digit and no less than 0 value.</p>
29	As a school admin I want to be able to edit trips info so that I can keep the trips list up to date.	3	Feature	Done	<p>As a school admin, when I choose a trip to edit that have specific grade and grade section. The system displays a pre-filled form. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on OK the System Should indicate that I have successfully edited a trip for specific grade and grade section. Then redirect me to the website edit trip's page. And the trip record should be updated with the new information in trip table in the database.</p> <p>As a school admin, when I want to edit trip, If the date of the trip has passed, the pencil button for editing should be disabled, and I should not be able to click on it.. the pencil button should only be enabled if the date of the trip is in the future.</p> <p>As a school admin, when I choose a trip to edit. The system displays a pre-filled form. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on Cancel. The form should not submit, and the Editing should be cancelled, Then the system redirects me to the website edit trip's page. And Nothing change in the trip table in the database.</p> <p>As a school admin, when I choose a trip to edit that is not having specific grade and grade section. The system displays a pre-filled form. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on OK the System Should indicate that I have successfully updated a trip for ALL grade and grade sections Then redirect me to the website edit trip's page. And the trip record should be updated with the new information in trip table in the database.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I choose a trip to edit. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on OK the system should redirect me to the website trip's page. And Nothing change in the trip table in the database.</p> <p>As a school admin, when I choose a trip to edit. Enter all the required information. And click "Cancel button ". The system should display confirmation message with two options (OK) and (Cancel) if I click on cancel the system should redirect me to the website edit trip's page for the chosen trip. And I can continue to fill the form.</p> <p>As a school admin, when I choose a trip to edit. And fail to fill in the required information. The system should display an error message that indicates which field to fill and the conditions for this field. And redirect me to the website edit trips page.</p> <p>As a school admin, when I choose a trip to edit. And fill in the trip name field with less than 5 characters or more than 50 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 50 characters.</p> <p>As a school admin, when I choose a trip to edit. And fill in the trip's name field with other characters than numbers, letters, and spaces. The system should display an error message indicating that the accepted entry are just numbers, letters, and spaces.</p> <p>As a school admin, when I choose a trip to edit. And fill the short description field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I choose a trip to edit. And fill the trip details field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I choose a trip to edit. And fill the skills field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p> <p>As a school admin, when I choose a trip to edit. And fill the agreement field with less than 5 characters or more than 500 characters. The system should display an error message indicating that the accepted entry are at least 5 characters and no more than 500 characters.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I choose a trip to edit. And fill in the price field with letters or less than 1 digit or negative value. The system should display an error message indicating that the only accepted entry is number and at least 1 digit and no less than 0 value.</p> <p>As a school admin, when I choose a trip to edit. And fill in the End time field with time that before the start time or the difference between the start and end time is less than one hour. The system should display an error message indicating that the End time should be after start time and the difference between them is at least one hour then redirect me to website edit trip page.</p> <p>As a school admin, when I choose a trip to edit. Trying to update the chosen trip to same name, date, start / end time, description, details and terms and conditions as in the trip table in the database for same School. The system should display an error message that indicates this trip is already exist, then redirect me to the website new trips page.</p>
30	As a school admin I want to be able to edit uniform info so that I can keep clubs list up to date.	3	Feature	Done	<p>As a school admin, when I choose a uniform to edit. The system displays a pre-filled form. When entering all the required new information and click submit. The system should display a confirmation edit message with two options "ok" and "cancel" if click "ok". The system should indicate that I have successfully updated a uniform. And keep me in the same page to see the updated information. And the uniform record should be updated with the new information in the uniform table.</p> <p>As a school admin, when I choose a uniform to edit. The system displays a pre-filled form. When entering all the required new information and click edit. The system should display a confirmation edit message with two options "ok" and "cancel" if click "cancel". The system should redirect me to the website uniforms page. And nothing changes in the uniform table.</p> <p>As a school admin, when I choose a uniform to edit. And fail to fill in the required information and click submit. The system should display a confirmation edit message with two options "ok" and "cancel" if click "ok". The system should display an error message that indicates which field to fill. And keep me on the edit uniform page.</p> <p>As a school admin, when I choose a uniform to edit. The system displays a pre-filled form. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on Cancel. The form should not submit, and the Editing should be cancelled, Then the system redirects me to the website edit uniform page. And Nothing change in the uniform table in the database.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I choose a uniform to edit that have Specific size and size quantity. if I try to delete a size and size quantity and click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Cancel. Then The system should redirect me to the edit club's page. and nothing change in uniform_size table.</p> <p>As a school admin, when I choose a uniform to edit that have Specific size and size quantity. if I try to delete size and size quantity. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Ok) or (Cancel). If I click on Ok. The system should indicate that the size and size quantity was deleted. And redirect me to the edit uniform page. And if I click on submit the size and size quantity record should be deleted from uniform_size table.</p> <p>As a school admin, when I choose a uniform to edit the system displays a pre-filled form, if I have delete all the uniform size and size quantity.. When entering all the required new information and click submit the system should display confirmation edit message with two options (OK) and (Cancel) if I click on OK the System Should display an error massage indicates that cannot have a uniform without. Size and size quantity Then redirect me to the website edit uniform page.</p> <p>As a school admin, when I choose a uniform to edit. And fill in the uniform name field with less than 5 characters or more than 32 characters. The system should display an error message indicating that the accepted entries are no less than 5 characters and no more than 32 characters.</p> <p>As a school admin, when I choose a uniform to edit. and fill in the price field and fill in with letters or more than 5 digits or negative value. The system should display an error message indicating that the only accepted entry number at least 1 digit and at most 5 digits and no less than 0 value.</p> <p>As a school admin, when I open the "edit uniform" page. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on Cancel the system should keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I open the " edit uniform " page. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on Ok the system should redirect me to the uniform's page.</p> <p>As a school admin, when I open the "edit uniform" page. Editing uniform with information of an existing uniform with the same grade, name, and size. And click "submit". The system should indicate and display an error message that the</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>uniform already exists. Then redirect me to the website edit uniform page.</p> <p>As a school admin, when I open the "edit uniform" page and not select grade or size. The system should display an error message indicating I should choose one option.</p>
31	As a canteen moderator I want to be able to add items so that parents can view the school menu.	4	Feature	Done	<p>As a canteen moderator, when I open the "add new item" page. Enter all the required information. And click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Ok" the system should indicate that I have successfully added the item. Then redirect me to the inventory page. And a new record should be added to the item database table with a unique item ID as a primary key.</p> <p>As a canteen moderator, when I open the "add new item" page. Enter all the required information. And click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Cancel" the system should keep me on the same page without adding the item.</p> <p>As a canteen moderator, when I open the "add new item" page and fail to fill in the required information. And click on "submit". The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p> <p>As a canteen moderator, when I open the "add new item" page and fill in the item name field with numbers or with less than 3 or more than 20 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 20 characters.</p> <p>As a canteen moderator, when I open the "add new item" page and fill in the price field with letters or less than 1 digit and more than 5 digits. The system should display an error message indicating that the only accepted entry is numbers and at least 1 digit and at most 5 digits.</p> <p>As a canteen moderator, when I open the "add new item" page and fill in the other allergies field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a canteen moderator, when I open the "add new item" page and fill in the item name field and price field with the same name and price of another item. The system should show a confirmation message to confirm adding the product again with two options (Cancel) or (Ok). and when I click on "ok" the system should indicate that I have successfully added the item. Then redirect me to the inventory page. And a new record should be added to the item database table with a unique item ID as a primary key.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a canteen moderator, when I open the "add new item" page and fill in the item name field and price field with the same name and price of another item. The system should show a confirmation message to confirm adding the product again with two options (Cancel) or (Ok). and when I click on "Cancel" the system should keep me on the same page without adding the item.</p> <p>As a canteen moderator, when I open the "add new item" page. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Cancel" the system should keep me on the same page and I can continue filling out the form.</p> <p>As a canteen moderator, when I open the "add new item" page. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Ok" the system should redirect me to the inventory page.</p>
32	As a canteen moderator I want to be able to delete items so that that the school menu can be up to date.	3	Feature	Done	<p>As a canteen moderator, if I try to delete an item. And click on the (trash) icon. And there were no pre-orders for the item or any stock available. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Ok". The system should indicate that the item has been deleted successfully. And redirect me to the inventory page. And the item record should be deleted from the database.</p> <p>As a canteen moderator, if I try to delete an item. And click on the (trash) icon. And there were no pre-orders for the item or any stock available. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Ok". The system should indicate that the item has been deleted successfully. And redirect me to the inventory page. And the item record should be deleted from the database.</p> <p>As a canteen moderator, if I try to delete an item. And click on the (trash) icon. And there were no pre-orders for the item or any stock available. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Cancel". Then The system should keep me on the same page, without deleting the item.</p> <p>As a canteen moderator, if I try to delete an item. And click on the (trash) icon. And there were pre-orders for the item. The system should display an alert message indicating that there are pre-orders for the item, and you cannot delete it. With (Ok) option. If I click on "Ok". The system should keep me on the same page without deleting the item.</p> <p>As a canteen moderator, if I try to delete an item. And click on the (trash) icon. And there was available stock for the item. The system should display an alert message indicating that there is available stock for the item, and you cannot</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>delete it. With (Ok) option. If I click on “Ok”. The system should keep me on the same page without deleting the item.</p>
33	As a canteen moderator I want to be able to edit items so that that the school menu can be up to date.	3	Feature	Done	<p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. The system displays a pre-filled form. When entering all the required new information and click on “submit”. The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on “Ok” the system should indicate that I have successfully updated the item information. Then keep me on the same page. And the item’s information should be updated in the form and the database.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. The system displays a pre-filled form. When entering all the required new information and click on “submit”. The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on “Cancel” the system should keep me on the same page without updating the item’s information.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. And fail to fill in the required information. And click on “submit”. The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p> <p>As a canteen moderator, when I open the "add new item" page and fill in the item name field with numbers or with less than 3 or more than 20 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 20 characters.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. And fill in the price field with letters or less than 01 digit and more than 5 digits. The system should display an error message indicating that the only accepted entry is numbers and at least 1 digit and at most 5 digits.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. And fill in the other allergies field with numbers or with less than 3 or more than 30 characters. The system should display an error message indicating that the accepted entries are letters, no less than 3 and no more than 30 characters.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. And fill in the item name field and price field with the same name and price of another item. The system should show a confirmation message to confirm adding the product again with two options (Cancel) or (Ok). and when I click on “ok” the system should indicate that I have successfully added the item. Then redirect me to the inventory page. And a new</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>record should be added to the item database table with a unique item ID as a primary key.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. And fill in the item name field and price field with the same name and price of another item. The system should show a confirmation message to confirm adding the product again with two options (Cancel) or (Ok). and when I click on “Cancel” the system should keep me on the same page without adding the item.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on “Cancel” the system should keep me on the same page and I can continue filling out the form.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on “Ok” the system should redirect me to the inventory page.</p>
34	As canteen moderator, I want to be able to view the stock of each item so that I can manage the item's stock.	4	Feature	Done	<p>As a canteen moderator, when I open the “Item stock” page. I want to know the total number of items in stock, total sales, and total waste.</p> <p>As a canteen moderator, when I open the “Item stock” page. I want to know the status of each box (Out of stock, wasted, In stock).</p> <p>As a canteen moderator, when I open the “Item stock” page. I want to know the Unexpired and expired items.</p>
35	As canteen moderator, I want to be able to add a new box to the item's stock.	3	Feature	Done	<p>As a canteen moderator, when I open the "add new box" page. Enter all the required information. And click on “submit”. The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on “Ok” the system should indicate that I have successfully added the box. Then redirect me to the item's stock page. And a new record should be added to the stock database table with a unique stock ID as a primary key.</p> <p>As a canteen moderator, when I open the "add new box" page. Enter all the required information. And click on “submit”. The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on “Cancel” the system should keep me on the same page without adding the box.</p> <p>As a canteen moderator, when I open the "add new box" page and fail to fill in the required information. And click on “submit”. The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a canteen moderator, when I open the "add new box" page and fill in the price field with less than 1 quantity per box or more than 5000 quantities. The system should display an error message indicating that the only acceptable entry is that the box contains at least 1 quantity to add to the inventory and no more than 5000 quantities.</p> <p>As a canteen moderator, when I open the "add new box" page. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Cancel" the system should keep me on the same page and I can continue filling out the form.</p> <p>As a canteen moderator, when I open the "add new box" page. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Ok" the system should redirect me to the item's stock page.</p>
36	As canteen moderator, I want to be able to delete the box from the item's stock.	2	Feature	Done	<p>As a canteen moderator, if I try to delete a box. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Ok". The system should indicate that the item has been deleted successfully. And redirect me to the item's stock page. And the item record should be deleted from the database.</p> <p>As a canteen moderator, if I try to delete a box. And click on the (trash) icon. The system should display a confirmation deletion message. With two options (Cancel) or (Ok). If I click on "Cancel". Then The system should keep me on the same page, without deleting the box.</p>
37	As canteen moderator, I want to be able to edit the box information.	3	Feature	Done	<p>As a canteen moderator, when I choose a box to edit its information. And click on the (pencil) icon. The system displays a pre-filled form. When entering all the required new information and click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Ok" the system should indicate that I have successfully updated the box information. Then keep me on the same page. And the box information should be updated in the form and the database.</p> <p>As a canteen moderator, when I choose a box to edit its information. And click on the (pencil) icon. The system displays a pre-filled form. When entering all the required new information and click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Cancel" the system should keep me on the same page without updating the box information.</p> <p>As a canteen moderator, when I choose a box to edit its information. And click on the (pencil) icon. And fail to fill in the required information. And click on "submit". The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a canteen moderator, when I choose a box to edit its information. And click on the (pencil) icon. And fill in the price field with less than 1 quantity per box or more than 5000 quantities. The system should display an error message indicating that the only acceptable entry is that the box contains at least 1 quantity to add to the inventory and no more than 5000 quantities.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Cancel" the system should keep me on the same page and I can continue filling out the form.</p> <p>As a canteen moderator, when I choose an item to edit its information. And click on the (pencil) icon. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on "Ok" the system should redirect me to the inventory page.</p>
38	As a parent I want to be able to add money to my child's wallet so that my child can purchase items from the canteen.	5	Feature	Done	<p>As a parent, if I access my child's profile page and select "Add Masroof" to add money to their wallet, I should enter the amount and confirm it. The system should then take me to the payment form, where I must fill in all the necessary information and click on "Pay". Following this, the system should redirect me to a 3D-Secure ACS page, displaying a summary of the payment information, and prompt me to enter the password (<b>12345 for success</b>). Once I submit the password, a confirmation message should appear, indicating that the payment was successful, and the amount has been credited to my child's virtual wallet.</p> <p><b>To test the payment:</b> Transaction Type: Successful Card Number: 4111111111111111</p> <p>Transaction Type: Failed Card Number: 401288888881881</p> <p>Any two-part name, any not expired date, and a three-digit number such as 111 can be used.</p> <p>As a parent, if I access my child's profile page and select "Add Masroof" to add money to their wallet, I should enter the amount and confirm it. The system should then take me to the payment form, where I must fill in all the necessary information and click on "Pay". Following this, the system should redirect me to a 3D-Secure ACS page (It always assumes the card has enough money), displaying a summary of the payment information, and prompt me to enter the password (<b>12345 for success</b>). If I want to cancel the transaction and return to my child's profile page, I should click the "cancel" button and I will be redirected to my child's profile page.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a parent, if I want to add amount for my child's school virtual wallet. If the value of the amount i want to deposit, when added to the current balance, exceeds the maximum limit set by the school, the system should reject it and display an error message indicating that this amount exceeds the maximum limit.</p> <p>As a parent, if I want to add amount for my child's school virtual wallet. If the value of the amount i want to deposit is smaller than 1 SR or if I make the field empty, the system should display an error message indicating the minimum amount to deposit is 1 SR.</p> <p>As a parent, if I want to add amount for my child's school virtual wallet. If I enter any character that is not a number, the system should display an error message indicating the only accepted entry Is numbers.</p>
39	As a parent I want to be able to view the school clubs so that I can choose the most appropriate one for my child.	3	Feature	Done	<p>As a parent, When I open the "clubs" page. The system should display a list of all available clubs that are not passed and available for my child grade and section to register before 10 days of the opening and after 10 days of the opening. When I click "view" the system should take me to the club details page. (As we ask many schools for the appropriate time frame, displaying a list of available clubs for registration within an appropriate time frame helps schools manage the registration process efficiently and reduces the likelihood of last-minute cancellations or changes.)</p> <p>As a parent, When I open the "clubs" page. If the club page is empty, the system should display a message stating that there are currently no clubs.</p> <p>As a parent, When I open the "clubs" page. and navigate to all the clubs lists that not passed and available to my child grade and section the system should show me if this club my child is already registered on or not.</p>
40	As a parent I want to be able to view the school uniforms so that I can choose one for my child.	3	Feature	Done	<p>As a parent, when I navigate to the "Uniform" page, the system should display a list of all available uniforms for my child's grade, along with their sizes, from the uniform dataset. The system should only display uniforms with a quantity greater than zero.</p> <p>As a parent, when I navigate to the "Uniform" page, if there are no uniforms available for my child's grade, the system should display a message stating that there are currently no uniforms available.</p> <p>As a parent, when I navigate to the "Uniform" page, if the quantity of available uniforms is zero, the system should display a message stating that there are currently no uniforms available.</p>
41	As a parent I want to be able to view school trips	3	Feature	Done	As a parent, When I open the "trips" page. The system should display a list of all available trips. When I click "view" the system should take me to the trip details page.



ID	PBI	Size	Type	Status	Acceptance Criteria
	so that I can decide which trip I want my child to attend.				<p>As a parent, When I open the "trips" page. The system should display a list of all available trips that are not passed and available for my child grade and section to register before 2 hours of the start time. When I click "view" the system should take me to the trip details page. (As we ask many schools for the appropriate time frame, displaying a list of available trips for registration within an appropriate time frame make the system helps schools manage resources more effectively and reduces the likelihood of last-minute changes or cancellations.)</p> <p>As a parent, When I open the "trip" page. If the trips page is empty, the system should display a message stating that there are currently no trips.</p>
42	As a parent I want to be able to add school uniform to my cart so that I can pay for it.	3	Feature	Done	<p>As a parent, when I navigate to the "Uniforms" page and click on the "Add to Cart" button for a specific uniform, the system should display a confirmation message stating that the uniform has been successfully added to the cart. As a result of successfully adding the uniform to the cart, the system should display the uniform in the cart page to indicate that it has been added successfully. And a new record should be added to the uniform order table with the unique identifier (uID) as the primary key to store the details of the uniform order.</p> <p>As a parent, when I navigate to the "Uniforms" page and click on the "Add to Cart" button for a specific uniform, before adding the uniform to the cart, the system should check the available quantity of that uniform already in the cart. If the quantity is greater than two, the system should display an error message indicating that the uniform cannot be added.</p> <p>As a parent, when I navigate to the "Uniforms" page and click on the "Add to Cart" button for a specific uniform, before adding the uniform to the cart, the system should check the available quantity of that uniform already in the cart. If the quantity in the cart equals the quantity in the stock, the system should display an error message indicating that the uniform cannot be added.</p>
43	As a parent I want to be able to add school trips to my cart so that I can pay for it.	3	Feature	Done	<p>As a parent, when I open the "trips" page and trying to add not passed trip. And click on "add to cart" button. The system should display the trip on the cart page to indicate that I have successfully added a trip. And a new record should be added in the trip order table with the tID as primary key.</p> <p>As a parent, when I open the "trips" page. Trying to add the same trip that I added into my cart and click on "add to cart" button the system should display an error message indicate that this trip has conflict with another registered trip.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a parent, when I open the "trips" page. Trying to add trip that not passed and click on "add to cart" button if the trip has the same date as any trip that my child is already register in the system should display an error message indicate that my child has conflict trip.</p> <p>As a parent, when I open the "trips" page. Trying to add trip that not passed and click on "add to cart" button if the trip has the same date as any trip that in my cart the system should display an error message indicate that my child has conflict trip.</p>
44	As a parent I want to be able to add school clubs to my cart so that I can pay for it.	3	Feature	Done	<p>As a parent, when I open the "clubs" page and trying to add not passed club. And click on "add to cart" button. The system should display the club on the cart page to indicate that I have successfully added a club. And a new record should be added in the club order table with the cID as primary key.</p> <p>As a parent, when I open the "clubs" page. Trying to add the same club that I added into my cart and click on "add to cart" button the system should display an error message indicate that this club has conflict with another registered trip.</p> <p>As a parent, when I open the "clubs" page. Trying to add club that not passed and click on "add to cart" button if the club has the same time and days as any club that my child is already register in the system should display an error message indicate that my child has conflict club.</p> <p>As a parent, when I open the "clubs" page. Trying to add club that not passed and click on "add to cart" button if the club has the same time and days as any club in my cart the system should display an error message indicate that my child has conflict club.</p>
45	As a parent I want to be able to view the school canteen meals so that I can make informed choices for my children.	3	Feature	Done	<p>As a parent, When I open the "canteen" page. The system should display a list of all available meals with their information that are not expired yet in the items table.</p> <p>As a parent, When I open the "canteen" page. If the canteen page is empty, the system should display a message stating that there are currently no meals</p>
46	As a parent I want to be able to pre-order a meal so that my child does not have to wait in the canteen queue.	3	Feature	Done	<p>As a parent, when I open the "canteen" page. And click on "add to cart". The system should display the meal on the cart page to indicate that I have successfully added a uniform. And a new record should be added in the item order dataset with the OID as primary key.</p> <p>As a parent, when I open the "canteen" page. And click on "add to cart". If the item has any Allergens to my child, the add to cart button should be unclickable. and I cannot add this item to my cart.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a parent, when I open the "canteen" page. And click on "add to cart". The system should check the available quantity of that item already in the cart. If the quantity in the cart equals the quantity in the stock, the system should display an error message indicating that the item cannot be added.</p>
47	As a parent I want to be able to view the cart so that I can pay for the items	4	Feature	Done	<p>As a parent, When I open the “cart” page for my specific child. The system should display a list of all items that I already add to my cart from the order table. and an order summary that contains all the cart's item information with the total price.</p> <p>As a parent, When I open the "cart" page. If the cart page is empty, the system should display a message stating that there are currently no items in the cart.</p>
48	As a parent, I want to be able to pay for all the items in the cart so that I can buy all my child's school services.	7	Feature	Done	<p>As a parent, if I access my child's profile page and click on the “cart” button, the system should display a list of all the items that I have added to the cart for my child, along with a summary of the total price and the number of items. I should be able to delete or change the quantity of canteen and uniform items, which are limited to two quantities per item. Once I am ready to pay, I can click on the “Pay” button. Following this, the system should redirect me to a 3D-Secure ACS page, displaying a summary of the payment information (It always assumes the card has enough money), and prompt me to enter the password (<b>12345 for success</b>). Once I submit the password, a confirmation message should appear, indicating that the payment was successful, And the status in the order table in the database should be updated to “paid”.</p> <p><b>To test the payment:</b></p> <p>Transaction Type: Successful Card Number: 4111111111111111</p> <p>Transaction Type: Failed Card Number: 4012888888881881</p> <p>Any two-part name, any not expired date, and a three-digit number such as 111 can be used.</p> <p>As a parent, if I access my child's profile page and click on the “cart” button, the system should display a list of all the items that I have added to the cart for my child, along with a summary of the total price and the number of items. I should be able to delete or change the quantity of canteen and uniform items, which are limited to two quantities per item. Once I am ready to pay, I can click on the “Pay” button. Following this, the system should redirect me to a 3D-Secure ACS page, displaying a summary of the payment information, and prompt me to enter the password (<b>12345 for success</b>). If I want to cancel the transaction and return to my child's cart page, I should click the “cancel” button and I will be redirected to my child's cart page.</p> <p>As a parent, when I open the "cart" page. If the cart page is empty, the system should display a message stating that there</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					are currently no items to pay for and the pay button will be disabled.
49	As a canteen moderator I want to be able to view pre-ordered meals list so that I can give students their orders.	3	Feature	Done	<p>As a canteen moderator, When I open the "pre-order" page. The system should display a list of all available pre-orders for that day.</p> <p>As a canteen moderator, When I open the "pre-order" page. The system should display a list of all available pre-orders for that day. When I click on "view order details". The system should view all the order details with the "confirm" button. When I click the "Confirm" button the system will display a success message indicating that the order has been confirmed.</p> <p>As a canteen moderator, when I open the "pre-order" page. If the pre-order page is empty, the system should display a message stating that no data is available.</p>
50	As a school admin I want to be able to view a list of uniforms order so that I can manage the student's orders.	3	Feature	Done	<p>As a school admin, when I navigate to the "Uniform" page and click on the "View Orders" button, the system should display a list of all available uniform orders from the uniform order table.</p> <p>As a school admin, when I navigate to the "Uniform" page and click on the "View Orders" button, the system should display a list of all available uniform orders from the uniform order table. When I click on the "Details" button for a specific order, the system should display the order details, and to confirm that the order has been received by the student, click on the "Confirm" button. Upon confirmation, the system should delete the record from the uniform order dataset.</p> <p>As a school admin, when I navigate to the "Uniform" page and click on the "View Orders" button, If there are no uniform orders available, the system should display a message stating that there are currently no uniform orders. This message should be displayed when I open the "View Orders" page.</p>
51	As a canteen moderator I want to be able to capture student face to pay so that I can manage canteen sales.	7	Feature	Done	As a canteen moderator, I should be able to view a list of students with their information when I log in to my account using my credentials. To select a student, I can either search for their name/ID in the search bar or capture their face for face recognition to enter the sales page. To capture a student's face, I can click on the "Scan student face" button, and a window will appear with the camera open. If I want to capture the face, I should click on "Capture photo." If the photo is captured and I want to retake it, I should click on "Retake." Otherwise, I can click on "continue" to begin the identification/recognition process. Once the recognition process is complete, the sales page will open, displaying the student's wallet information, and the items that the child is allergic to will be disabled. After the transaction is completed, the system automatically deducts the payment



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>amount from the student's virtual wallet and record the transaction in the database.</p> <p>As a canteen moderator, to select a student, I can either search for their name/ID in the search bar or capture their face for face recognition to enter the sales page. To capture a student's face, I can click on the "Scan student face" button, and a window will appear with the camera open. If I want to capture the face, I should click on "Capture photo." If the photo is captured and I want to retake it, I should click on "Retake." Otherwise, I can continue to begin the identification/recognition process. If the face has not been recognized an error message will appear indicating that the face was not recognized, and I can search by name/ID.</p> <p>As a canteen moderator, to view the pre-orders made by students, I need to access the "pre-orders" page. The system will present me with a list of all the pre-order meals, from which I can select one to view its details. Alternatively, I can search for students by name or ID, and the system will also provide me with the option to scan a student's face using the "scan student face" button located in the upper right corner of the screen. Clicking on the button will open a window with the camera activated, and if I wish to capture the face, I must click on "Capture photo." In case the photo needs to be retaken, I can click on "Retake," or proceed by clicking on "continue" to initiate the identification/recognition process. Once the recognition process is complete, the system will display the pre-ordered meal of the recognized student in the table.</p> <p>As a canteen moderator, to view the pre-orders made by students, I need to access the "pre-orders" page. The system will present me with a list of all the pre-order meals, from which I can select one to view its details. Alternatively, I can search for students by name or ID, and the system will also provide me with the option to scan a student's face using the "scan student face" button located in the upper right corner of the screen. Clicking on the button will open a window with the camera activated, and if I wish to capture the face, I must click on "Capture photo." In case the photo needs to be retaken, I can click on "Retake," or proceed by clicking on "continue" to initiate the identification/recognition process. If the face has not been recognized an error message will appear indicating that the face was not recognized, and I can search by name/ID.</p>
52	As a canteen moderator I want to be able to search for a specific student so that I can see his pre-	5	Feature	Done	<p>As a canteen moderator, when I try to search and enter the order number in the search bar field, the system should display the specified order.</p> <p>As a canteen moderator, when I try to search and enter the student's name in the search bar field, the system should display all the student orders.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
	ordered meal.				
53	As a school admin I want to be able to view the club registered students list so that I can see all students on a certain club.	3	Feature	Done	<p>As a school admin, When I open the “club” page. And click on club details. The system should display the club details and a list of all registered student in that club from the club order table.</p> <p>As a school admin, When I open the “club” page. And click on club details. The system should display the club details and If there is no registered student in that club, the system should display a message stating that there are currently no registered student in this club.</p>
54	As a school admin I want to be able to view the trip registered students list so that I can see all the students on a certain trip.	3	Feature	Done	<p>As a school admin, When I open the “trip” page. And click on trip details. The system should display the trip details and a list of all registered student in that trip from the trip order dataset.</p> <p>As a school admin, When I open the “trip” page. And click on trip details. The system should display the club details and If there is no registered student in that club, the system should display a message stating that there are currently no registered student in this trip.</p>
55	As a school admin, I want to be able to view the school’s total annual income dashboard so that I can stay up to date on the school’s finances.	7	Feature	Done	<p>As a school admin, When I open the “dashboard” page. The system should display the updated school’s total annual income dashboard with the new information available in the database.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on “All” a dropdown menu should appear, and I can filter out the dashboard by category.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the school’s total annual income dashboard with the new information available in the database. When I click on the year a dropdown menu of available year data should appear, and I can filter out the dashboard by years.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I hover over a month on the dashboard, I should be able to view the annual income of that month.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on the zoom icon the dashboard should zoom in.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on the zoom-in icon the dashboard should zoom in.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on the zoom-out icon the dashboard should zoom out.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on the hand icon, I should be able to move the dashboard left and right.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on the hand icon, I should be able to move the dashboard left and right.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. When I click on the home icon, the dashboard settings should be reset.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school d school’s total annual income dashboard with the new information available in the database. When I click on the hamburger icon, the system should display a drop-down list with different downloading options to download the dashboard data.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school’s total annual income dashboard with the new information available in the database. If the school has no data yet all months will set to be 0 income.</p>
56	As a school admin, I want to be able to search for students by name, ID, or Grade so that I can find students more efficiently.	5	Feature	Done	<p>As a school admin, when I try to search for a student and fill the search bar with the student’s name. The student record should be displayed in the result area of the table by the system.</p> <p>As a school admin, when I try to search for students by grade and fill the search bar with the specific grade. The students of that grade should be displayed in the result area of the table by the system.</p> <p>As a school admin, when I try to search for a student and fill the search bar with the student’s ID. The student record should be displayed in the result area of the table by the system.</p>
57	As a parent I want to be able to edit my profile information	4	Feature	Done	As a parent, when I need to edit my profile. The system displays a pre-filled form. When entering all the required new information and click edit. The system should indicate that I have successfully edited my profile. Then redirect me to the parent home page. And the parent record should be



ID	PBI	Size	Type	Status	Acceptance Criteria
	so that I can update my information				<p>updated with the new information and saved in the parent dataset.</p> <p>As a parent, when I need to edit my profile. And fail to fill in the required information. The system should display an error message that indicates which field to fill.</p> <p>As a parent, when I need to edit my profile. And fill in the first name field with numbers. The system should display an error message indicating that the accepted entry are Only letters. no less than 5 and no more than 30 characters..</p> <p>As a parent, when I need to edit my profile. And fill in the first name field with character less than 5 or more than 30. The system should display an error message indicating that the accepted entry at least 3 characters and no more than 30 characters.</p> <p>As a parent, when I need to edit my profile. And fill in the last name field with numbers. The system should display an error message indicating that the accepted entry are Only letters. no less than 5 and no more than 30 characters..</p> <p>As a parent, when I need to edit my profile. And fill in the last name field with character less than 5 or more than 30. The system should display an error message indicating that the accepted entry at least 3 characters and no more than 30 characters.</p> <p>As a parent, when I need to edit my profile. And fill the National field with format that does not start with 4 letters and 4 numbers after. The system should display an error message indicating that the accepted entry starts with 4 letters then 4 numbers.</p> <p>As a parent, when I need to edit my profile. And fill the email field with wrong format. The system should display an error message indicating that the email format is not accepted.</p> <p>As a parent, when I need to edit my profile. And fill in the phone number field with letters or less than ten-character numbers or starting with other than 05 or 011. The system should display an error message indicating that the only accepted entry is ten numbers starting with 05 or 011.</p> <p>As a parent, when I need to edit my profile. And try to fil the National id field. The system should make the field grey and disabled and cannot fill it .(As we ask many parents Disabling the National ID field when a parent edits their profile ensures the protection of sensitive information, as it prevents accidental or unauthorized changes to the National ID number, which is often used for identification and verification purposes.)</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a parent, when I need to edit my profile. And fill the email field with the same email as other parent have the system should display an error message indicating that this email is already taken.</p> <p>As a parent, when I need to edit my profile and fill the password field with characters that do not include at least one number, one uppercase letter, one lowercase letter, and are less than 8 characters long, the system should display an error message indicating that this field must contain at least one number, one uppercase letter, one lowercase letter, and be at least 8 characters long.</p> <p>As a parent, when I need to edit my profile and fill the 'confirm password' field with a password that does not match the one I have already written in the password field, the system should display an error message indicating that the passwords do not match.</p>
58	As a school admin I want to be able to edit my profile information so that I can update my information	4	Feature	Done	<p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. The system should display a pre-filled form. When entering all the required new information and click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "Ok" the system should indicate that I have successfully updated the school information. Then keep me on the same page. And the school information should be updated in the form and the database.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. The system should display a pre-filled form. When entering all the required new information and click on "submit". The system should show a confirmation message with two options (Cancel) or (Ok). and when I click on "cancel" the system should keep me on the same page without updating the school information.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. And fails to fill in the required information. And click on "submit". The system should display an error message that indicates which field to fill. And keep me on the same page and I can continue filling out the form.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. And upload an image of my school logo the system must approve it. However, if I do not upload the logo, the default image will be used instead.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. And fill in the school's name field with characters that are less than 5 and more than 30 characters. The system should display an error message indicating that the accepted entry is only</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>letters (either case), numbers, and underscore. No less than 5 and no more than 30 characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and fill the school's pin field with less than 5 characters and more than 20. The system should display an error message indicating that the accepted entry is only letters (either case), numbers, and underscore. No less than 5 and no more than 20 characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and fill the school's pin field with an existing school pin. The system should display an error message indicating the school pin is already taken and ask me to choose another pin.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and fill the school's password field with less than 8 characters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letter. And at least 8 or more characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and try to change the school's password field then confirm password field will be required too.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and fill the school's confirm password field with less than 8 characters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, and one lowercase letters. And at least 8 or more characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and the password and confirm password fields do not match. The system should display an error message indicating that the school passwords do not match.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. And fill in the school mobile number filed with letters or less than 10 numbers or with a number not starting with 05 or 011. The system should display an error message indicating that the only accepted entry is 10 numbers, start with either 05 or 011and if it is a telephone number include your region code.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. And fill in the school national address filed with more\less that 4 letters first then 4 numbers. The system should display an error message indicating that the only accepted entry is 8 characters and only 4 letters first then 4 numbers.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. And fill the email field with wrong format. The system should display an error message indicating that the email format is not accepted it must contain <a href="mailto:characters@domain.xyz">characters@domain.xyz</a>.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and fill the school's email field with an existing school email. The system should display an error message indicating the email is already taken and ask me to choose another email.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. I will not be able to change the school level.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. I will not be able to modify sections in which students registered and an appropriate message will display.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and edit the canteen pin. Then, fill the canteen pin field with less than 5 characters and more than 15. The system should display an error message indicating that the accepted entry is only letters, numbers, and underscore, no less than 5 and no more than 15 characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and edit the canteen account. Then, fill the canteen's pin field with an existing canteen pin. The system should display an error message indicating the canteen pin is already taken and ask me to choose another pin.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and edit the canteen account. Then, fill the canteen's password field with less than 8 characters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and edit the canteen account. Then, fill the canteen's confirm password field with less than 8 characters. The system should display an error message indicating that the accepted entry is at least one number, one uppercase, one lowercase letters. And at least 8 or more characters.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. and try to change the canteen's password field then confirm password field will be required too.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on “Cancel” I the system should keep me on the same page, and I can continue filling out the form.</p> <p>As a school admin, when I try to edit the school information. And click on (Edit School Information) button. Enter all the required information. And click on the "Cancel button ". The system should display a confirmation message with two options (Ok) and (Cancel) if I click on “Ok” the system should redirect me to the dashboard page.</p>
59	As a parent I want to be able to see the latest payment history so that I can keep track of my child's purchases.	5	Feature	Done	<p>As a parent, When I open the “latest activity” page. Then the system should display to me a list of all my child’s recent activities. When I click on “All” a filtering dropdown list should appear to allow me to filter the list by the type of activity (Deposit, Withdrawal, refunded) when choosing one of the options the list should be filtered.</p>
60	As a canteen moderator, I want to be able to manage canteen sales so that I can sell items to the students.	4	Feature	Done	<p>As canteen moderator, when I open “Select student page”, when I don't select a student and click on “Shop” tab the system should display an error message indicating that I should select a student to start the selling process.</p> <p>As canteen moderator, when I open “Select student page”, I will not be able to select a student that has not available wallet amount.</p> <p>As canteen moderator, when I open “Select student page”, if I select a student that has an available wallet amount and clicks on the “Shop” tab the system should redirect me to the sales page to start the selling process.</p> <p>On the “canteen sales” page (shop) tab, a list of available (not expired) canteen items should display to the moderator. And the moderator can add the items to the cart. If the moderator adds items and the total price of the items is more than the remaining daily limit. An error message will display to the user indicating that the quantity you are trying to add is more than the student’s remaining daily limit.</p> <p>On the “canteen sales” page (shop) tab, a list of available (not expired) canteen items should display to the moderator. And the moderator can add the items to the cart. If the moderator adds items less or equal to the remaining daily limit. A success message will display to the user indicating that the item has been added successfully.</p> <p>On the “canteen checkout” page (checkout) tab, if there are no items in the cart a message will display to the user indicating that the cart is empty.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart will display all added items if there are any out-of-stock or expired items. A message will display to the user indicating that the item is out-of-stock or exceeds the available stock.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart would display all added items if I tried to modify the amount of an item and the total price of the item quantity exceeds the student’s remaining daily remaining limit. An error message will display to the user indicating that the total price of the item quantity you are trying to modify is more than the student’s remaining daily limit.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart would display all added items if I tried to modify the amount of an item to an amount that exceeds the available stock an error message will display indicating that it exceeds the available stock.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart will display all added items if I click on the “trash” icon the item will be deleted from the cart. And a success message will display indicating that the item has been deleted successfully.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart will display all added items if the subtotal exceeds the students’ remaining daily limit. and I click on the “Confirm” button. A confirmation message will display with two options “Ok” and “Cancel”. If I click on the “Ok” button an error message will display indicating that the subtotal is more than the student’s remaining daily limit.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart will display to the user with all added items. If there are any out-of-stock items. and I click on the “Confirm” button. A confirmation message will display with two options “Ok” and “Cancel”. If I click on the “Ok” button an error message will display indicating that there are out-of-stock items in the cart.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart will display to the user with all added items. If there are any items amount that exceeds the available stock. and I click on the “Confirm” button. A confirmation message will display with two options “Ok” and “Cancel”. If I click on the “Ok” button an error message will display indicating that there are items exceeding the available stock.</p> <p>On the “canteen checkout” page (checkout) tab and there are items in the cart. A shopping cart will display to the user with all added items. If the total in the cart is less or equal to the remaining daily limit and there are no out-of-stock items</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>or items that exceed the available stock. and I click on the "Confirm" button. A confirmation message will display with two options "Ok" and "Cancel". If I click on the "Ok" button a success message will display indicating that the order has been confirmed. a new record will be added to the Orders table on the dataset.</p> <p>On the "canteen checkout" page (checkout) tab and there are items in the cart. A shopping cart will display to the user with all added items. If the total in the cart is less or equal to the remaining daily limit and there are no out-of-stock items or items that exceed the available stock. and I click on the "Confirm" button. A confirmation message will display with two options "Ok" and "Cancel". If I click on the "cancel" button. The system should keep me on the same page without confirming the order.</p> <p>On the "canteen checkout" page (checkout) tab and there are no items in the cart. I will not be able to click on the "Confirm" button.</p>
61	As a parent I want to be able to set a limit for my child's canteen purchases so that I prevent my child from overspending in the canteen.	5	Feature	Done	<p>As a parent, if I access my child's profile page, I should be able to see a section labeled "daily withdrawal limit". In this section, I should have the ability to either increase or decrease the limit amount by clicking on the "+" or "-" buttons. Alternatively, I can also manually enter the desired amount and then click on the "update" button. Once the limit amount is updated, the system should display a confirmation message in the top right corner of the screen. The amount should also be reflected in the limit column of the student table in the database.</p> <p>As a parent, if I access my child's profile page, I should be able to see a section labeled "daily withdrawal limit". In this section, I should have the ability to either increase or decrease the limit amount by clicking on the "+" or "-" buttons. Alternatively, I can also manually enter the desired amount and then click on the "update" button. However, if I mistakenly enter a negative number or a number that exceeds 100, the system should prevent me from submitting it. Instead, the system should restrict the amount to a maximum of 100 (Some parents indicated a preference for a maximum daily limit of more than 80 but not exceeding 100 when asked) or a minimum of 1 and prompt me to enter a valid amount before updating.</p>
62	As a school admin I want to be able to set a limit for student's wallets so that parents can deposit a reasonable amount.	5	Feature	Done	<p>As a school admin when I set maximum limit on a student's wallet balance and click on confirm button, if I write a number that smaller than 1 or make the field empty the system should display an error message indicate that the field should be in the desire range.</p> <p>As a school admin when I set maximum limit on a student's wallet balance and click on confirm button. The system should reject any decimal number or maximum entry that is greater than 2000 or smaller than 50 (As we ask a lot of parents and schools, rejecting any maximum entry that is</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>greater than 2000 or smaller than 50 ensures that the maximum limit is reasonable and appropriate, and that students do not carry an excessive amount of money in their wallet. This helps to promote responsible spending habits and ensures the safety of the students.)</p> <p>As school admin when I set maximum limit on student's wallet balance. If I enter any character that is not a number, the system should reject it.</p> <p>As a school admin when I set a maximum limit on a student's wallet balance with all conditions are right and click on confirm button. The system should display a message indicate that the maximum limit is update it successfully.</p> <p>As a school admin when I set a maximum limit on a student's wallet balance for the first time the default limit should be 1000 SR.</p>
63	As a parent, I want to be able to upload a photo of my child to their profile so that they can use facial recognition payment in the canteen.	7	Feature	Done	<p>As a parent, if I log into my profile with my credentials, I should be able to view a list of all my children. If I haven't uploaded a photo of any of my children before, the "view profile" button for that child will be disabled until I upload a photo (because Masroofi uses students' photo as an identity for canteen purchases). If I wish to upload a photo for any of my children, I should click on the three dots located in the top right corner of their profile. A window will appear with instructions on uploading the photo. The photo should be formal, less than 2MB in size, and only accept files with image extensions. When I upload a new photo and click on "save changes." If the system detects a face in the photo, it will accept it, and the photo will be saved and updated. And the "view profile" button will be enabled.</p> <p>As a parent, if I log into my profile with my credentials, I should be able to view a list of all my children. If I wish to delete a photo for any of my children, I should click on the three dots located in the top right corner of their profile. A window will appear I should click on the trash button, and the default photo will then be displayed. And the "view profile" button will be disabled.</p> <p>As a parent, if I log into my profile with my credentials, I should be able to view a list of all my children. If I haven't uploaded a photo of any of my children before, the "view profile" button for that child will be disabled until I upload a photo (because Masroofi uses students' photo as an identity for canteen purchases). If I wish to upload a photo for any of my children, I should click on the three dots located in the top right corner of their profile. A window will appear with instructions on uploading the photo. The photo should be formal, less than 2MB in size, and only accept files with image extensions. When I upload a new photo and click on "save changes." If the system detects more than one face in the photo, the system should display an error message.</p> <p>As a parent, if I log into my profile with my credentials, I should be able to view a list of all my children. If I haven't uploaded a photo of any of my children before, the "view</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
					<p>profile" button for that child will be disabled until I upload a photo (because Masroofi uses students' photo as an identity for canteen purchases). If I wish to upload a photo for any of my children, I should click on the three dots located in the top right corner of their profile. A window will appear with instructions on uploading the photo. The photo should be formal, less than 2MB in size, and only accept files with image extensions. When I upload a new photo and click on "save changes." If the system did not detect a face in the photo, the system should display an error message.</p>
64	As a parent, I want to be able to manage all my children's profiles even if they are in different schools so that I stay updated with their school activities without the need to log in to multiple accounts.	3	Feature	Done	<p>As a parent, if I log into my profile with my credentials, I should be able to view a list of all my children even if they attended different schools, but their school must use Masroofi service.</p> <p>As a parent, if I log into my profile using my credentials and the school has deleted my children, the system will display a message indicating that there are no children.</p> <p>As a parent, if I log into my profile using my credentials and my children have already graduated from the school, the system will display a message indicating that there are no children associated with my account.</p>
65	As a parent, I want to be able to view all my child's uniform and canteen pre-orders so that I can keep track of their orders.	4	Feature	Done	<p>As a parent, When I open the “latest activity” page. . Then the system should display to me a list of all my child’s recent activities. When I click on the “Orders” tab a table of all the parent orders to his child should appear. When I click on the “View Order details” button. All the order details will be viewed to the parent.</p> <p>As a parent, When I open the “latest activity” page. Then the system should display to me a list of all my child’s recent activities. When I click on the “Orders” tab a table of all the parent orders to his child should appear. When I click on the “View Order Details” button. All the order details will be viewed to the parent. When I click on the “Close” button the system should redirect me to the latest activity page.</p>
66	As a school admin, I want to be able to view the school financial situation dashboard so that I can stay up to date on the	7	Feature	Done	<p>As a school admin, When I open the “dashboard” page. The system should display the updated school financial situation dashboard with the new information available in the database.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school financial situation dashboard with the new information available in the database. When I click on the date a drop-down of many date filtering options should appear to the user and the user can choose one of them or customize the range as he wants.</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
	school's finances.				<p>As a school admin, When I open the “dashboard” page. The system displays the updated school financial situation dashboard with the new information available in the database. When I hover over one of the categories, the system should display the total income of that category in the specified date range. click on the zoom-out icon the dashboard should zoom out.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school financial situation dashboard with the new information available in the database. When I click on the hamburger icon, the system should display a drop-down list with different downloading options to download the dashboard data.</p> <p>As a school admin, When I open the “dashboard” page. The system displays the updated school financial situation dashboard with the new information available in the database. If the school has no data yet all categories will set to be 0 total income.</p>
67	As a parent I want to be able to cancel uniform orders so that I can ensure that my child is not stuck with an order for a uniform that they no longer need.	5	Feature	Done	<p>As a parent, When I open the “latest activity” page for my specific child. The system should display a list of all uniforms orders that I already ordered and next to each order a cancel button, the system should make the cancel button clickable only if the status for the order is not refunded.</p> <p>As a parent, When I open the “latest activity” page for my specific child. The system should display a list of all uniforms orders that I already ordered and next to each order a cancel button, if I click on cancel the system should display a confirmation message with two options "OK" , "cancel" if I click on OK the system should display a confirmation button with a successful message indicate that the order has been cancel successfully and the money should be refunded on my child virtual wallet and the status of the order should be change to refunded and the cancel button disabled .</p> <p>As a parent, when I open the “latest activity” page for my specific child. The system should display a list of all uniforms orders that I already ordered and next to each order a cancel button, if I click on cancel the system should display a confirmation message with two options "OK", "cancel" if I click on cancel the system should direct me to the latest activity page and nothing happen to this order.</p>
68	As a parent I want to be able to cancel canteen orders so that I can ensure that my child is not stuck with an order for a canteen item that	5	Feature	Done	<p>As a parent, when I open the “latest activity” page for my specific child. The system should display a list of all canteen orders that I already ordered and next to each order a cancel button, the system should make the cancel button clickable only if the status for the order is not refunded.</p> <p>As a parent, when I open the “latest activity” page for my specific child. The system should display a list of all canteen orders that I already ordered and next to each order a cancel button, if I click on cancel the system should display a confirmation message with two options "OK" , "cancel" if I click on OK the system should display a confirmation button with a successful message indicate that the order has been</p>



ID	PBI	Size	Type	Status	Acceptance Criteria
	they no longer need.				<p>cancel successfully and the money should be refunded on my child virtual wallet and the status of the order should be change to refunded and the cancel button disabled .</p> <p>As a parent, when I open the “latest activity” page for my specific child. The system should display a list of all canteen orders that I already ordered and next to each order a cancel button, if I click on cancel the system should display a confirmation message with two options "OK", "cancel" if I click on cancel the system should direct me to the latest activity page and nothing happen to this order.</p>

**Table 7 Product Backlog**



## 4.3 System Design

### 4.3.1 Architectural Diagram

Our system is a web-based application that enables many users to request and receive services from a centralized server. Also, storing the website's data in a shared database will allow it to be accessed by multiple clients from a variety of locations. Accordingly, we determined that Client Server Architecture would be the most appropriate architectural pattern. Where a client computer provides an interface through which users can request services from the server and view the results returned by the server.

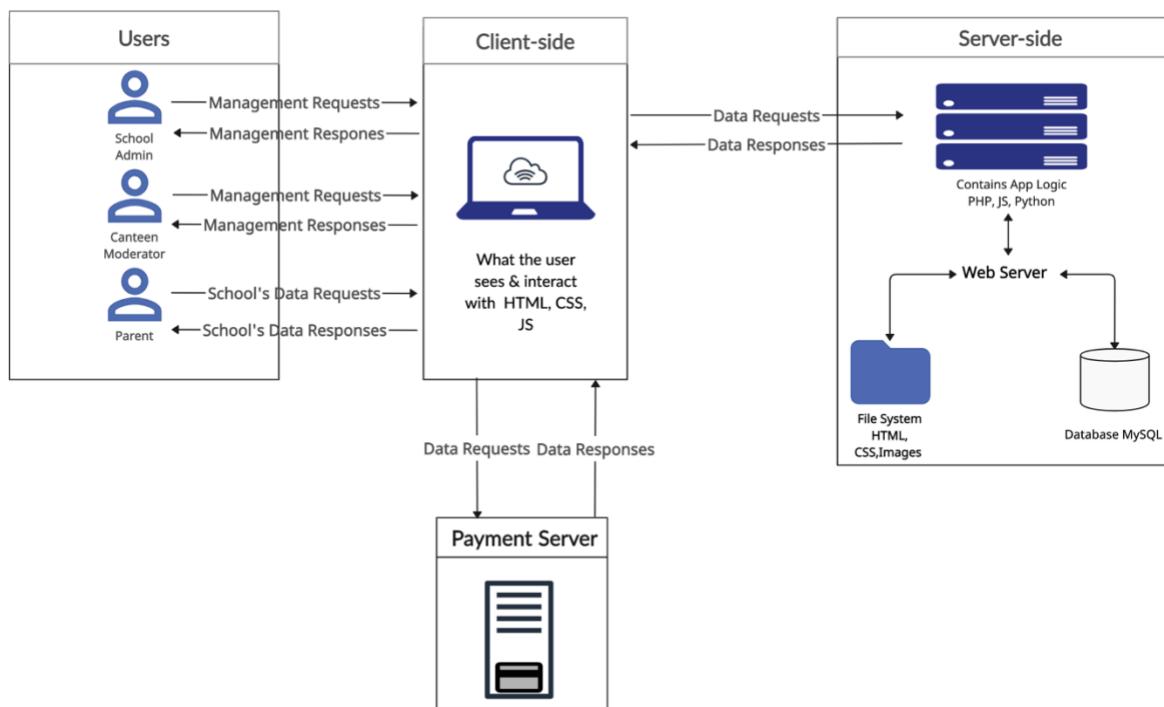


Figure 8 Architectural Design

As shown in Figure 8, the major components of the model are:

- Several clients who can use services provided by servers, such as school admins, parents, and canteen moderator.
- Several servers offer services to clients, for example: third-party payment server and Masroofi server.
- The network that enables clients to access these services.
- The architecture enables clients to access the website over a network, and it accepts and responds to multiple requests from multiple clients and servers simultaneously.



- The client side contains the front-end part that holds the website interfaces that allows clients to interact directly with the website.
- The server side holds the backend servers on which the clients' requests are communicated with Masroofi's database and the third-party payment server.

Due to the following reasons, we couldn't use the other architecture design patterns for our website:

- **MVC Architecture:** It is used when there are multiple ways to view and interact with the data. Also, it requires additional code and data complexity when the data model and interaction are simple. Due to our website's simplicity, MVC architecture is not suitable since we do not need multiple views.
- **Layered Architecture:** Most often, it is used in situations where performance is not a major concern. In our system, performance is a high priority and layered architecture may cause it to be decreased.
- **Repository Architecture:** It is used when a large amount of data needs to be shared and when the components can be independent. Repository architecture is not suitable for our website because our website components are dependent and need to interact with each other. Also, Repository architecture is a single point of failure so problems in the repository affects the whole system.
- **Pipe and Filter Architecture:** It is used for non-interactive systems; it processes the input in separate stages to generate an output. We need an interactive system for our website, so the pipe and filter architecture is not appropriate.



### 4.3.2 Class Diagram /DFD

Class diagram is a type of static structure diagram, Figure 9 bellow describes the structure of our system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

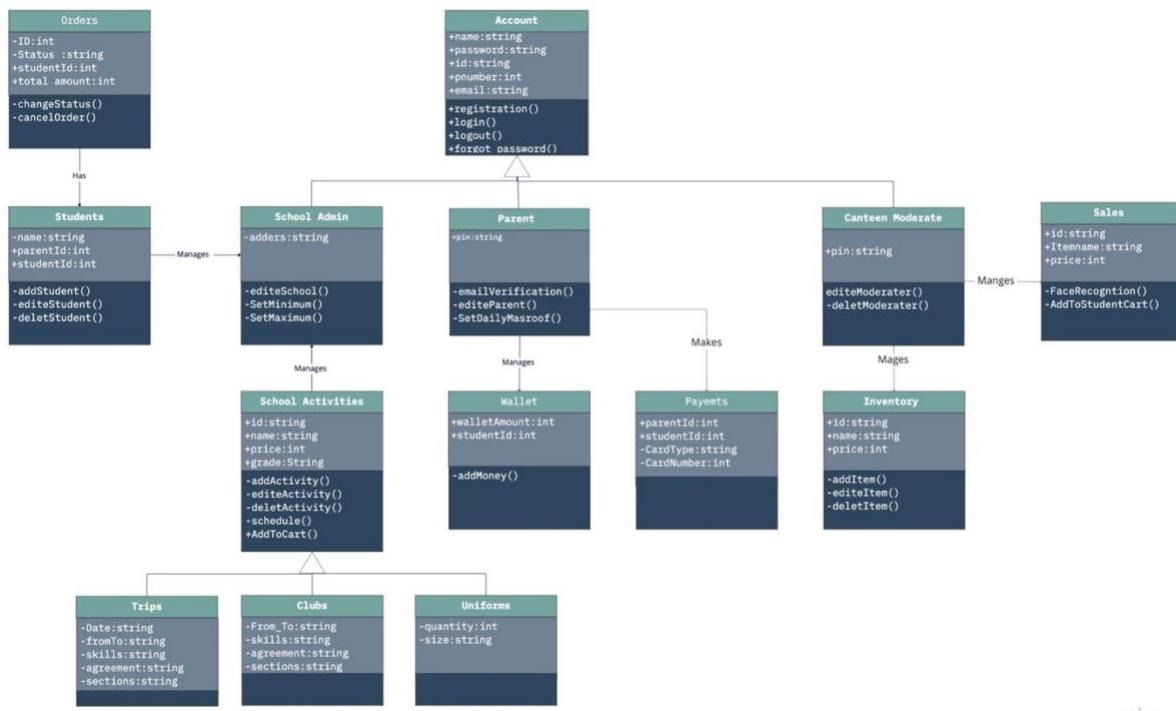


Figure 9 Class Diagram



### 4.3.3 Component Level Design

- **Order status for canteen and uniform**

Figure 10 shows a flowchart of the canteen and uniform orders status.

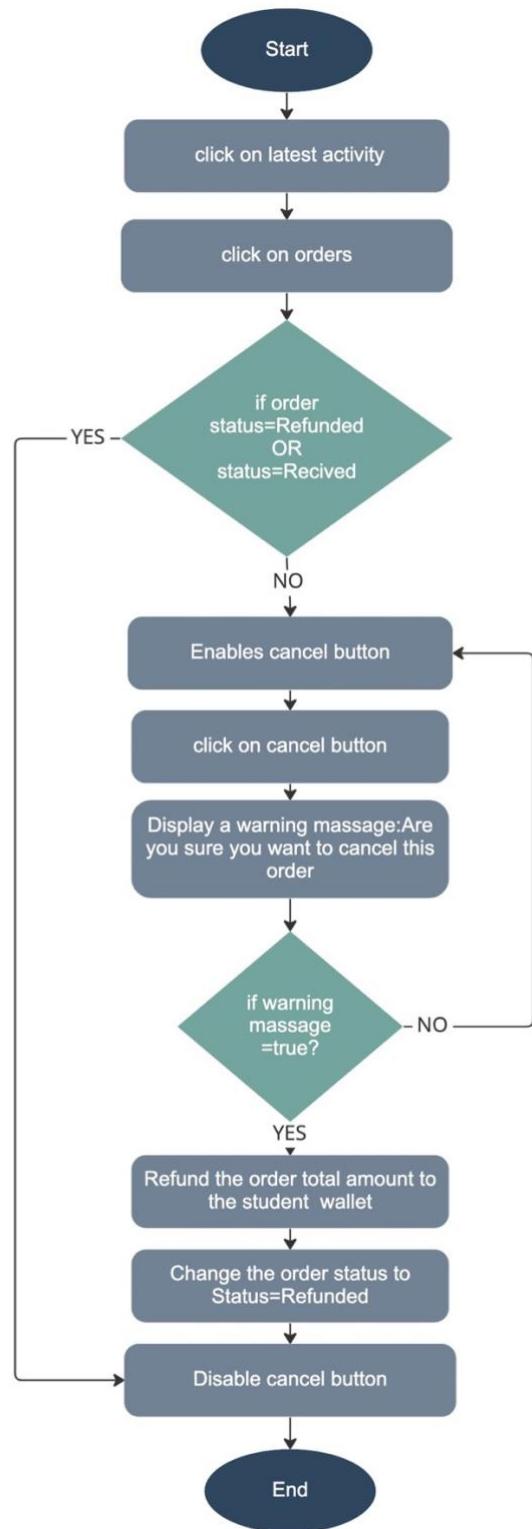


Figure 10 Order status for canteen and uniform



- **Canteen face recognition**

Figure 11 shows a flowchart of the canteen student face recognition process.

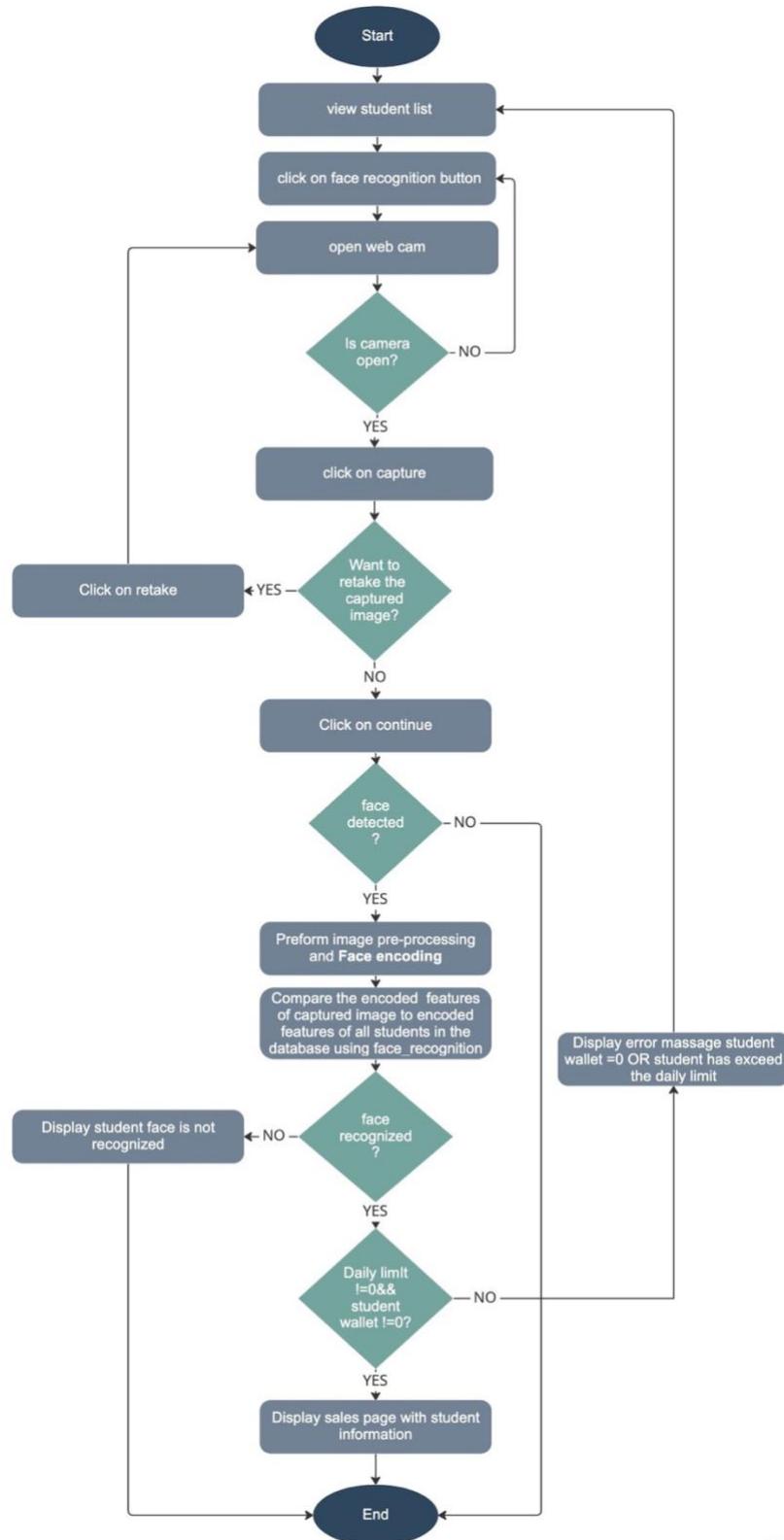


Figure 11 Canteen Face Recognition



- **Upload student photo**

Figure 12 shows a flowchart of when a parent uploads a photo of his child.

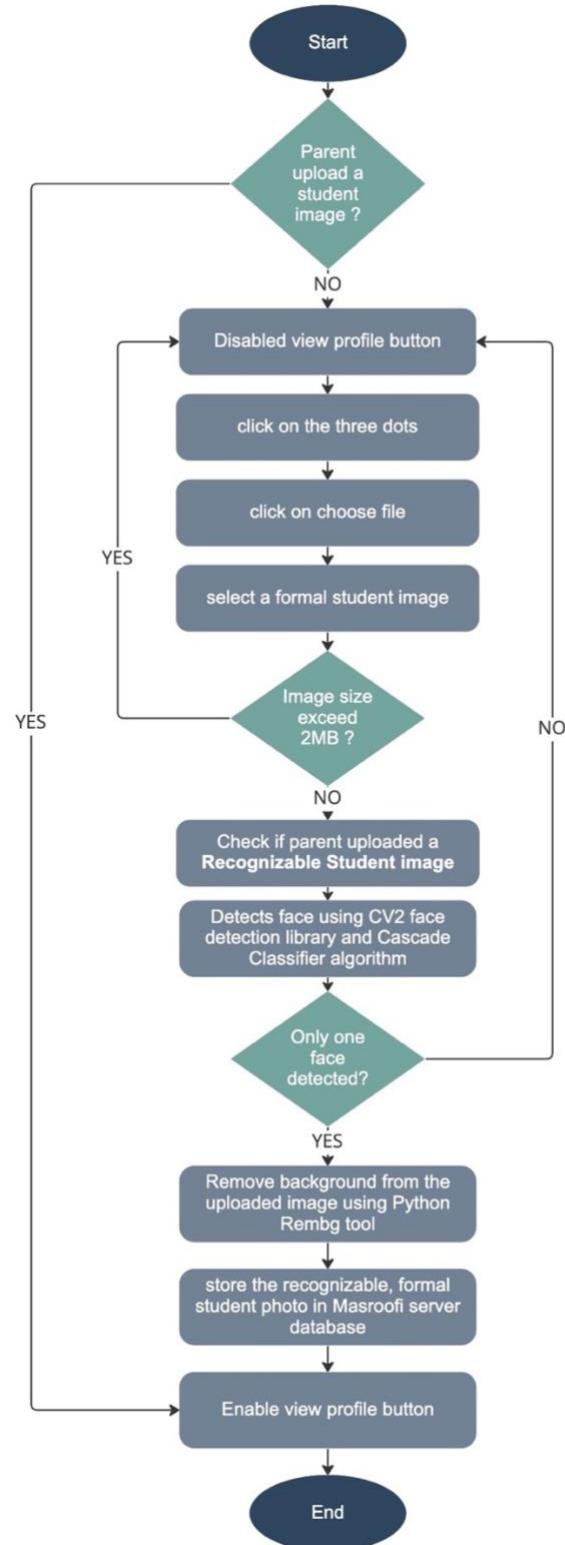


Figure 12 Upload Student Photo



- **Add items to student cart**

**Classification:** Function

**Definition:** The parent will be able to add items to his child cart

**Pre-condition:** The parent is logged in and choose a child to make the order

**Post-condition:** The items is added in the child cart

1.BEGIN

2.DISPLAY all the parent children even if they are in different schools

3.SELECT a child to make the order

4.READ the child ID

5.DISPLAY the child home page

6.SELECT a category

7.IF category == clubs THEN

8.DISPLAY all the clubs available for the child

9.SELECT one of the clubs and click on view to see the club information

10.IF club already added in the cart THEN

11.Display error message: the cub is already added in the cart

12.ELSEIF the parent did not agree to the agreements OR the student is already registered OR the club is added in the cart THEN

13.Disable add to cart button

14.ELSE enable add to cart button

15.IF parent click on add to cart THEN

16.IF the added club have any conflicts with other clubs student is registered in OR clubs in the cart

17.Display error message that the club can not be added because of the conflicts

18.ELSE club is added to the cart

19.IF category == Uniform



20.DISPLAY all the uniforms available for the child and their quantity !=0

21. IF parent select a uniform and size and click on add to cart THEN

22. IF uniform is already in cart with quantity <2 THEN

23. INCREMENT uniform's quantity in cart by 1

24.ELSEIF uniform is already in cart with quantity ==2 THEN

25. Display error message that the quantity in the cart exceed the allowed quantity

26.ELSE ADD item to cart with a quantity of 1

27. IF category == CANTEEN

28.DISPLAY all the items available for the child and their quantity !=0

29. IF student have allergies of one of the item THEN

30. Change the button to allergies and disable it

31. ELSEIF parent select an item and click on add to cart THEN

32. IF item is already in cart with quantity < 2 THEN

33. INCREMENT item's quantity in cart by 1

34.ELSEIF item is already in cart with quantity ==2 THEN

35. Display error message that the quantity in the cart exceed the allowed quantity

36.ELSE ADD item to cart with a quantity of 1

37. IF category == Trip THEN

38.DISPLAY all the trips available for the child

39. SELECT one of the trips and click on view to see the trip information

40. IF trip already is added in the cart THEN

41. Display error message: the trip is already added in the cart

42.ELSEIF the parent did not agree to the agreements OR student is already registered THEN

43. Disable add to cart button



44.ELSE enable add to cart button

45.IF parent click on add to cart THEN

46.IF the added trip have any conflicts with other trips student is registered in  
OR conflicts with the trips in the cart

47.Display error message that the trip can not be added because of the  
conflicts

48.ELSE trip is added to the cart

END IF

END IF

ENF IF

END IF

END IF

ENF ELSEIF

END ELS

END IF

END IF

END ESLE IF

ENF IF

ENF ELSEIF

ENF ELS

ENF IF

END IF

END IF

ENF IF

END



- **Canteen pre-order**

**Classification:** Function

**Definition:** The canteen moderator will approve the order, or the order will be canceled

**Pre-condition:** The canteen moderator is logged in

**Post-condition:** The order status change to Received Or refunded

- 1.BEGIN
- 2.Display all the students pre-order list
- 3.IF order\_date== today\_date AND current\_time >=15:00:00 AND order\_time < 09:00:00  
AND order\_status == Awaiting
  - 4.SET order\_status to Refunded AND add the order total amount to the student wallet
- 5.ELSEIF order\_date== today\_date AND current\_time >=15:00:00 AND order\_time >= 09:00:00 AND order\_status == Awaiting
  - 6.SET order\_status to Refunded AND add the order total amount to the student wallet
- 7.ELSEIF order\_date== today\_date AND current\_time >=15:00:00 AND order\_time >= 09:00:00 AND order\_status == Awaiting
  - 8.SET order\_status to Refunded AND add the order total amount to the student wallet
- 9.ELSE order\_date== yesterday\_date AND order\_status == Awaiting THEN
  10. Display all the students pre-order list
  - 11.Select a student from the list OR search using face\_recognition
  - 12.Display the order details and student information
  - 13.Select confirm
  - 14.IF conformation message== True THEN
    - 15.SET order\_status to Received AND Decrement products quantity in stock
  - 16.ELSE
    - 17.Disply all the students pre orders
- END IF
- END ELSEIF
- ENF ELSEIF



ENF ELSE

END IF

END ELSE

END

## 4.4 Data Design

### 4.4.1 Data Models

Masroofi is a web-based application that is associated with a MySQL database, which is one of the most popular databases for PHP applications [22]. Tables are used to store related data. The Entity Relationship Diagram (ERD) bellow in Figure 13 shows the relationships between entities, the primary key of each entity, and the relations described in the relational schema.

- **ER diagram**

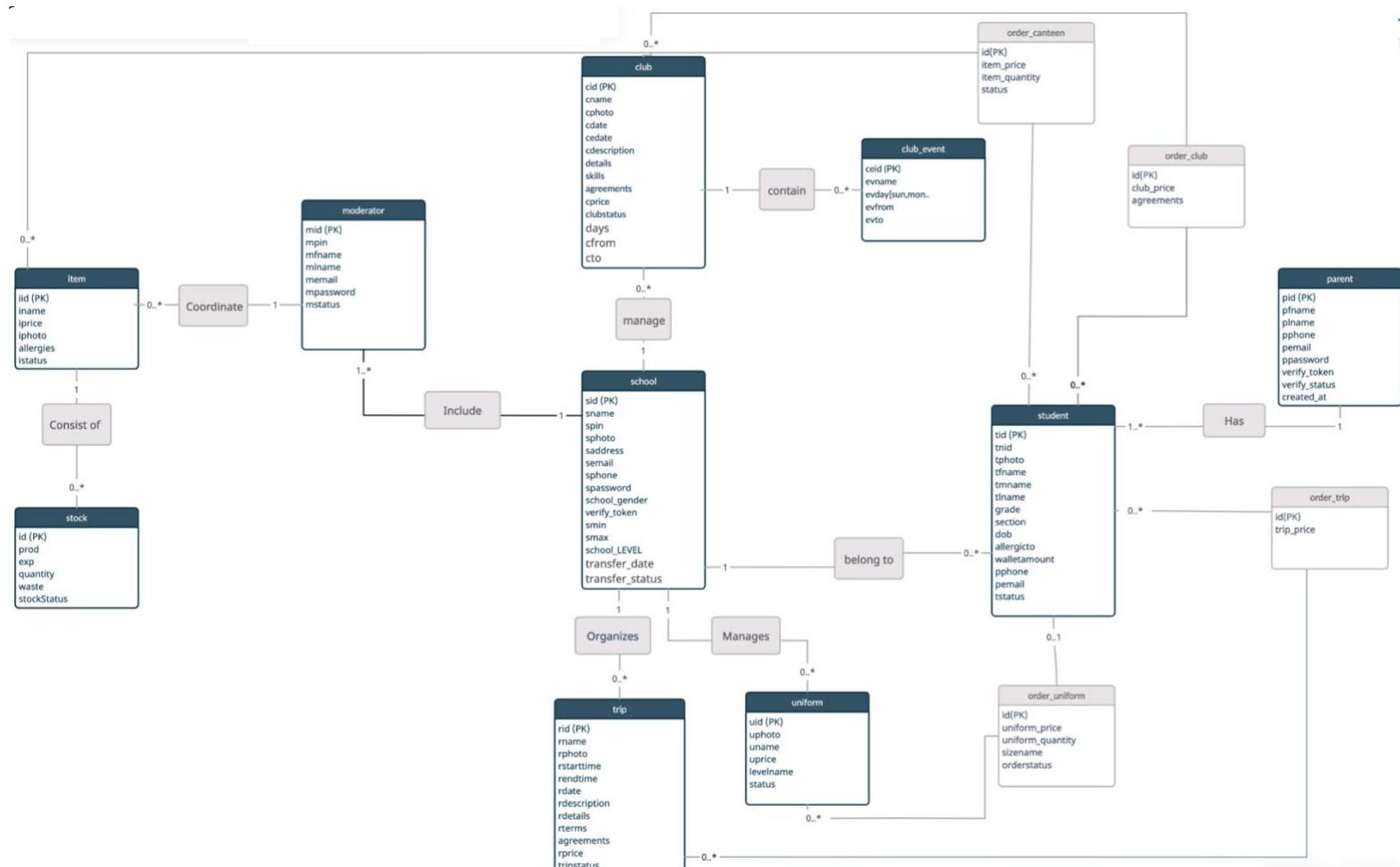


Figure 13 Er Diagram



- **Relation schema**

**school** (sid, sname, spin, sphoto, saddress, semail, sphone, spassword, school\_gender, verify\_token, transfer\_date, transfer\_status, smin, smax)

**Primary Key:** sid

---

**school\_level** (levelid, levelname, sizechart, sid)

**Primary Key:** levelid

**Foreign Key:** sid **reference school** (sid)

---

**grade\_section** (sectionid, sectionname, sid)

**Primary Key:** sectionid

**Foreign Key:** sid **reference school** (sid)

---

**club** (cid, cname, cphoto, cdate, cedate, cdescription, details, skills, agreements, cprice, clubstatus, days, cfrom, cto, sid)

**Primary Key:** cid

**Foreign Key:** sid **reference school** (sid)

---

**club\_grade** (cgid, clubgradesec, clubgrade, cid, sid)

**Primary Key:** cgid

**Foreign Key:** cid **reference club** (cid)

**Foreign Key:** sid **reference school** (sid)

---

**club\_event** (ceid, evname, evdet, evfrom, evto, cid, sid)

**Primary Key:** ceid

**Foreign Key:** cid **reference club** (cid)



**Foreign Key:** sid **reference school** (sid)

---

**event\_days** (edid, day, week, cid, sid, ceid)

**Primary Key:** edid

**Foreign Key:** cid **reference club** (cid)

**Foreign Key:** sid **reference school** (sid)

**Foreign Key:** ceid **reference club\_event** (ceid)

---

**trip** (rid, rname, rphoto, rstarttime, rendtime, rdate, rdescription, rdetails, rterms, agreements, rprice, tripstatus, sid)

**Primary Key:** rid

**Foreign Key:** sid **reference school** (sid)

---

**trip\_grade** (rgid, tripgradesec, tripgrade, rid, sid)

**Primary Key:** rgid

**Foreign Key:** rid **reference trip** (rid)

**Foreign Key:** sid **reference school** (sid)

---

**uniform** (uid, uphoto, uname, uprice, levelname, status, sid)

**Primary Key:** uid

**Foreign Key:** sid **reference school** (sid)

**size** (sizeid, sizename)

**Primary Key:** sizeid



**uniform\_size** (id, uid, sizename, qun, sid)

**Primary Key:** id

**Foreign Key:** uid reference **uniform** (uid)

**Foreign Key:** sid reference **school** (sid)

---

**moderator** (mid, mpin, mfname, mlname, mstatus, cid)

**Primary Key:** mid

**Foreign Key:** cid reference **canteen** (cid)

---

**canteen** (id, cpin, cpassword, sid)

**Primary Key:** id

**Foreign Key:** sid reference **school** (sid)

---

**canteen\_cart** (id, quantity, cid, tid, itemID)

**Primary Key:** id

**Foreign Key:** cid reference **canteen** (cid)

**Foreign Key:** tid reference **student** (tid)

**Foreign Key:** itemID reference **item** (iid)

---

**item** (iid, iname, iprice, iphoto, allergies, istatus, cid)

**Primary Key:** iid

**Foreign Key:** cid reference **canteen** (cid)

---

**stock** (id, prod, exp, quantity, waste, stockStatus, itemid)

**Primary Key:** id

**Foreign Key:** itemid reference **item** (iid)



**parent** (pnid, pfname, plname, pphone, pemail, ppassword, pnational, verify\_token, verify\_status, created\_at)

**Primary Key:** pnid

---

**cart** (cartid, category, qun, price, sizeid, tripsecid, total\_price, Cstatus, productID, sid, tid)

**Primary Key:** cartid

**Foreign Key:** sid **reference school** (sid)

**Foreign Key:** tid **reference student** (tid)

---

**orders** (orderNo, date, time, userType, total, mid, sid, tid)

**Primary Key:** orderNo

**Foreign Key:** sid **reference school** (sid)

**Foreign Key:** tid **reference student** (tid)

**Foreign Key:** mid **reference moderator** (mid)

---

**order\_canteen** (id, item\_name, item\_price, item\_quantity, status, itemID, orderNo)

**Primary Key:** id

**Foreign Key:** orderNo **reference orders** (orderNo)

**Foreign Key:** itemID **reference item** (iid)

---

**order\_club** (id, club\_name, club\_price, agreements, cid, orderNo)

**Primary Key:** id

**Foreign Key:** orderNo **reference orders** (orderNo)

**Foreign Key:** cid **reference club** (cid)

---



**order\_trip** (id, trip\_name, trip\_price, rstarttime, rendtime, rdate, agreements, rid, orderNo)

**Primary Key:** id

**Foreign Key:** orderNo **reference orders** (orderNo)

**Foreign Key:** rid **reference trip** (rid)

---

**order\_uniform** (id, uniform\_name, uniform\_price, uniform\_quantity, sizename, status, sizeid, orderNo)

**Primary Key:** id

**Foreign Key:** orderNo **reference orders** (orderNo)

**Foreign Key:** sizeid **reference uniform\_size** (sizeid)

---

**latest\_activity** (latest\_id, amount\_price, type\_purchase, date\_current, time\_current, orderNo, sid, tid)

**Primary Key:** latest\_id

**Foreign Key:** sid **reference school** (sid)

**Foreign Key:** tid **reference student** (tid)

**Foreign Key:** orderNo **reference orders** (orderNo)

---

**student** (tid, tnid, tphoto, tfname, tmname, tlname, grade, section, dob, allergicto, CurrentAmount, walletamount, pphone, pemail, tlimit, tstatus, sid, pnid)

**Primary Key:** tid

**Foreign Key:** sid **reference school** (sid)

**Foreign Key:** pnid **reference parent** (pnid)



## • Data Dictionary

The data dictionary bellow in Table 8 contains data about Masroofi database.

Entity Name	Attribute	Description	Data Type	Null	Default	PK
school	sid	The school admin id	int (5)	No		Yes
	sname	The school's name	Varchar (200)	No		
	spin	The school's pin	Varchar (20)	No		
	sphoto	The school's photo	Text	Yes		
	saddress	The school's address	Varchar (200)	No		
	semail	The school's email	Varchar (200)	No		
	sphone	The school's mobile number	Varchar (10)	No		
	spassword	The school password	Text	No		
	school_gender	The school's gender	Varchar (200)	No		
	verify_token	Token for updating school password	Varchar (2000)	No	23	
	transfer_date	The date on which students transferred to the next grade in a particular year.	date	Yes		
	transfer_status	Transfer status in a specific year 1: already transferred 0: not yet transferred.	Tinyint (1)	No	0	
club	smin	The school's minimum accepted wallet amount	int (50)	Yes		
	smax	The school's maximum accepted wallet amount	Int (50)	Yes		
	cid	The club's id	Int (5)	No		Yes
	cname	The club's name	Varchar (200)	No		
student	cphoto	The club's photo	Text	No		
	cdate	The club's start date	Varchar (200)	No		



Entity Name	Attribute	Description	Data Type	Null	Default	PK
club	cedate	The club's end date	Varchar (200)	No		
	cdescription	The club's description	Varchar (2000)	No		
	details	The club's details	Varchar (2000)	No		
	skills	The club's gained skills	Varchar (2000)	No		
	agreements	The club's agreements	Varchar (2000)	No		
	cprice	The club's price	Double	No		
	clubstatus	The club's status 1= available, 0= deleted	Int (1)	No		
	days	The club weekly events days	Varchar (200)	No		
	cfrom	The club weekly events start time	Varchar (200)	No		
	cto	The club weekly events end time	Varchar (200)	No		
club_grade	cgid	The club's id	Int (5)	No		Yes
	clubgradesec	The club's grade sections	Varchar (200)	No		
	clubgrade	The club's grade	Varchar (200)	No		
club_event	ceid	The id of a club event	Int (5)	No		Yes
	evname	The event name	Varchar (200)	No		
	evfrom	The event start time	Varchar (200)	No		
	Evto	The event end time	Varchar (200)	No		
event_days	edid	The event day id	Int (5)	No		Yes
	day	The event day	Varchar (200)	No		
	week	The even week	Varchar (200)	No		
trip	rid	The trip's id	Int (5)	No		Yes



Entity Name	Attribute	Description	Data Type	Null	Default	PK
trip	rname	The trip's name	Varchar (200)	No		
	rphoto	The trip's photo	Text	No		
	rstarttime	The trip's start time	Varchar (200)	No		
	rendtime	The trip's end time	Varchar (200)	No		
	rdate	The trip's date	Varchar (200)	No		
	rdescription	The trip's description	Varchar (2000)	No		
	rdetails	The trip's details	Varchar (2000)	No		
	rterms	The trip's terms	Varchar (2000)	No		
	agreements	The trip's agreements	Varchar (2000)	No		
	rprice	The trip's price	Double	No		
uniform	tripstatus	The trip's status 1= available, 0= deleted	Int (5)	No		
	uid	The uniform's id	Int (5)	No		Yes
	uphoto	The uniform's photo	Text	No		
	uname	The uniform's name	Varchar (200)	No		
	uprice	The uniform's price	Double	No		
	levelname	The uniform's level name	Varchar (20)	No		
uniform_size	status	The uniform's status 1= available, 0= deleted	Int (11)	No		
	id	The uniform size id	Int (11)	No		Yes
	sizename	The uniform size name	Varchar (11)	No		
moderator	qun	The uniform quantity	Int (20)	No		
	mid	The moderator's id	Int (5)	No		Yes



Entity Name	Attribute	Description	Data Type	Null	Default	PK
	mpin	The moderator's pin	Varchar (200)	No		
	mfname	The moderator's first name	Varchar (200)	No		
	mlname	The moderator's last name	Varchar (200)	No		
	mstatus	The moderator's status 1= available, 0= deleted	Int (20)	No		
canteen	id	The school's canteen id	Int (11)	No		Yes
	cpin	The school's canteen pin	Varchar (200)	No		
	cpassword	The school's canteen password	Varchar (200)	No		
canteen_cart	id	The current cart id	Int (11)	No		Yes
	quantity	The cart items quantity	Varchar (10)	No		
item	iid	The canteen's item id	Int (11)	No		Yes
	iname	The canteen's item name	Varchar (200)	No		
	iprice	The canteen's item price	Varchar (200)	No		
	iphoto	The canteen's item photo	Varchar (200)	No		
	allergies	The canteen's item containing allergies	Varchar (200)	No		
	istatus	The canteen's item status 1=available, 0=deleted	Int (11)	No		
stock	id	The stock id	Int (11)	No		Yes
	prod	The stock production date	date	No		
	exp	The stock expiration date	date	No		
	quantity	The stock quantity	Varchar (200)	No		
	waste	The stock waste quantity	Varchar (200)	No		
	stockStatus	The stock status	Int (11)	No		
parent	pnid	The parent's national id	Varchar (200)	No		Yes



Entity Name	Attribute	Description	Data Type	Null	Default	PK
parent	pfname	The parent's first name	Varchar (200)	No		
	plname	The parent's last name	Varchar (200)	No		
	pphone	The parent's phone number	Varchar (200)	No		
	pemail	The parent's email	Varchar (200)	No		
	ppassword	The parent's password	Varchar (200)	No		
	pnational	The parent national address	Varchar (200)	No		
	verify_token	Token for updating and verifying the parent account	Varchar (200)	No		
	verify_status	The parent's status 1= verified, 0= not verified	Tinyint (2)	No		
	created_at	The time of the registration	timestamp	No		
cart	cartid	The cart's id	Int (10)	No		Yes
	category	The category of the item in cart: uniform, canteen, trip, club	text	No		
	productID	The item ID	Int (10)	No		
	qun	The quantity if each added item	Int (10)	No		
	sizeid	The size of the uniform	int	Yes		
	price	The price of added items	float	No		
	total_price	The total cart price	float	No		
	tripsecid	The added trip section id.	Int	Yes		
	Cstatus	The status of the added items	Int (11)	No		
orders	orderNo	The order id	Int (11)	No		Yes



Entity Name	Attribute	Description	Data Type	Null	Default	PK
order_canteen	date	The order date	date	No		
	time	The order time	Varchar (200)	No		
	userType	The user who made the order: parent or moderator	Varchar (200)	No		
	total	The total price of the orders	float	No		
order_club	id	The canteen order id	Int (11)	No		Yes
	Item_name	The item name	Varchar (50)	No		
	Item_price	The item price	Varchar (200)	No		
	Item_quantity	The item quantity	Varchar (200)	No		
	status	The item status	Varchar (200)	No		
order_trip	id	The order id	Int (11)	No		Yes
	Club_name	The club name	Varchar (200)	No		
	Club_price	The club price	Varchar (200)	No		
	agreements	The club agreements	Varchar (2000)	No		
order_uniform	id	The order id	Int (11)	No		Yes
	Trip_name	The trip name	Varchar (200)	No		
	Trip_price	The trip price	Varchar (200)	No		
	rstarttime	The trip start time	Varchar (200)	No		
	rendtime	The trip end time	Varchar (200)	No		
	rdate	The trip date	Varchar (200)	No		
	agreements	The trip agreements	Varchar (2000)	No		



Entity Name	Attribute	Description	Data Type	Null	Default	PK
uniform	Uniform_price	The uniform price	Varchar (200)	No		
	Uniform_quantity	The uniform quantity	Varchar (200)	No		
	sizename	The uniform size name	Varchar (11)	No		
	status	The uniform status	Varchar (200)	No		
latest_activity	latest_id	The latest activity id	Int (11)	No		Yes
	Amount_price	The price of the last payment	float	No		
	Type_purchase	The type of the purchase: withdrawal or deposit	Varchar (2000)	No		
	Date_current	The date of the purchase	Varchar (2000)	No		
	Time_current	The time of the purchase	Varchar (2000)	No		
student	tid	The student's id	Int (11)	No		Yes
	tnid	The student's national id	Varchar (10)	No		
	tphoto	The student's photo	Varchar (500)	No		
	tfname	The student's first name	Varchar (200)	No		
	tmname	The student's middle name	Varchar (200)	No		
	tlname	The student's last name	Varchar (200)	No		
	grade	The student's grade	Varchar (200)	No		
	section	The student's section	Varchar (200)	No		
	dob	The student's date of birth	date	No		
	allergicto	The student's allergy	Varchar (200)	No		



Entity Name	Attribute	Description	Data Type	Null	Default	PK
	CurrentAmount	The amount that will be deposited into child's wallet	float	No		
	walletamount	The student's wallet amount	float	No		
	pphone	The student's parent phone number	Varchar (200)	No		
	pemail	The student's parent email	Varchar (10)	No		
	tlimit	The student's daily withdrawal limit	Int (11)	No		
	tstatus	The student's status 1= available, 0= deleted	Int (10)	No		

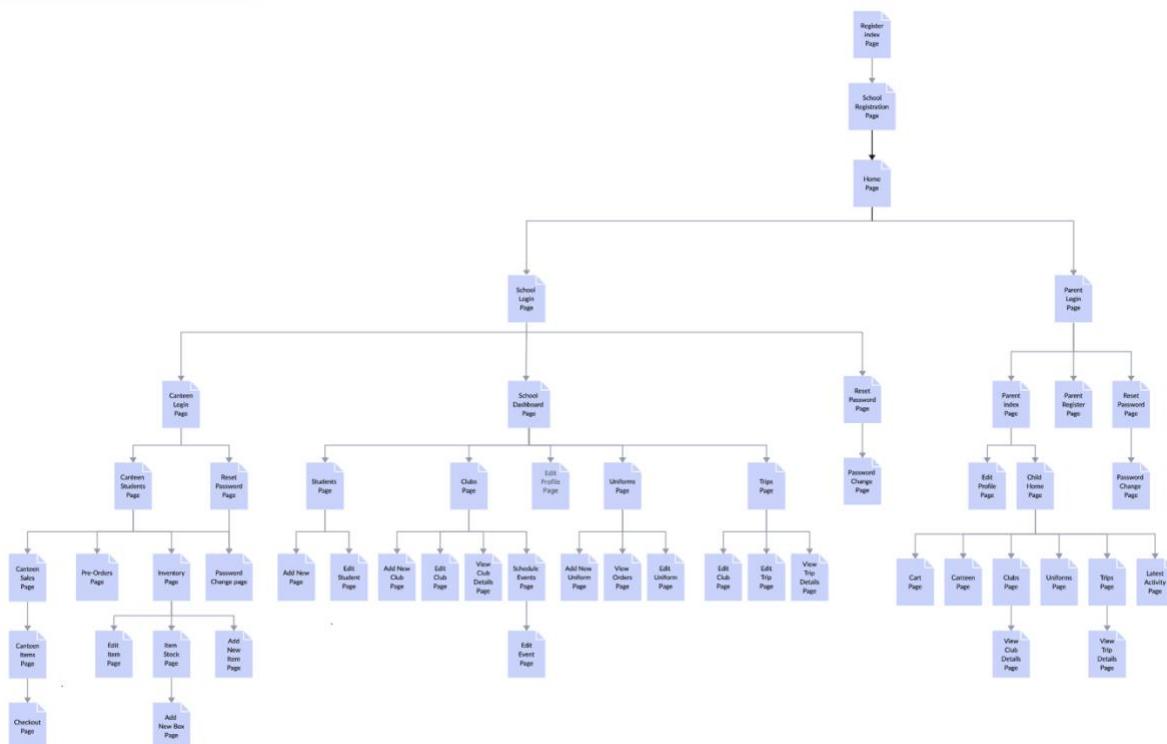
Table 8 Data Dictionary



## 4.5 Interface Design

#### 4.5.1 Site Map

Site map is a way of mapping out the structure and organization of pages, and content in our website. Figure 14 shows Masroofi site map.



## **Figure 14 Site map**



#### 4.5.2 UX guidelines

We followed the HubSpot [23] UX Guidelines & Best Practices for Exceptional Web Design and Usability. We followed many of the instructions they provided, including the following:

##### 1- Simplicity:

- Colors: We used maximum of 5 different colors in our design.
- Graphics: We only use graphics if they help a user complete a task or perform a specific function.

##### 2- Navigability:

- Using breadcrumbs.
- Don't offer too many navigation options per page.
- Don't make users dig too deep.

##### 3- Consistency:

- The overall design of our site is similar across all pages.

##### 4- Responsivity:

- Our site is compatible with the many devices that our visitors are using.

##### 5- Conventionality:

- Placing the logo at the top left of a page.
- Making the logo clickable, so it always brings a user back to its homepage.
- Having links that change color when user hover over them.

##### 6- Error Prevention:

- Ensure user errors are prevented by providing clear error messages.



## 4.6 Implementation

### 4.6.1 Secure Parent Registration

To make parents' registration in the system as secure as possible, we carefully searched for the most efficient method. As national IDs and e-mail addresses are not enough to confirm that a registered parent is in fact the parent, we did email verification. It will not be possible for the parent to access his account unless his account is verified using the link we sent to his email address. So, we had some challenges with how we were intending to implement it. We were able to resolve this issue using an existing API library called PHPMailer. It is a code library to send emails safely and easily via PHP code from a web server [24].

Following are the steps we used to implement PHPMailer:

- 1- Installing composer.
- 2- Using PHPMailer.
- 3- Create a PHPMailer class object.
- 4- Configure the server settings:
  - 5- isSMTP (): Set mailer to use SMTP.
  - 6- Host: Specifies the servers.
  - 7- SMTPAuth: Enable/Disable SMTP Authentication.
  - 8- Username: Specify the username.
  - 9- Password: Specify the password.
  - 10- SMTPSecure: Specify encryption technique. Accepted values ‘tls’ or ‘ssl’.
  - 11- Port: Specify the TCP port which is to be connected.
  - 12- Add the recipients of the mail.
  - 13- Add the content:
    - 14- isHTML (): If passed true, sets the email format to HTML.
  - 15- Subject: Set the subject of the Mail.
  - 16- Body: Set the contents of the Mail.
  - 17- Finally, send the email. Using Send () .



```
use PHPMailer\PHPMailer\PHPMailer;
use PHPMailer\PHPMailer\SMTP;
use PHPMailer\PHPMailer\Exception;

// Include library files
require 'PHPMailer/Exception.php';
require 'PHPMailer/PHPMailer.php';
require 'PHPMailer/SMTP.php';

function sendemail_verify($pfname,$pemail,$verify_token)
{
    $mail = new PHPMailer(true);
    $mail->isSMTP();
    $mail->SMTPAuth   = true;

    $mail->Host      = 'smtp.gmail.com';
    $mail->Username  = 'masroofi.system@gmail.com';
    $mail->Password  = 'vcxgqnpbeqkjfnxp';

    $mail->SMTPSecure = "tls";
    $mail->Port       = 587;

    $mail->setFrom('masroofi.system@gmail.com', $pfname);
    $mail->addAddress($pemail);

    $mail->isHTML(true);
    $mail->Subject = 'Email Verification from Masroofi School Online Payment System.';

    $email_template =""
<h2>You have Registered with Masroofi</h2>
<h5>Verify your email address to Login with the below given link</h5>
<br/><br/>
<a href='http://localhost/gp1-masroofi/2022-GP1-12/MasroofiORG/verify-email.php?token=$verify_token'> Click Me </a>
";

    $mail->Body    = $email_template;
    $mail->send();
}
```

Figure 15 PHP Mailer

#### 4.6.2 School Dashboards Visualization

The financial dashboard is a management tool that helps schools track all incomes in detail. It must provide real time results, clear and concise. There were a few challenges with implementing the dashboard. A dashboard is only useful and relevant if key information is kept up to date. Also, it must be accurate, responsive, understandable, and meaningful. We implement our dashboards front-end visualization through ApexCharts. It is a modern JavaScript charting library that empowers developers to build interactive data visualizations [25]. With AJAX and PHP, we calculated and represented income data from all four categories at the school: canteen, uniform, clubs, and trips. AJAX transfers data between the web server and the browser, enabling faster response times and interactive database communication. The charts we developed were designed with the purpose of making them as useful and understandable as possible. In order to achieve this, we have done the following:

- 1- **Responsive:** Scales perfectly across desktops, tablets, and mobile devices.
- 2- **Interactive:** Zoom, pan, scroll through data, show informative tooltips when the user hovers over datapoints. Each of these options helps to communicate data more effectively.



- 3- **High Performance:** high performance on large numbers of datapoints.
- 4- **Export Charts:** Allows exporting the chart to popular image formats like PNG or SVG and allows exporting the chart data to a CSV file.
- 5- **Click on each category's dashboard:** Schools have four main categories of income: canteen, uniform, clubs, and trips. Each category can be viewed on a separate dashboard.
- 6- **Pick a date range:** To help provide more options, we added a date range picker. It is a component for choosing date ranges. To help display the dashboard in a specific date range.

- **First dashboard**

```
28
29 echo "<script>window.onload = function() { dashboardajax('All', '$year', '$school_id'); };</script>";
30
```

Figure 16 Dashboard1

The default dashboard representation shows the total school income for the current year among all four categories. Figure 16 shows the code that will send the dashboard AJAX function the default parameters (all categories, the current year, school id) each time a user loads the page.



```
<script>
//onload call the ajax function and send the current year if it is success then call the dashboard function (done)
//if the user select one of the years then call the ajax again the get the data then call the dashboard function
function dashboardajax(cat,year,sid){
    if(cat == 'Category'){
        //take the cat value
        var cat = $('#Category').val();
    }else if(year == 'year'){
        //take the year value
        var year = $('#year').val();
    }

    $.ajax({
        url: 'SchoolAction.php',
        method: 'post',
        data: {
            getsales:'getsales',
            year:year,
            sid:sid,
            cat:cat,
        },
        success: function(data) {
            chart1.updateSeries([
                {
                    name: 'Income',
                    data: JSON.parse(data)
                }
            ]);
            /* dashboard(JSON.parse(data)); */
        }
    });
}

var options1 = [
    chart: {
        type: 'area',
        height: 250,
    },
    series: [
        {
            name: 'Income',
            data: [0,0,0,0,0,0,0,0,0,0,0,0]
        },
    ],
    xaxis: {
        categories: ['Jan','Feb','Mar','Apr','May','Jun','Jul','Aug','Sep','Oct','Nov','Dec']
    },
    stroke: {
        curve: 'smooth',
        colors: ['#2193B0', '#E91E63', '#9C27B0'],
    },
    yaxis: [
        {
            labels: {
                formatter: function(value) {
                    return value + 'S.R'
                }
            },
            title: {
                text: 'Income',
                align: 'center',
            }
        }
    ],
    fill: [
        colors: ['#2193B0', '#2193B0', '#9C27B0']
    ],
    dataLabels: {
        enabled: true,
        style: {
            colors: ['#2193B0', '#E91E63', '#9C27B0']
        },
        background: {
            enabled: true,
            padding: 4,
        },
    }
];
var chart1 = new ApexCharts(document.querySelector("#myChart"), options1);
chart1.render();

```

Figure 17 Dashboard2

Figure 17 shows the function that receives the parameters sent from the [previous](#) code and returns the response data (all categories, the current year, school id) from the AJAX request. When the AJAX request is successful, the dashboard will dynamically update with the data.



```
elseif(isset($_POST['getsales'])){  
    $category = $_POST['cat'];  
    $months = [1,2,3,4,5,6,7,8,9,10,11,12];  
    $sid = $_POST['sid'];  
    $year = $_POST['year'];  
  
    if($category == 'All'){  
  
        $sales = array();  
        foreach($months as $month){  
            $subtotal = 0;  
  
            //canteen  
            $query = mysqli_query($conn, "SELECT orders.* , order_canteen.* FROM orders INNER JOIN order_canteen ON orders.orderNo=order_canteen.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND order_canteen.status='Received' AND sid='$sid'");  
            while($ordersInfo = mysqli_fetch_assoc($query)){ //calculate sales in that year  
                $total = $ordersInfo['item_price']* $ordersInfo['item_quantity'];  
                $subtotal += $total;  
            }  
  
            //uniform  
            $query = mysqli_query($conn, "SELECT orders.* , order_uniform.* FROM orders INNER JOIN order_uniform ON orders.orderNo=order_uniform.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND order_uniform.status='Received' AND sid='$sid'");  
            while($ordersInfo = mysqli_fetch_assoc($query)){ //calculate sales in that year  
                $total = $ordersInfo['uniform_quantity'] * $ordersInfo['uniform_price'];  
                $subtotal += $total;  
            }  
  
            //trip  
            $query = mysqli_query($conn, "SELECT orders.* , order_trip.* FROM orders INNER JOIN order_trip ON orders.orderNo=order_trip.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND sid='$sid'");  
            while($ordersInfo = mysqli_fetch_assoc($query)){ //calculate sales in that year  
                $total = $ordersInfo['trip_price'];  
                $subtotal += $total;  
            }  
  
            //club  
            $query = mysqli_query($conn, "SELECT orders.* , order_club.* FROM orders INNER JOIN order_club ON orders.orderNo=order_club.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND sid='$sid'");  
            while($ordersInfo = mysqli_fetch_assoc($query)){ //calculate sales in that year  
                $total = $ordersInfo['club_price'];  
                $subtotal += $total;  
            }  
  
        }  
        array_push($sales,$subtotal);  
    }  
    echo json_encode($sales);  
}
```

Figure 18 Dashboard3

The code in Figure 18 above is the AJAX called page. Where the database is accessed to retrieve and calculate all of the school income data. This shows how to retrieve the data when all four categories and the current year are selected.

```
<div class="d-flex">  
    <div class="mx-2">  
        <select class="form-control" id="Category" onchange="dashboardajax(this.value,'year',<?= $school_id ?>)";>  
            <option value='All'>All</option>  
            <option value='Canteen'>Canteen</option>  
            <option value='Uniform'>Uniforms</option>  
            <option value='Trip'>Trips</option>  
            <option value='Club'>Clubs</option>  
        </select>  
    </div>  
  
    <div class="mx-2">  
        <select class="form-control" id="year" onchange="dashboardajax('Category',this.value,<?= $school_id ?>)";>  
            <!-- default is the current year unless the user chooses something if the user reload the page it will be the default again  
            //get the year the first order happened in the school  
            loop through years -->  
            <?php  
                for($year ; $first_order <= $year; $year--){  
                    echo "<option value='$year'>$year</option>";  
                }  
            ?>  
        </select>  
    </div>  
</div>
```

Figure 19 Dashboard4

As shown in Figure 19 above, the user can choose a certain year or category to be shown in the dashboard. The same dashboard AJAX function receives the selected category or year.



```
        }elseif($category == 'Canteen'){
            $sales = array();
            foreach($months as $month){
                $query = mysqli_query($conn, "SELECT orders.*, order_canteen.* FROM orders INNER JOIN order_canteen ON orders.orderNo=order_canteen.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND order_canteen.status='Received' AND sid='$sid'");
                $month = $month + 1;
                while($ordersInfo = mysqli_fetch_assoc($query)){
                    $total = $ordersInfo['item_price'] * $ordersInfo['item_quantity'];
                    $subtotal += $total;
                }
                array_push($sales,$subtotal);
            }
            echo json_encode($sales);
        }elseif($category == 'Uniform'){
            $sales = array();
            foreach($months as $month){
                $query = mysqli_query($conn, "SELECT orders.*, order_uniform.* FROM orders INNER JOIN order_uniform ON orders.orderNo=order_uniform.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND order_uniform.status='Received' AND sid='$sid'");
                $month = $month + 1;
                while($ordersInfo = mysqli_fetch_assoc($query)){
                    $total = $ordersInfo['uniform_quantity'] * $ordersInfo['uniform_price'];
                    $subtotal += $total;
                }
                array_push($sales,$subtotal);
            }
            echo json_encode($sales);
        }elseif($category == 'Trip'){
            $sales = array();
            foreach($months as $month){
                $query = mysqli_query($conn, "SELECT orders.*, order_trip.* FROM orders INNER JOIN order_trip ON orders.orderNo=order_trip.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND sid='$sid'");
                $month = $month + 1;
                while($ordersInfo = mysqli_fetch_assoc($query)){
                    $total = $ordersInfo['trip_price'];
                    $subtotal += $total;
                }
                array_push($sales,$subtotal);
            }
            echo json_encode($sales);
        }elseif($category == 'Club'){
            $sales = array();
            foreach($months as $month){
                $query = mysqli_query($conn, "SELECT orders.*, order_club.* FROM orders INNER JOIN order_club ON orders.orderNo=order_club.orderNo WHERE MONTH(date) = $month AND YEAR(date) = $year AND sid='$sid'");
                $month = $month + 1;
                while($ordersInfo = mysqli_fetch_assoc($query)){
                    $total = $ordersInfo['club_price'];
                    $subtotal += $total;
                }
                array_push($sales,$subtotal);
            }
            echo json_encode($sales);
        }
    }
}
```

Figure 20 Dashboard5

Figure 20 shows the AJAX called page. Where the database is accessed to retrieve and calculate all the school income data. This shows how to retrieve the data with only the category, or the year selected.

- **Second dashboard**

The second dashboard is very similar to the first. Except that it uses a different representation and provides a more flexible range of dates.

```
<div class="col-lg-6">
    <div class="card">
        <div class="card-header border-0 flex-wrap">
            <h4>Financial situation</h4>
            <div class="d-flex justify-content-end">
                <input class="form-control form-control-solid" placeholder="Pick date rage" id="kt_daterangepicker_4" onchange="donut(this.value,<?=$school_id ?>)" />
            </div>
        </div>
        <div class="card-body">
            <div id="chart" class="d-flex align-items-center mx-auto"></div>
        </div>
    </div>
</div>
```

Figure 21 Dashboard6

Using the code in Figure 21, the user can select a different date range to view school's income on the dashboard. In response to the click of a date range, the function donut() will be called.



```
// -----dashboard2-----  
var start = moment().subtract(29, "days");  
var end = moment();  
  
function cb(start, end) {  
    $("#kt_daterangepicker_4").html(start.format("YYYY-MM-DD") + " - " + end.format("YYYY-MM-DD"));  
}  
  
$("#kt_daterangepicker_4").daterangepicker({  
    startDate: start,  
    endDate: end,  
    maxDate: '<=' + $current_day + '>',  
    minDate: '<=' + $first_order + '>',  
    locale: {  
        format: 'YYYY/MM/DD',  
        separator: " - "  
    },  
    ranges: {  
        "Today": [moment(), moment()],  
        "Yesterday": [moment().subtract(1, "days"), moment().subtract(1, "days")],  
        "Last 7 Days": [moment().subtract(6, "days"), moment()],  
        "Last 30 Days": [moment().subtract(29, "days"), moment()],  
        "This Month": [moment().startOf("month"), moment().endOf("month")],  
        "Last Month": [moment().subtract(1, "month").startOf("month"), moment().subtract(1, "month").endOf("month")]  
    }  
}, cb);  
  
cb(start, end);  
  
function donut(dates,sid){  
    var dates = dates.split(" - ");  
    var start = dates[0].replace(/\//g, "-");  
    var end = dates[1].replace(/\//g, "-");  
    $.ajax({  
        url: 'SchoolAction.php',  
        method: 'post',  
        data: {  
            donut:'donut',  
            start:start,  
            end:end,  
            sid:sid,  
        },  
        success: function(data) {  
            // update the series data  
            chart2.updateSeries(JSON.parse(data));  
        }  
    });  
}  
//-----
```

Figure 22 Dashboard7

The dashboard's default date range is 29 days. This code in Figure 22 shows the function that returns the income data requested by the AJAX request. It also shows the calculations when the user selects another date range. For example, the last seven days, the last month, etc.

#### 4.6.3 Recognizable Student Photo

In order to successfully implement facial recognition for canteen payments. Parents must submit a clear, recognizable photo of their child. Face detection has been implemented using the Python CV2 library and the Cascade Classifier algorithm in this procedure. Face detection is a technique for recognizing human faces. Face identification algorithms generally identify all human faces in a photo, regardless of how many there are. This is an issue because we need to make sure parents only upload photos that include their child's face. Therefore, we count the number of faces in the uploaded photos. When there are several faces, we ask the parent to upload a photo that just shows the face of his child. This is in addition to the RemBg Python tool to remove the background from uploaded images and make them more formal. The [flowchart in section 4.4.3](#) illustrates the entire process.



**Figure 23 Recognizable Student Photo1**

Figure 23 above is the code that shows the process of face detection when parents upload their child's photo. We save the photo to a temporary file, then check its size. It will display an error message if it exceeds 2MB. If the photo size is acceptable, the photo will proceed to face detection. By using `escapeshellcmd()` and `shell_exec()` functions, we call the face detection Python page and pass the uploaded photo as a parameter. The value returned by the Python script is the number of faces detected in the uploaded photo. Since Python output is sent as json, we need to decode the json value returned by the `json_decode()` function and store the result in PHP variable.

```
import cv2
import sys

who = sys.argv[1]
image = cv2.imread(who)

#converted image
gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

#build classifier
haar_face_cascade = cv2.CascadeClassifier("//Applications/MAMP/htdocs/2022-GP1-12/MasroofICode/haarcascade_frontalface_default.xml")

#detectMultiScale is a general functions to detect objects, but to detect faces we must call the face cascade
faces = haar_face_cascade.detectMultiScale(gray, scaleFactor=1.1, minNeighbors=5)

for x,y,w,h in faces:
    cv2.rectangle(image, (x,y), (x+w, y+h), (0,0,255), 5)

lenf=len(faces)
print(lenf)
```

**Figure 24 Recognizable Student Photo2**

The code in Figure 24 above shows the face detection Python file. The first thing it does is read the parameter sent by the PHP page, which is the student's uploaded photo. For detection, the photo is converted from one color space to another using cvtColor(). Next, we build the classifier using the Cascade Classifier. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. Since Cascade Classifier is used for detecting objects in general. We must specify the type of detection we want, which is to detect faces using haar\_face\_cascade(). The function also counts the faces detected in the target image. We then save the count of faces in the Python variable lenf.



```
if($resultImage == 0) {
    echo "<div class='alert alert-danger alert-dismissible fade show'>
        <svg viewBox='0 0 24 24' width='24' height='24' stroke='currentColor' stroke-width='2' fill='none' stroke-linecap='round' stroke-linejoin='round' class='me-2'><polygon points='7.86 2 16.14 2 22.7
        <strong>Error!</strong> No Face has been Detected. Please Upload Appropriate Photo.
        <button type='button' class='btn-close' data-bs-dismiss='alert' aria-label='btn-close'>
        </button>
    </div>";
}

if($resultImage >1) {
    echo "<div class='alert alert-danger alert-dismissible fade show'>
        <svg viewBox='0 0 24 24' width='24' height='24' stroke='currentColor' stroke-width='2' fill='none' stroke-linecap='round' stroke-linejoin='round' class='me-2'><polygon points='7.86 2 16.14 2 22.7
        <strong>Error!</strong> Multiple Faces have been Detected. Please Upload Photo With your child Face Only.
        <button type='button' class='btn-close' data-bs-dismiss='alert' aria-label='btn-close'>
        </button>
    </div>";
}

if($resultImage ==1) {
    unlink("images/Students/det_Sid/$old_img");
    $command= escapeshellcmd("Users/nouralsultan/opt/anaconda3/bin/python removeBg.py $img");
    $result1351 = shell_exec($command);
    $random_name = json_decode($result1351);
    //remove bg
}
```

Figure 25 Recognizable Student Photo3

After saving the Python face detection returned value, in Figure 25 we check the variable value. In case the value equals zero, this indicates that no faces were detected in the uploaded photo and an error message will appear. If the value is greater than one, more than one face has been detected in the uploaded photo and an error message will appear. A value of one indicates that only one face has been detected. Using unlink(), we remove the old student photo if there was any. Afterward, the photo is sent as a parameter to the Python page for removing the background. We use json\_decode() to decode the Python returned photo path name and store it in a PHP variable.

```
from rembg import remove
from PIL import Image
import sys
import random

who = sys.argv[1]

num2 = random.randint(100, 1000000)
input_path = who
output_path = '/Applications/MAMP/htdocs/2022-GP1-12/MasroofICode/images/Students/removeBg/{}.png'.format(num2)
output1 = output_path.format(num2)

input = Image.open(input_path)
output = remove(input)
output.save(output1)
print(num2)
```

Figure 26 Recognizable Student Photo4

The above code in Figure 26 shows the remove background python page. Using rembg tool we imported the remove library that will remove the background from the uploaded photo. Then save the photo name in python variable num2.



```
Sup_filename="/Applications/MAMP/htdocs/2022-GP1-12/MasroofCode/images/Students/removeBg/$random_name.png"; //source path
$extension = pathinfo($up_filename,PATHINFO_EXTENSION);
$random = rand(0,100000);
$newname = $tid.'_'.$random.'.'.$extension;
$despath = "Images/Students/det_$id/$newname";
rename($up_filename, $despath);
$sql="UPDATE student SET photo='$newname' WHERE tid='$tid'";
$result=mysqli_query($conn,$sqlUp);
if($result){
    echo "<div class='alert alert-success alert-dismissible fade show'>
    <svg viewBox='0 0 24 24' width='24' height='24' stroke='currentColor' stroke-width='2' fill='none' stroke-linecap='round' stroke-linejoin='round' class='me-2'><polyline points='9 11 12 14 22 4'></polyline>
    <strong>Success!</strong> Student Photo has been updated Successfully
    <button type='button' class='btn-close' data-bs-dismiss='alert' aria-label='btn-close'></button>
</div>";
}
else{
    echo "<div class='alert alert-danger alert-dismissible fade show'>
    <svg viewBox='0 0 24 24' width='24' height='24' stroke='currentColor' stroke-width='2' fill='none' stroke-linecap='round' stroke-linejoin='round' class='me-2'><polygon points='7.86 2 16.14 2 22.7'></polygon>
    <strong>Error!</strong> Something went wrong, please try again.
    <button type='button' class='btn-close' data-bs-dismiss='alert' aria-label='btn-close'></button>
</div>";
}
}
?>
```

Figure 27 Recognizable Student Photo

To complete the process, in Figure 27 the formal and recognizable student photo needs to be renamed as the child ID. The child ID is used as part of the process of [face recognition](#) in the canteen. The student photo is then updated in the database.

#### 4.6.4 Face Recognition

In the process of implementing face recognition, we encountered difficulties. First, we had to select a machine learning facial recognition algorithm that would work well. Choosing a model that would achieve a high level of accuracy presented another difficulty. We experimented with a variety of libraries, like real-time facial recognition. The model failed to correctly recognize a face during testing. Real-time facial recognition also has the drawback of instantly identifying every face that passes in front of the camera. This won't work in our situation because it may identify any student's face. Thus, the canteen moderator will be able to capture image of just the student waiting in line by using the device webcam. Additionally, we have provided a re-take image function that allows the moderator to take the student's image again if there was any issue. As soon as the image is captured by the moderator, it will be processed for recognition. The face recognition and CV2 Python modules we used were effective at identifying students' faces during our tests. The [flowchart in section 4.4.3](#) illustrates the entire process.



**Figure 28 Face Recognition1**

The code in Figure 28 shows the first step in face recognition, which is to capture the student. With this code, the canteen moderator can capture or retake a photo.

```
$(document).ready(function() {
    Webcam.set({
        width: 320,
        height: 240,
        image_format: 'jpeg',
        jpeg_quality: 90
    });

    $('#accesscamera').on('click', function() {
        Webcam.reset();
        Webcam.on('error', function() {
            $('#photoModal').modal('hide');
            swal({
                title: 'Warning',
                text: 'Please give permission to access your webcam',
                icon: 'warning'
            });
        });
        Webcam.attach('#my_camera');
    });

    $('#takephoto').on('click', take_snapshot);

    $('#retakephoto').on('click', function() {
        $('#my_camera').addClass('d-block');
        $('#my_camera').removeClass('d-none');

        $('#results').addClass('d-none');

        $('#takephoto').addClass('d-block');
        $('#takephoto').removeClass('d-none');

        $('#retakephoto').addClass('d-none');
        $('#retakephoto').removeClass('d-block');

        $('#uploadphoto').addClass('d-none');
        $('#uploadphoto').removeClass('d-block');
    });

    $('#photoForm').on('submit', function(e) {
        e.preventDefault();
        $.ajax({
            url: 'photoUpload.php',
            type: 'POST',
            data: new FormData(this),
            contentType: false,
            processData: false,
        });
    });
});
```

**Figure 29 Face Recognition2**

By clicking the face recognition button, the above JavaScript in Figure 29 is triggered. To ensure a clear view of the camera, we set its dimensions to a standard size. If the device browser



allows access to the webcam, the canteen moderator can capture the student's face or retake it. When the moderator submits the photo we send the photo via an AJAX request to a PHP page.

```
<?php
if(isset($_POST['photoStore'])) {
    $encoded_data = $_POST['photoStore'];
    $binary_data = base64_decode($encoded_data);
    $sid = $_POST['school_id'];

    $photoname = uniqid().'.jpeg';

    $result = file_put_contents('images/Students/Check/'.$photoname, $binary_data);

    if($result) {
        // here execute python file
        $img = "/Applications/MAMP/htdocs/2022-GP1-12/MasroofiCode/images/Students/Check/$photoname";
        $command= escapeshellcmd("Users/nouralsultan/opt/anaconda3/bin/python face-recog.py $img $sid");
        $result135 = shell_exec($command);
        $resultImage = json_decode($result135);
    }
}
```

**Figure 30 Face Recognition3**

The photo sent by JavaScript will be stored and decoded with the base64\_decode() function showed in Figure 30. The student photo is then stored in a temporary folder for use in the face recognition process. By using escapeshellcmd() and shell\_exec(), we pass the student photo to the face recognition Python file. After the Python file recognizes the student, it returns the student ID. By using the json\_decode() function, we decode the JSON value and store it in a PHP variable.



```
import face_recognition as fr
import cv2 as cv
import os
import sys

who = sys.argv[1]
sid = sys.argv[2]
# who = "/Applications/MAMP/htdocs/2022-GP1-12/MasroofiCode/images/Students/21_53574.png"
# sid = 1

target_image = fr.load_image_file(who)
target_encoding = fr.face_encodings(target_image)

def encode_faces(folder):
    list_people_encoding = []
    for filename in os.listdir(folder):
        known_image = fr.load_image_file(f'{folder}{filename}')
        known_encoding = fr.face_encodings(known_image)[0]
        list_people_encoding.append((known_encoding, filename))
    return list_people_encoding

label = 0
def find_target_face():
    face_location = fr.face_locations(target_image)
    for person in encode_faces(f'/Applications/MAMP/htdocs/2022-GP1-12/MasroofiCode/images/Students/det_{sid}/'):
        encode_face = person[0]
        filename = person[1]
        is_target_face = fr.compare_faces(encode_face, target_encoding, tolerance=0.55)
        #if face found
        if face_location:
            face_number = 0
            for location in face_location:
                if is_target_face[face_number]:
                    nameRandom = os.path.splitext(filename)[0]
                    label = nameRandom.split('_')[0]
                    print(label)
                    create_frame(location, label)
                face_number+=1

def create_frame(location, label):
    top, right, bottom, left = location

    cv.rectangle(target_image, (left,top), (right, bottom), (255, 0,0), 2)
    cv.rectangle(target_image, (left,bottom + 20), (right, bottom), (255, 0,0), cv.FILLED)
    cv.putText(target_image, label, (left+3, bottom+14), cv.FONT_HERSHEY_DUPLEX, 0.4, (255,255,255), 1)

def render_image():
    rgb_img = cv.cvtColor(target_image, cv.COLOR_BGR2RGB)
    # cv.imshow('Face Recognition', rgb_img)
    # cv.waitKey(0)

find_target_face()
render_image()
```

Figure 31 Face Recognition4

You can see the face recognition Python file in Figure 31. The first step is to store the student's photo and school ID. Next, we use the face\_recognition package's load\_image\_file() function to load the photo containing the student's face so that the model can identify its location within the image. Load\_image\_file() converts an image to a NumPy array that contains a matrix of each pixel. After that, we encode the target student photo with the face\_recognition package's face\_encoding() function. The algorithm notes certain important measurements on the face like the size, color, and slant of eyes, the gap between eyebrows, etc. All of these factors define face encoding. It is the information obtained out of the photo that is used to identify the particular face. Now that we have the target photo, we can compare it with all the other students' pictures stored on the Masroofi server. That are uploaded by the parents. When find\_target\_face() is called, it uses the face\_locations() method, which takes an array of NumPy images from load\_image() and runs them through a "HOG" based model, a Histogram of



Oriented Gradients algorithm [26]. It returns a list of the coordinates of the faces it detects. The numbers map to the top, right, bottom, and left of the image. By looping through the list of face locations and encodings stored in Masroofi server for the school's students' photo, it will see if there are any matches. With fr.compare\_faces(), we compare the encoding of known faces to the encoding we are checking. Is\_target\_face contains a Python list of all the faces it's trying to find. When the face is found, we extract the student ID we saved during parent uploading and save it in the variable label.

```
$resultImage = json_decode($result135);
$img = $photename;
$imgpath = "/Applications/MAMP/htdocs/2022-GP1-12/MasroofiCode/images/Students/Check/".$img;
unlink( $imgpath );

if ($result135 > 0){
    echo 'success';
    echo $resultImage;
}

} else {
    echo die('Could not save image! check file permission.');
}
```

Figure 32 Face Recognition5

The purpose of this step shown in Figure 32 is to check if there is a returned student ID. In this case, we return the ID back to the AJAX request.

```
processData: function(),
success: function(data) {
    var response = data.split(",");
    if(response[0] == 'success') {
        $("#count").val(parseInt(response[1]));
        hello();

        Webcam.reset();

        $('#my_camera').addClass('d-block');
        $('#my_camera').removeClass('d-none');

        $('#results').addClass('d-none');

        $('#takephoto').addClass('d-block');
        $('#takephoto').removeClass('d-none');

        $('#retakephoto').addClass('d-none');
        $('#retakephoto').removeClass('d-block');

        $('#uploadphoto').addClass('d-none');
        $('#uploadphoto').removeClass('d-block');

        $('#photoModal').modal('hide');
        $('#photoModal').modal('hide');

    }
    else {
        swal({
            title: 'Error',
            text: 'Student is Not Recognized! Search his Name',
            icon: 'error'
        })
    }
}
```

Figure 33 Face Recognition6

If the AJAX retuned is successful. In order to continue purchasing, as shown in figure 33 we send the student ID and student information to the sales page. Otherwise, an error message will appear.



#### 4.6.5 Deposit Into Student's Wallet

While choosing the payment gateway to use in our system, it was difficult to select a secure and reliable payment gateway that accepted all types of credit cards. We compared and searched for the [most popular payment gateways in Saudi Arabia](#). Choosing a gateway that is secure and allows us to create test accounts was another challenge. After searching, we decided to use Moyasar as our payment gateway. The next challenge was how to link our system and Moyasar. Moyasar provides a REST API that uses HTTP methods for requests, authenticates via HTTP Basic Auth, and returns responses in JSON format. Moyasar provide us with two test keys: secret and publishable. The secret key is powerful and must be kept secret at all times. The publishable key enables us to perform one operation only: create a payment. Thus, we attached the publishable key to the payment form.

```
<!-- Moyasar Styles -->
<link rel="stylesheet" href="https://cdn.moyasar.com/mpf/1.7.3/moyasar.css">

<!-- Moyasar Scripts -->
<script src="https://polyfill.io/v3/polyfill.min.js?features=fetch"></script>
<script src="https://cdn.moyasar.com/mpf/1.7.3/moyasar.js"></script>
```

Figure 34 Payment Deposit1

As shown in Figure 34. We start the integration by including the official Moyasar CDN server URLs in the head section of the pages that contain payments. Those are the parent cart and add Masroof pages.

```
div class="musr-form">
<form class="needs-validation" novalidate action="" method="POST" enctype="multipart/form-data" autocomplete="off" onkeydown="return event.key != 'Enter';">
<!-- moyasar -->

<script>
  Moyasar.init({
    // Required
    // Specify where to render the form
    // Can be a valid CSS selector and a reference to a DOM element
    element: '.musr-form',

    // Required
    // Amount in the smallest currency unit
    // For example:
    // 10 SAR = 10 * 100 Halalas
    // 10 KWD = 10 * 1000 Fils
    // 10 JPY = 10 JPY (Japanese Yen does not have fractions)
    //amount: 1000,
    amount: 'php echo $amount2; ?',

    // Required
    // Currency of the payment transaction
    currency: 'SAR',

    // Required
    // A small description of the current payment process
    description: 'This payment is for <?php echo $name;?> schools',

    // Required
    // publishable_api_key: 'pk_test_qM3jKkfAt6096ghCaMN4wo8Nxfquvph08baFhwu',
    publishable_api_key: 'pk_test_qM3jKkfAt6096ghCaMN4wo8Nxfquvph08baFhwu',

    // Required
    // This URL is used to redirect the user when payment process has completed
    // Payment can be either a success or a failure, which you need to verify on your system (We will show this in a couple of lines)
    callback_url: 'http://localhost/2022-GPI-12/MasroofCode/ParentChildPagePayment.php?tid=<?php echo $id; ?>&amount1=<?php echo $amount1; ?>&amount=<?php echo $walletamount; ?>&sid=<?php echo $id; ?>',

    // Optional
    // Required payments methods
    // Default: ['creditcard', 'applepay', 'stcpay']
    methods: [
      'creditcard',
    ],
  });
</script>
<!-- end moyasar -->
</div>
</form>
```

Figure 35 Payment Deposit2



In Figure 35 we are initiating the payment by placing the form, adding the Moyasar <div> tag and then invoking the init method on the global Moyasar class. We need to specify the following in the init method:

- 1- **Amount:** The payment amount we have saved in the database from parents' actions. Either when they pay for the cart or when they deposit money into their child's Masroofi wallet.
- 2- **Currency:** SAR is the currency in which our payments are made.
- 3- **Description:** A description of the current payment process with the child's school name included. This is useful because in Moyasar dashboard, we need to know what school the payment process belongs to.
- 4- **Publishable API Key:** Our payment API key is required to perform the required payment actions.
- 5- **Callback URL:** The URL to which the parent will be redirected when payment is successful.
- 6- **Methods:** Required payment method.

#### Payment Lifecycle:

- 1- The user clicks on the pay button.
- 2- Payment details is sent securely to Moyasar servers and then processed.
- 3- The user is then redirected to the 3-D Secure page for validation.
- 4- If the payments succeed, the user is redirected back to the URL specified in callback\_url.



```
<?php
if ($status=="failed"){
?>

<div class="authincation h-100">
    <div class="container h-100">
        <div class="row justify-content-center h-100 align-items-center">
            <div class="col-md-5">
                <div class="form-input-content text-center error-page">
                    <!-- <h1 class="error-text fw-bold">Success</h1> -->
                    <h3 class=" fw-bold" style="font-size:5rem ;"><i class="bi bi-x-circle" style="color : red;"></i> Failed!!</h3>
                    <h6>Payment Failed!! <br> Please Try again.</h6>
                    <META HTTP-EQUIV="Refresh" Content="3; URL=ParentChildPage.php?id=<?php echo $tid ;?>">
                </div>
            </div>
        </div>
    </div>
</div>
<?php
}

?>

<?php
if ($status=="paid"){

?>

<div class="authincation h-100">
    <div class="container h-100">
        <div class="row justify-content-center h-100 align-items-center">
            <div class="col-md-5">
                <div class="form-input-content text-center error-page">
                    <!-- <h1 class="error-text fw-bold">Success</h1> -->
                    <h3 class=" fw-bold" style="font-size:5rem ;"><i class="bi bi-check2-circle" style="color:green ;"></i> Success!!</h3>
                    <h6>Your Payment was Successful!! <br> Amount has been added to wallet successfully</h6>
                    <META HTTP-EQUIV="Refresh" Content="3; URL=ParentChildPage.php?id=<?php echo $tid ;?>">
                </div>
            </div>
        </div>
    </div>
</div>
</div>
```

Figure 36 Payment Deposit3

After the user has completed the payment and been redirected to the callback\_url we provided earlier, the following HTTP query parameters will be appended: id, status, message. It is necessary to verify the status of the payment before accepting payment orders or proceeding with any action. As shown in Figure 36, we will fetch the payment based on its parameters and determine whether it has been successful or failed, and we will inform the parent accordingly.

#### 4.6.6 GitHub Link

<https://github.com/HutoonAlomran/2022-GP1-12>



## 5 System Evaluation

The System Evaluation assesses whether the software meets the desired requirements and quality standards. It includes user testing, demographics, feedback, quality testing, and a discussion of the findings.

### 5.1 User Acceptance Testing

This section presents a summary of User Acceptance Testing (UAT) conducted on the system. The UAT aimed to evaluate the system's acceptance by its intended users by performing three phases of testing. The first phase involved five canteen moderators with varying technical expertise. The second phase involved eight school administrators from both private and public schools to obtain a more representative sample. The third phase involved nine parents.

The testing results were extensively analyzed to determine the system's ability to meet its intended objectives. In addition, they were used to identify areas for improvement. The UAT proved to be an invaluable tool in evaluating user experience. It ensured that the system is fit for purpose and caters to the needs of its intended users. The insights gained from the testing are instrumental in further improving the system. We are confident that the improvements made based on the UAT results will enhance the system's effectiveness and user satisfaction.

#### 5.1.1 Demographics of Participants

Relevant demographic information of the UAT testers shown in Table 9 bellow.

Participant No	Age	Gender	Technical Background	User Type
1	33	Female	Has technical background	Canteen Moderator
2	39	Female	Has technical background	Canteen Moderator
3	46	Female	Has technical background	Canteen Moderator
4	43	Male	Has technical background	Canteen Moderator
5	44	Male	Has technical background	Canteen Moderator
6	49	Female	Has technical background	School Admin
7	53	Female	Has technical background	School Admin
8	49	Male	Has technical background	School Admin
9	49	Female	Has technical background	School Admin
10	41	Female	Has technical background	School Admin
11	45	Male	Has technical background	School Admin



Participant No	Age	Gender	Technical Background	User Type
12	48	Male	Has technical background	School Admin
13	41	Female	Has technical background	School Admin
14	39	Female	Has technical background	Parent
15	32	Male	Has technical background	Parent
16	29	Female	Has technical background	Parent
17	28	Female	Has technical background	Parent
18	30	Male	Has technical background	Parent
19	32	Female	Has technical background	Parent
20	30	Female	Has technical background	Parent
21	38	Male	Has technical background	Parent
22	41	Male	Has technical background	Parent

Table 9 Demographics of Participants

### 5.1.2 Questionnaire/Interview Results

In this section, we present the results of the user testing that were conducted. By providing a comprehensive overview of users' experiences, opinions, and suggestions, it can help inform further improvements and ensure that it meets their needs.

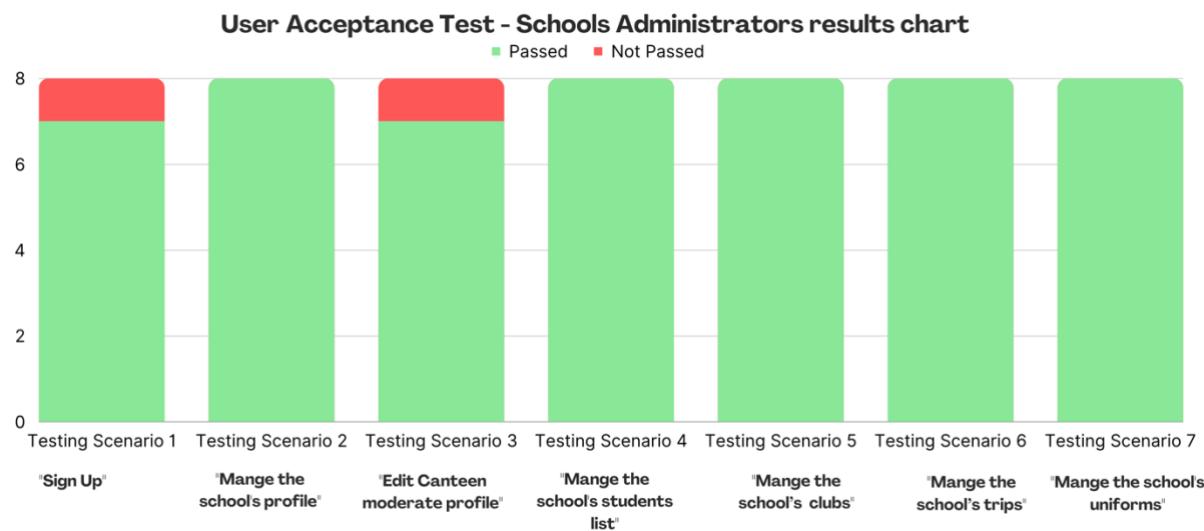
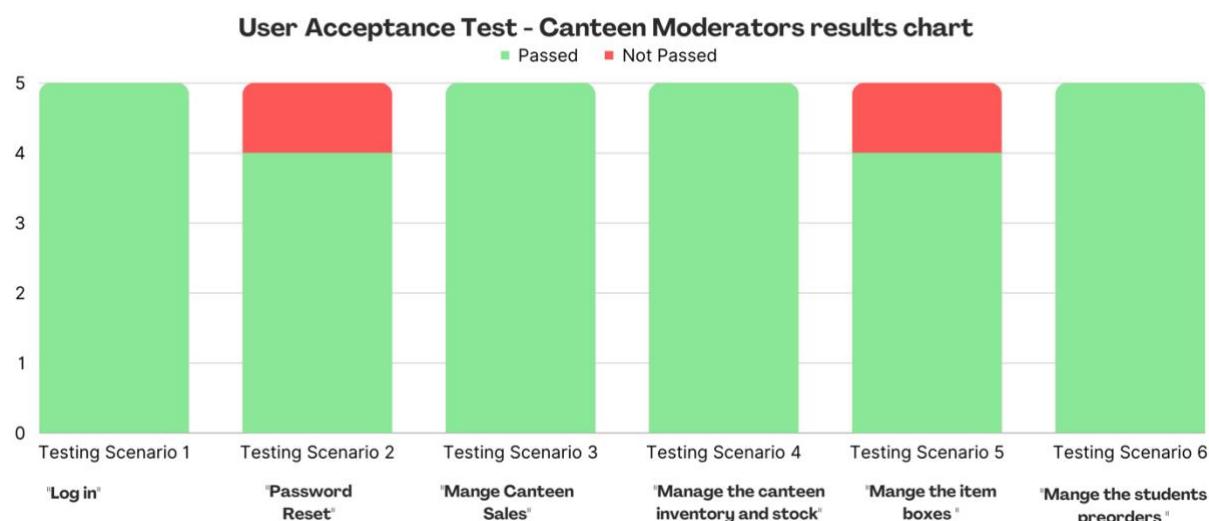


Figure 37 UAT School Admins results chart

Based on the chart presented in Figure 37, it can be inferred that the majority of the eight school administrators who participated in the UAT testing were able to successfully complete all the assigned tasks. However, one school administrator encountered some difficulties with registering and editing canteen information. Through a meeting, we were able to address the



issue by providing them with a detailed user guide and explaining certain steps. The detailed results of the school admins questionnaire can be found in Appendix E.



**Figure 38 UAT Canteen Moderators results chart**

The results of the User Acceptance Testing (UAT) for the canteen moderators are presented in Figure 38. Out of the five moderators who participated in the testing, four were able to successfully complete all the assigned tasks. However, one moderator experienced difficulties with resetting the password and managing the item boxes. Through a meeting, we were able to address the issue by providing them with a detailed user guide and explaining certain steps.

The testing scenarios were provided to all moderators, and they were asked to complete a questionnaire consisting of 10 questions. The detailed results of the questionnaire can be found in Appendix G. Overall, the UAT results indicate that the system is user-friendly and functional, with only minor issues encountered by one moderator, which were resolved through support and guidance.

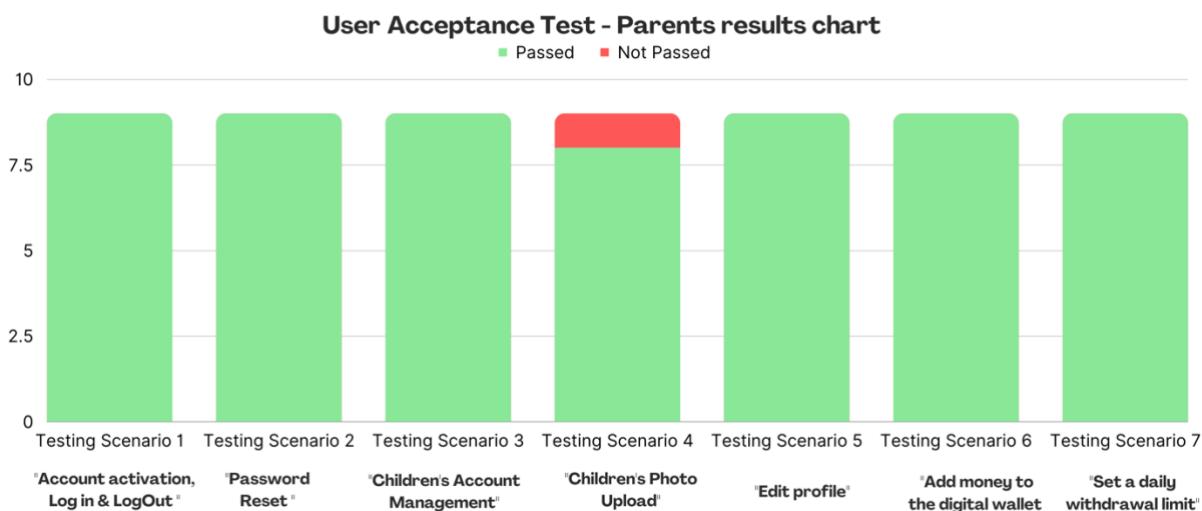


Figure 39 UAT Parents results chart1.

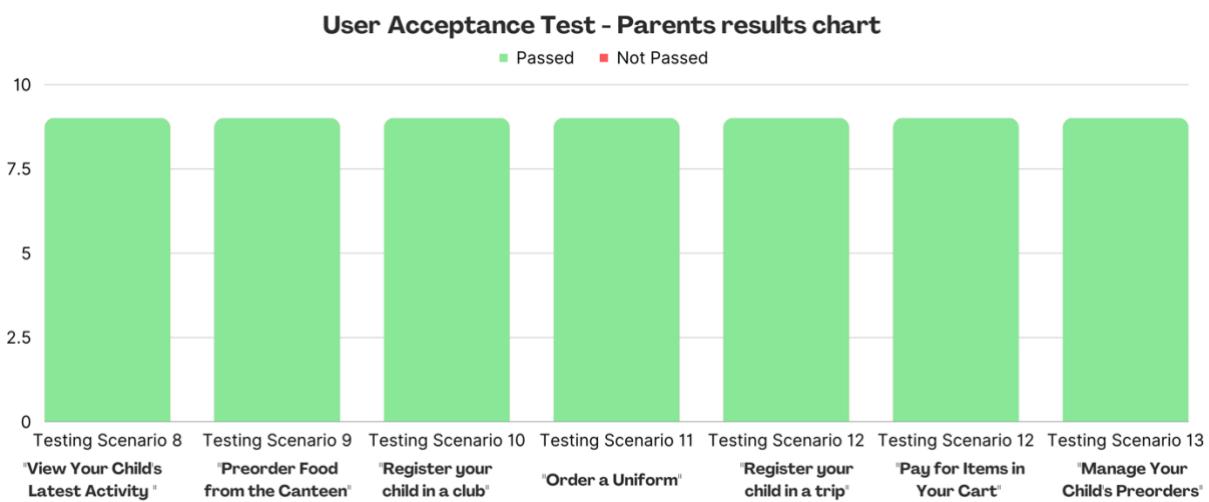


Figure 40 UAT Parents results chart2.

The results of the User Acceptance Testing (UAT) for the parents shown in Figure 39 and 40 revealed that the majority of the 8 participants were able to complete all the assigned tasks successfully. However, one parent encountered some difficulties with the "Children's Photo Upload" feature. Following a meeting with the parent, we provided them with a detailed user guide and explained certain steps to resolve the issue. A questionnaire containing 15 questions was administered to them along with the testing scenarios. The detailed results of the questionnaire can be found in Appendix F.

UAT testing was conducted with 8 school admins, 5 canteen moderators, and 9 parents to evaluate the Masroofi system. The results indicate that most school admins (62.5%) believe that the implementation of a cashless payment system would be convenient. Additionally,



62.5% of school admins agree that overcrowding in the canteen is an issue, and the same percentage believes that the features of face recognition and pre-ordered meals would effectively address the issue of overcrowding. Only 12.5% of school admins have a systematic approach for allergic students. However, 62.5% of school admins strongly agree that the system's capability to prevent students with allergies from buying food items containing allergens would effectively enhance the safety and well-being of their students.

In the case of 5 canteen moderators, 60% strongly agree that schools should implement a cashless payment system. Furthermore, 60% of moderators believe that using Masroofi for managing their school's canteen stock and sales would simplify the process, reduce the need for administrative staff, and improve efficiency. 60% of moderators also agree that overcrowding is an issue in the canteen, and the same percentage believes that implementing features such as face recognition and pre-ordered meals would be an effective solution to address the issue of overcrowding. Only 40% of moderators agree that they have faced difficulties related to food safety, specifically regarding the risk of allergens causing harm to students. However, 40% of moderators believe that implementing a system that prevents students with allergies from purchasing food items containing allergens would effectively improve the safety and well-being of their students. Additionally, 40% of moderators agree that Masroofi provides a fast and efficient payment process, quicker service, and shorter queues to reduce crowdedness.

In the case of 9 parents, 77.8% strongly agree that schools should implement a cashless payment system, and 66.7% strongly agree that using face recognition as payment is safe and trustworthy. Furthermore, 66.7% of parents strongly agree that the ability to deposit money into their children's wallets eliminates the need to provide cash and change every day. Additionally, 77.8% of parents strongly agree that they felt comfortable setting daily limits for their child's canteen purchases. Moreover, 66.7% of parents strongly agree that the purchase history tracking feature was useful to them. However, only 11.1% of parents have a neutral opinion on whether using face recognition as payment is safe and trustworthy, and 22.2% of parents disagree with it.



## 5.2 Quality Attributes (NFR testing)

Non-functional requirements testing results shown in Table 10 below.

User story	Quality Attribute	Measure	Results
As a school admin I want my school financial dashboard to display within 7 seconds on my request so that I can keep track of the updates on my school financial performance.	Performance: How responsive is the system and its components? How well it handles traffic and how efficiently the site can handle user requests?	Time to First Byte: (TTFB) is the amount of time it takes for the browser to receive the first byte of data from the server after a request is made. It's a measure of how long it takes for the server to start processing and sending data in response to a request.  Page load: time is the amount of time it takes for a webpage to fully load in a browser. It is a measure of how long it takes for all of the resources required to render a webpage (e.g., images, scripts, stylesheets) to be downloaded and processed by the browser.	We start by using GTmetrix website and enter the URL of the school dashboard page in the text box provided. Select a test location from the drop-down menu. Click on the "Test your site" button to start the test.  GTmetrix will analyze website's performance and generate a report that includes several metrics, including the Time to First Byte (TTFB) and Page Load Time metrics. After calculating the performance of the task for 4 times we found that the maximum time of the task was 1393ms as shown in <b>Figure 41 and 42</b>  The numbers that we got considered acceptable or even good for most websites.  A Fully Loaded Time of <b>1.3</b> seconds is considered good or even excellent for most websites. A TTFB of <b>130ms</b> is considered good, as it indicates that the server is responding quickly to requests.
As a user I want to learn how to use the main functionality of the system within 5-10 minutes so that I save my time and not get frustrated.	Usability: refers to the ease of use and how well users can accomplish specific tasks and how satisfied they are with the process.	Task completion rate typically calculated as the percentage of users who successfully complete a specific task out of the total number of users who attempted the task.	Explain the test scenario (steps) Identify the specific task to test (Add new student). Gather a group of representative users to complete the task which are 5 school admins. Record the number of users who attempted the task (n) Record the number of users who successfully completed the task (s) Calculate the task completion rate as: $(s / n) \times 100$



			We tested 5 school admins, and all of them completed all 5 tasks successfully within 2-10 min. Thus, the success rate equation = $5 / 5 \times 100 = 100$ and that what we aimed for
As a user I want the website to be available 99% of the time I try to access it, so that I can access and manage my account whenever I need.	Availability: The amount of time that the website, is accessible and responsive to users.	Measure uptime percentage: calculate the uptime percentage by dividing the total amount of time the website was available by the total amount of time we've monitored it. Uptime Percentage = $(\text{Total Uptime} / \text{Total Monitoring Time}) \times 100$	We used an uptime monitoring tool, "UptimeRobot," to periodically monitor the availability of our website by sending requests and checking for a response. We determined the monitoring period to be 2 weeks. We calculated the total amount of time the website was available by subtracting the total downtime from the total monitoring time. In this case, the total monitoring time was 342 hours (14 days x 24 hours per day), and the total downtime was 0 hours, as the website was available the entire time. We calculated the uptime percentage using the formula $(\text{total uptime} / \text{total monitoring time}) \times 100$ . In this case, the uptime percentage is $(342 / 342) \times 100 = 100\%$ . Based on these results in <b>Figure 43</b> , we can conclude that the website was available 100% of the time during the monitoring period, indicating that the website has high availability and reliability.

Table 10 NFR Testing



## Speed Visualization ?

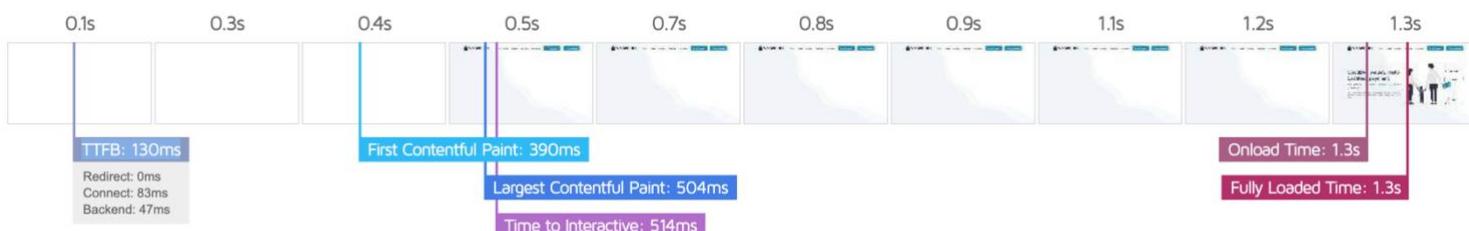


Figure 41 Performance Summary showing acceptable website performance

The Performance Summary in Figure 41 shows a Fully Loaded Time of 1.3 seconds, while the Performance Detail shows a Time to First Byte (TTFB) of 130ms, both of which are considered good or even excellent for most websites. These results indicate that the website is performing well, and the server is responding quickly to requests.

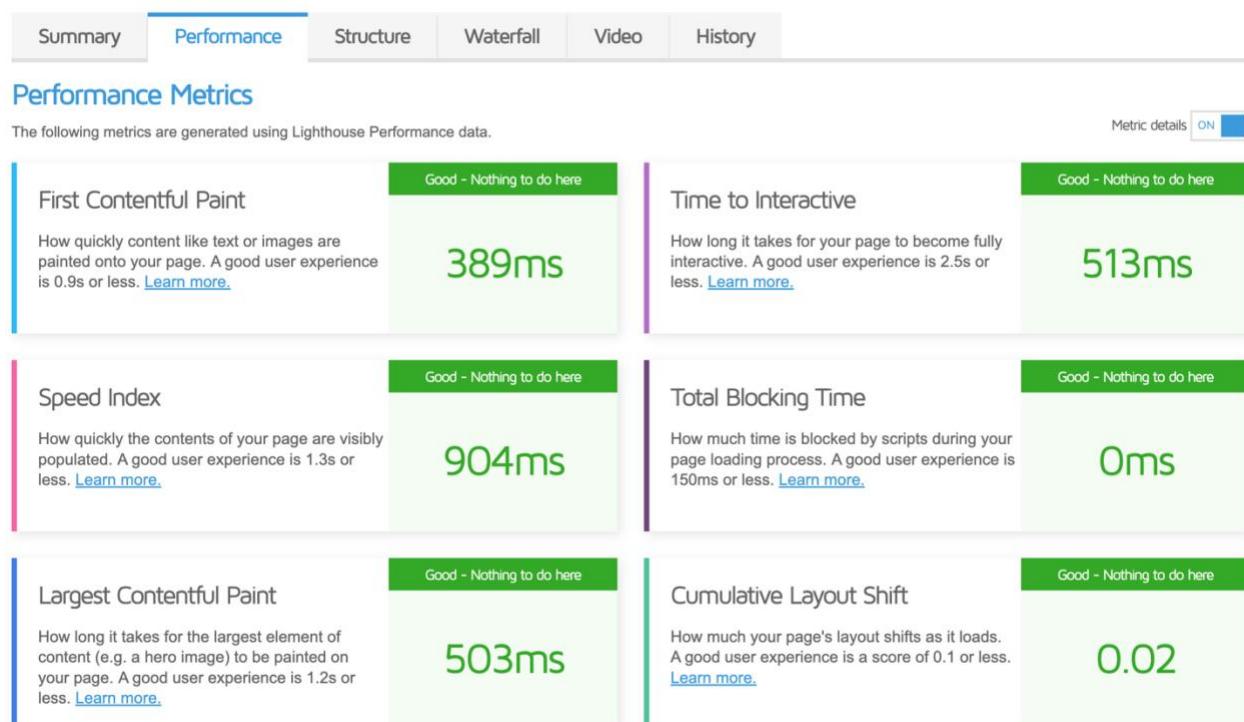


Figure 42: displays the Lighthouse Performance Metrics that are important for monitoring website performance.

Metrics shown in Figure 42 can help identify areas for improvement in website performance and provide insights into how users interact with the website. Notably, the metrics show a Fast First Contentful Paint of 389ms, a Quick Time to Interactive of 513ms, and a Good Speed Index of 904ms, all of which indicate a well-performing website. Additionally, the metrics



show zero Total Blocking Time and low Cumulative Layout Shift score of 0.02, which contribute to a smooth and uninterrupted user experience.

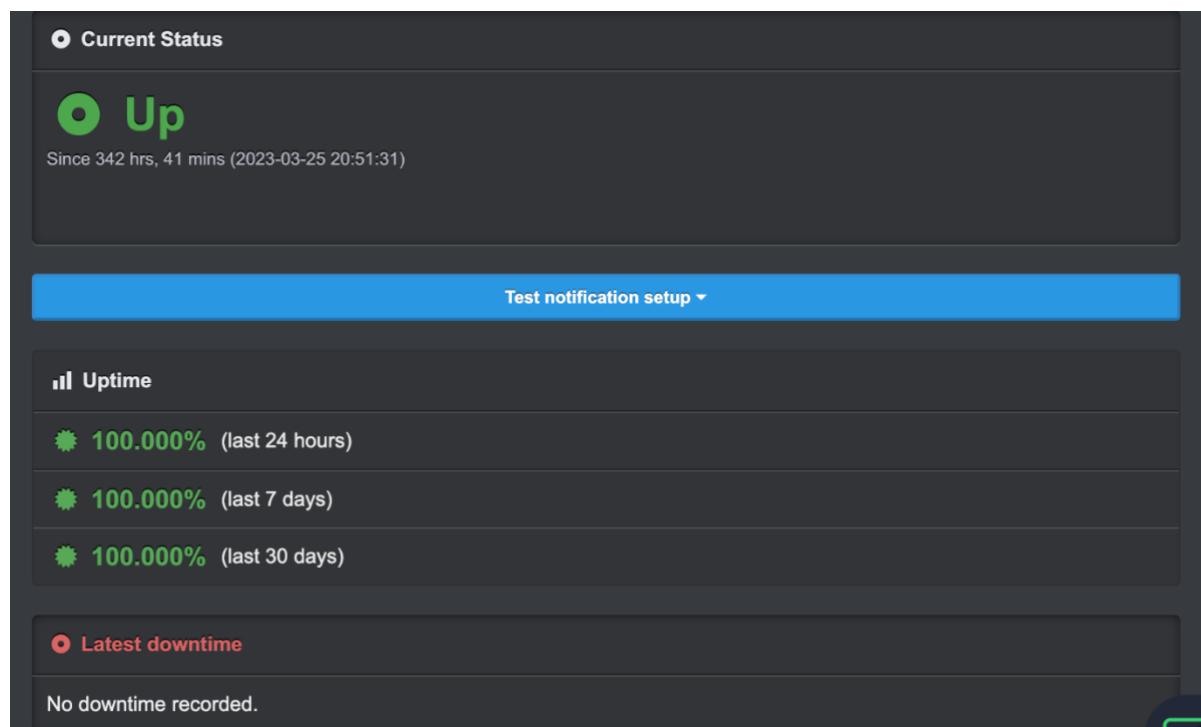


Figure 43: Uptime Monitoring Results for Website Availability

Using the uptime monitoring tool, "UptimeRobot," we were able to monitor the availability of our website over a two-weeks period. Figure 43 shows the results of this monitoring, which indicate that the website was available 100% of the time during the monitoring period. This high level of uptime suggests that the website is always reliable and available for users, providing a positive user experience. The total monitoring time was 342 hours, and the total downtime was 0 hours, highlighting the website's consistent availability. These uptime results demonstrate that the website is performing optimally and functioning efficiently.

### 5.3 Discussion

Based on the results obtained from the UAT testing, it can be concluded that the implementation of a cashless payment system in schools is highly convenient and has the potential to bring numerous benefits such as improved efficiency, reduced administrative costs, and alleviated issues related to canteen overcrowding. The majority of respondents across all categories, ranging from schools to parents, strongly agreed or agreed with this statement, with agreement levels ranging from 60% to 87.5%.



Moreover, the implementation of additional features such as face recognition and pre-ordered meals was viewed positively by the majority of respondents, indicating that these features could effectively address the issue of canteen overcrowding. Respondents were also positive about the safety and security of the system, with a significant percentage of them agreeing that the system's capability to prevent students with allergies from buying food items containing allergens would effectively enhance the safety and well-being of students.

However, some concerns were expressed by a small percentage of respondents regarding the visual appeal of the user interface and the need for further improvement in certain areas. These concerns should be taken into consideration to improve the overall user experience and satisfaction.

Regarding the NFR testing results, it is evident that the website is performing exceptionally well in terms of speed, availability, and usability. The website's Fully Loaded Time of 1.3 seconds and TTFB of 130ms are considered good or excellent for most websites, while the website's uptime percentage of 100% implies that it is always available to users. Additionally, the user story tested for the main functionality of the system showed a success rate of 100%, indicating that users were able to complete the tasks successfully within the desired time frame of 5-10 minutes.

Overall, the results obtained from both UAT and NFR testing suggest that the system is performing well, and users are generally satisfied with its features and functionality. However, there is always room for improvement, and feedback from users should be considered to enhance the user experience and satisfaction further. This could involve improving the visual appeal of the user interface, addressing concerns expressed by users, and exploring additional features that could bring further benefits to the system.



## 6 Conclusions and Future Work

With the help of Masroofi, Saudi schools will become more technical and efficient. The impact of online payments in schools on the global economy will be significant since the education sector is so large. The availability of online payment systems leads to a virtuous economic cycle whereby increased consumption leads to increased production, more jobs, greater income, and ultimately stronger economic growth. Implementing Masroofi would likely include improved efficiency and security. Schools and parents would also benefit from this type of system in terms of using digital technology and promoting financial literacy. The local impact would likely include increased convenience for parents and school canteen moderators, as well as improved financial tracking and accountability for the school. This can also help to reduce the risk of fraud, theft and viruses spreading (e.g., COVID-19) associated with cash transactions. Additionally, handling cash payments could be simplified and reduced in time and resources. It would eliminate the need to use paper for transactions between schools and parents.

There were a few problems encountered during the software development process. At the beginning, the schools refused to provide us with students' data due to their privacy concerns. So, Masroofi students' data had to be entered by us. Finding the right target group for user testing was another challenge. We spent a lot of time finding school admins who would be willing to test our website. Also, we had some problems connecting Python to PHP for most of our heavy and critical features, like face detection, recognition, etc. The integration of data and images across two languages was difficult to convey, translate, and implement.

As a limitation, our system does not have a school fees payment feature. The system does not allow direct communication between schools and parents. As the system is limited to school payments, it does not consider absences, online classes, or schedules. One additional limitation of the Masroofi system is that parents are unable to choose a specific date and time for pre-ordering items due to the uncertainty of future stock availability. This is particularly relevant in Saudi school canteens, where canteen moderators often do not know what items will be available in stock and do not pre-order them.

The main contribution of Masroofi is the development of a cashless payment system for schools in Saudi Arabia. This system will facilitate transactions between schools, parents, and school canteen moderators by allowing payments to be made digitally, eliminating the need for cash transactions. Also, reduce canteen waiting lines by implementing payment with face



recognition technology. This will enhance the convenience and security of financial transactions within the school system, making the process faster and more efficient.

In our future work, we want to increase our scope and include more features that will be beneficial to parents and schools. Absher and Noor will be linked to our website so that we are not reliant on the parents to upload their children's pictures. This will also assist us in collecting accurate and reliable student data. Additionally, it will reduce the amount of time needed for school staff to manually enter each student and fill in the information, which is prone to error. Madrasati will also be connected to our website so that parents can find everything they need for their children in one location. Direct chat communication between parents and schools will be implemented. Additionally, parents will be able to cancel trips and clubs and receive refunds to their personal cards. To simplify the process of entering student information, Masroofi will be able to extract data from any excel sheet uploaded by school staff. These enhancements will improve the usability and efficiency of Masroofi for both parents and schools.



## 7 Acknowledgements

We begin by expressing our deepest gratitude and thanks to Allah for granting us the strength and guidance to successfully complete the Masroofi project.

Our project would not have been possible without the constant supervision and support of Dr. Nourah AlRossais and Dr. Wejdan AlKhaldi, and we extend our heartfelt appreciation to them for their invaluable contributions.

We are also grateful to Dr. Hend AlRasheed for her expertise in agile frameworks and for serving as our scrum master.

We would also like to extend our appreciation to King Saud University's College of Computer and Information Sciences, specifically the Information Technology department, for providing us with the opportunity to participate in their learning program.

Finally, we would like to express our sincere love and gratitude to our families for their unwavering support and inspiration throughout this project and all of our endeavors.



## 8 Achievements

We are thrilled to announce that Masroofi has achieved outstanding success in the field of innovation and entrepreneurship. The project has been selected for the prestigious مبادرة تطوير الابتكار بمعهد رياادة الأعمال provided by مركز النماذج الأولية للأفكار والتطبيقات المبتكرة at King Saud University [27], which is a testament to the exceptional quality and innovative approach of the project. Additionally, Masroofi has been chosen out of hundreds of researchers for محور الأبحاث العلمية [28] الملتقى العلمي 13 لطلاب وطالبات جامعة الملك سعود للبحث والإبتكار والموهبة provided by the university. These recognitions reflect the hard work, dedication, and innovative mindset of Masroofi's team.

Moreover, we are excited to share that we are planning to publish two papers about Masroofi in respected academic journals. The first paper is titled "MASROOFI: Saudi Canteen Payment System Using Face Recognition Technology" provided in APPENDIX H and the second paper is titled "MASROOFI: Canteen Management System and More." provided in APPENDIX I. The papers will be published soon, and we believe they will further demonstrate the project's research capabilities and scientific contributions.

It is an honor for Masroofi to be recognized for such outstanding accomplishments. We are confident that it will continue to make a meaningful impact in the field of innovation and entrepreneurship.



## 9 References

- [1] *Digital payments in Saudi Arabia surge by 75% amid pandemic.* (2021, January 8). ArabNews. <https://www.arabnews.com/node/178886/business-economy>
- [2] Growth Potential of Private Educationin Saudi Arabia. SEP. 2018. By Strategic Gears Management Consultancy. <https://argaaamplus.s3.amazonaws.com/8960e9c4-e262-4c96-a033-b766ce1ced2c.pdf>
- [3] Statista. (2022, January 7). School students in Saudi Arabia 2013–2019. <https://www.statista.com/statistics/628665/saudi-arabia-total-number-of-students/>
- [4] Loh, E., Loh, E., & Loh, E. (n.d.). Why are Cashless Payment Systems the Way to Go for Schools? Elwyn Loh. <https://littlevoices.littlelives.com/why-are-cashless-payment-systems-the-way-to-go-for-schools?hsLang=en>
- [5] Callaghan, Chris. “Top 10 Ways to Generate Income for Your School.” *Top 10 Ways to Generate Income for Your School*, 21 July 2022, [blog.schoolsandacademinesshow.co.uk/top-10-ways-to-generate-income-for-your-school](http://blog.schoolsandacademinesshow.co.uk/top-10-ways-to-generate-income-for-your-school).
- [6] How Does Online Payment Processing Software Work? (2022, September 22). Intellias. Retrieved September 26, 2022, from <https://intellias.com/how-online-payment-processing-platforms-work/>
- [7] *Online Payment Importance and benefits.* (2022, May 18). Defmacro Software Pvt. Ltd. Copyright (C) 2016. Retrieved September 26, 2022, from <https://www.clear.in/s/online-payment-importance-benefits>
- [8] Alahmadi, Rahaf. “رواء الدفع الإلكتروني.” 9 Sept. 2020, [www.rewaatech.com/](http://www.rewaatech.com/)
- [9] *Facial recognition: top 7 trends (tech, vendors, use cases).* (2021, November 9). Thales Group. Retrieved September 26, 2022, from <https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/biometrics/facial-recognition>
- [10] “Facial Recognition: How It Works and Its Safety.” *Facial Recognition: How It Works and Its Safety*, 28 July 2022, [www.electronicid.eu/en/blog/post/face-recognition/en](http://www.electronicid.eu/en/blog/post/face-recognition/en).
- [11] “What Size Is 2MB in Pixels? – BioSidmartin.” *What Size Is 2MB in Pixels? – BioSidmartin*, 10 May 2019, [biosidmartin.com/what-size-is-2mb-in-pixels](http://biosidmartin.com/what-size-is-2mb-in-pixels).
- [12] “What Is Encoding? - Definition From Techopedia.” *Techopedia.com*, [www.techopedia.com/definition/948/encoding](http://www.techopedia.com/definition/948/encoding). Accessed 14 Jan. 2023.
- [13] *Face Detection, because. . . yes - Hugo Alberto Trujillo Martinez.* (2021, December 22). Medium. Retrieved September 26, 2022, from <https://hugoalbertotrujillomartinez.medium.com/face-detection-because-yes-da45865a8b7e>
- [14] “School Meals | Healthy Schools | CDC.” *School Meals / Healthy Schools / CDC*, 19 Oct. 2022, [www.cdc.gov/healthyschools/nutrition/schoolmeals.htm](http://www.cdc.gov/healthyschools/nutrition/schoolmeals.htm).
- [15] Eduspot | Dedicated to Supporting Schools. (2022, August 5). Eduspot. Retrieved September 26, 2022, from <https://eduspot.co.uk/>
- [16] <https://payschools.com/white-papers-and-case-studies/>
- [17] ParentPay - Leading Cashless Payment System for Schools. (2022, September 21). ParentPay. Retrieved September 26, 2022, from <https://www.parentpay.com/>
- [18] OnlineSchoolFees.com. (n.d.). Retrieved September 26, 2022, from <https://onlineschoolfees.com/>



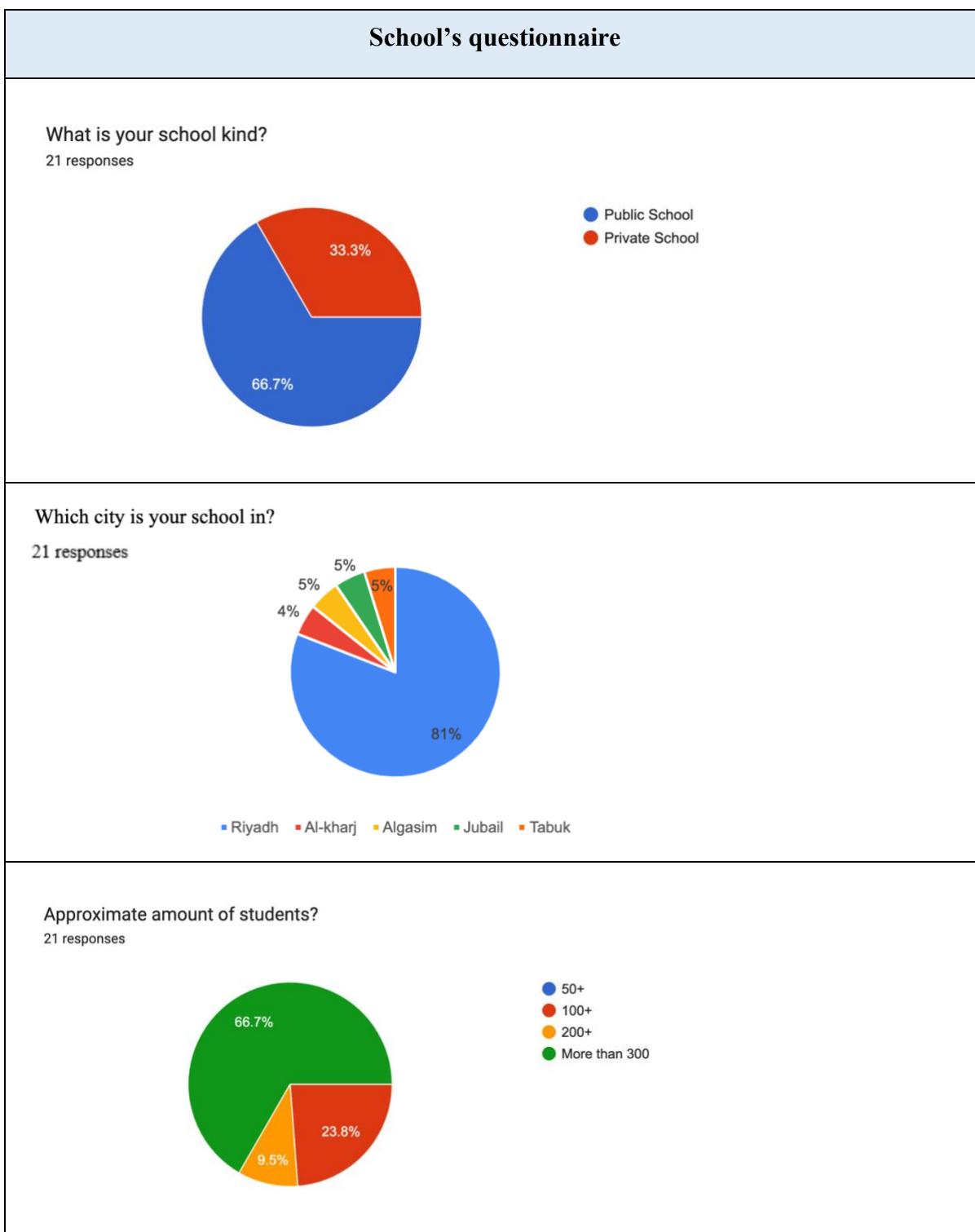
[19] Online School Payments - A Leading Provider Of Online Software Solutions. (n.d.). Retrieved September 26, 2022, from <https://www.osmsinc.com/>

- [20] [العربي] إطلاق نظام "مصروف" لطلاب مدارس القطاع الخاص. 5 September 2022. Retrieved September 26, 2022, from <https://www.alarabiya.net/saudi-today/2022/09/05/%D8%A7%D8%B7%D9%84%D8%A7%D9%82-%D9%86%D8%B8%D8%A7%D9%85-%D9%85%D8%B5%D8%B1%D9%88%D9%81-%D9%84%D8%B7%D9%84%D8%A7%D8%A8-%D9%85%D8%AF%D8%A7%D>.
- [21] “Agile Vs. Scrum: Key Difference Between Methodology.” Guru99, 7 Jan. 2020, [www.guru99.com/agile-vs-scrum.html](http://www.guru99.com/agile-vs-scrum.html).
- [22] PHP: Hypertext Preprocessor. (2022, October 28). <https://www.php.net>
- [23] Juviler, J. (2022, August 11). 9 Guidelines & Best Practices for Exceptional Web Design and Usability. <https://blog.hubspot.com/blog/tabid/6307/bid/30557/6-guidelines-for-exceptional-website-design-and-usability.aspx>
- [24] Wikipedia contributors. (2022, October 27). PHPMailer. Wikipedia. <https://en.wikipedia.org/wiki/PHPMailer>
- [25] “Installation and Getting Started &Ndash; ApexCharts.js.” ApexCharts.js, apexcharts.com/docs/installation. Accessed 14 Jan. 2023.
- [26] “Histogram of Oriented Gradients Explained Using OpenCV.” LearnOpenCV – Learn OpenCV, PyTorch, Keras, Tensorflow With Examples and Tutorials, 6 Dec. 2016, learnopencv.com/histogram-of-oriented-gradients.
- [27] <https://kmsksu.sa/>
- [28] <https://sa.ksu.edu.sa/ar/ssf>



## 10 Appendix

### 10.1 Appendix A

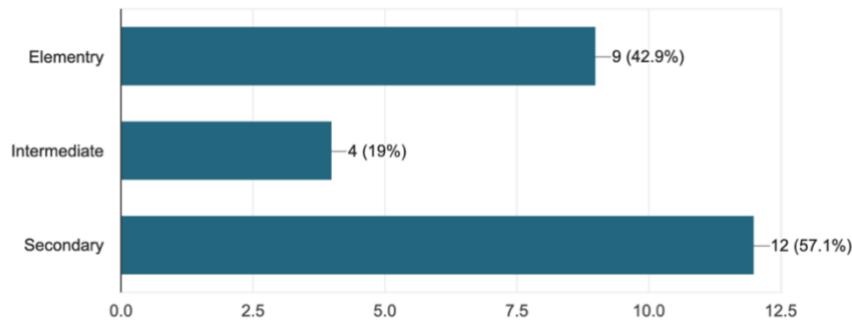




## School's questionnaire

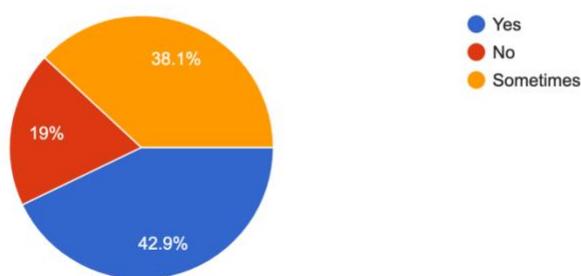
What is your school type?

21 responses



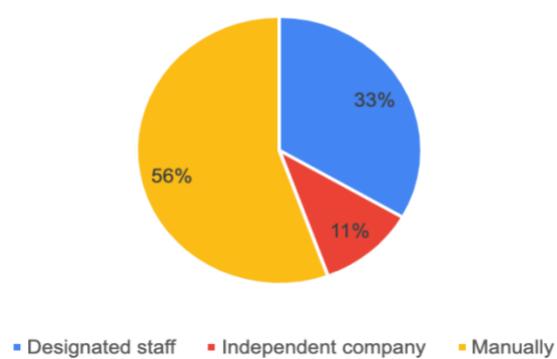
Do you find it challenging to collect cash or any paper based from your students?

21 responses



How do you handle canteen inventory and sales?

21 responses

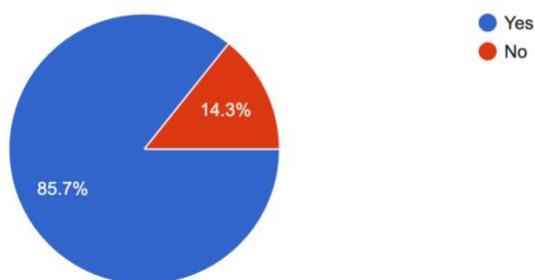




## School's questionnaire

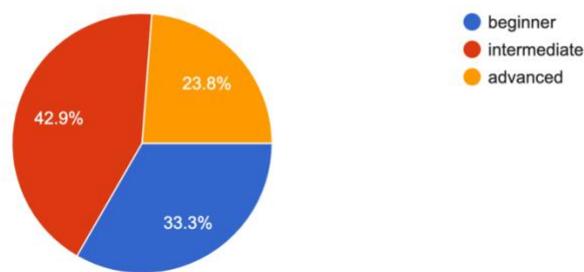
Do you prefer having a dashboard to monitor your school's financial situation?

21 responses



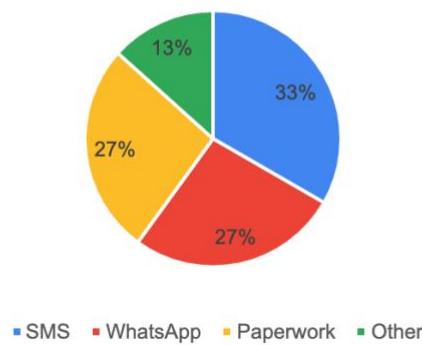
What is the technical level of your school staff?

21 responses



What is your current way of communication with parents in regarding to trips,  
uniforms, clubs and other school activities?

21 responses

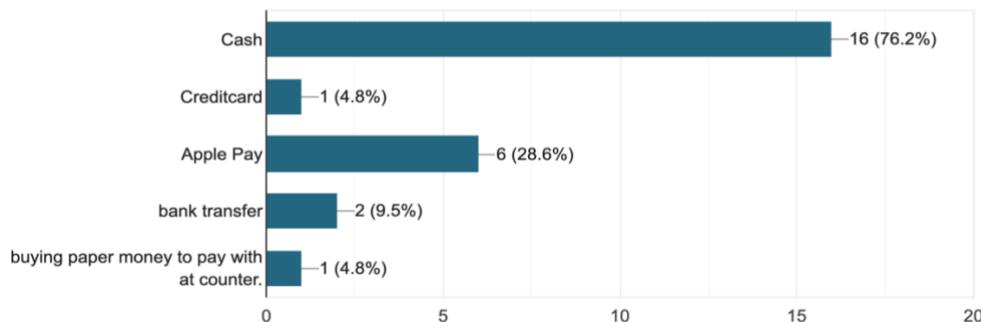




### School's questionnaire

What are the payment methods currently available in your school canteen?

21 responses

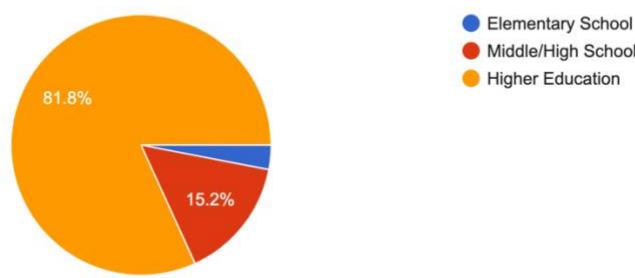


### 10.2 Appendix B

#### Parent questionnaire

What is your level of education?

99 responses

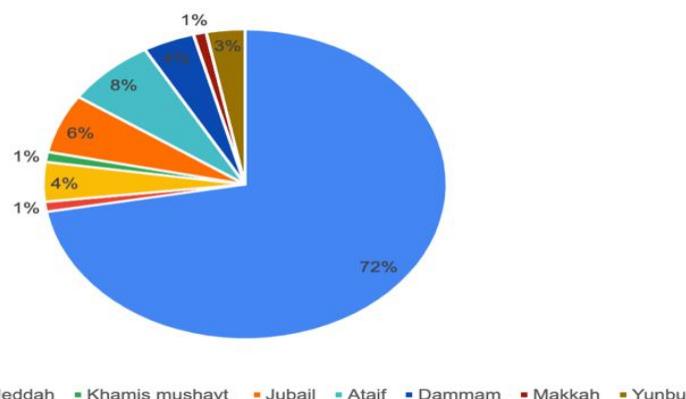




## Parent questionnaire

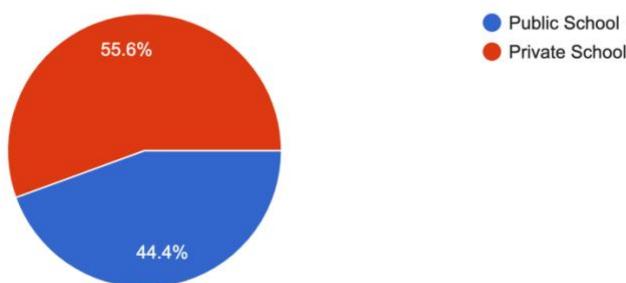
What city do you live in?

99 responses



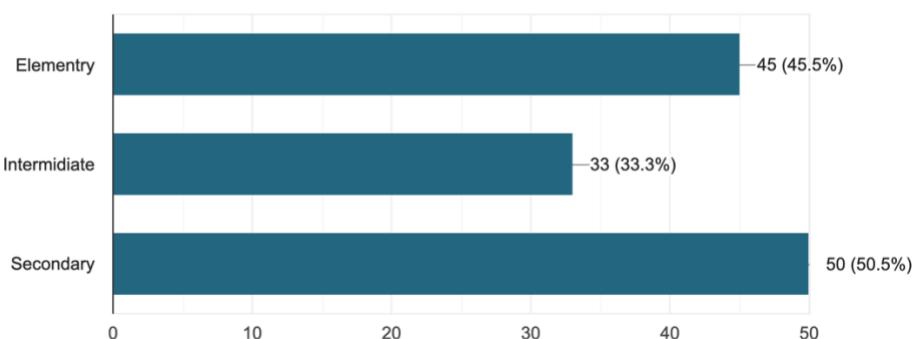
What kind of school does your child attend?

99 responses



Which type of school do your children attend?

99 responses

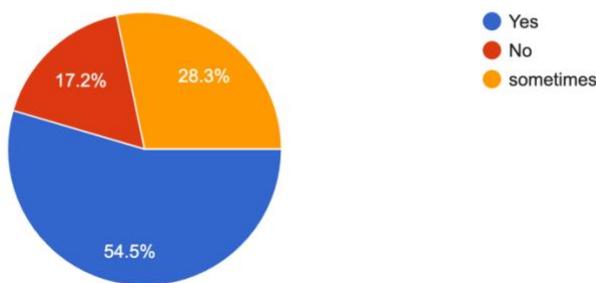




## Parent questionnaire

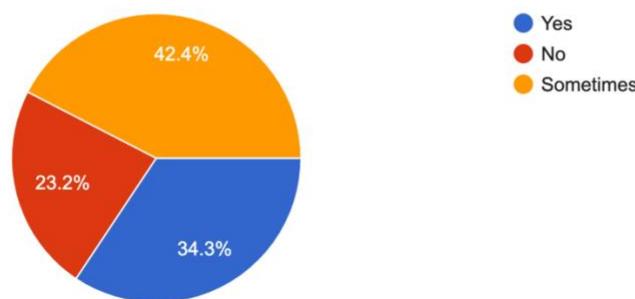
Do you prefer to use a cashless payment system to pay for your child meals and activities?

99 responses



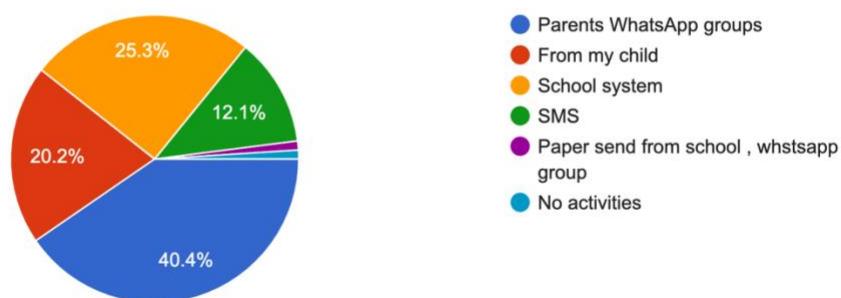
Do you find it challenging to enroll your child and pay for his school activities?

99 responses



How you are informed about school activities and trips?

99 responses

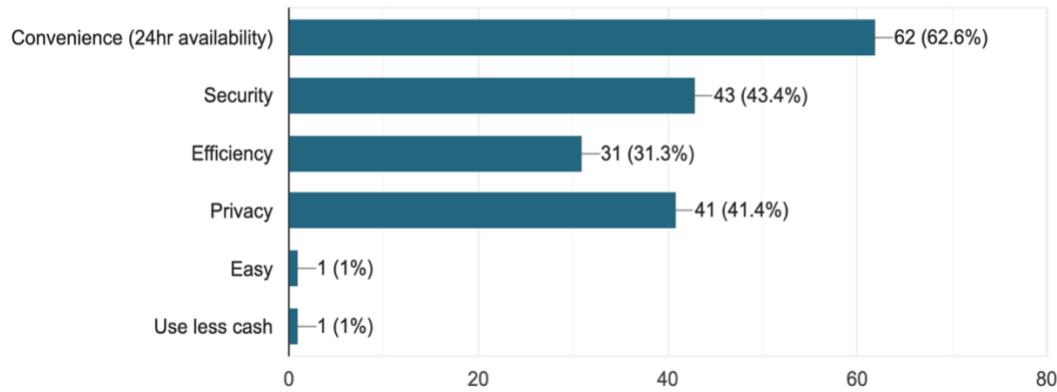




## Parent questionnaire

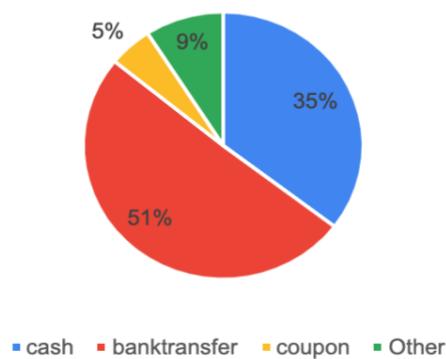
In your opinion, What makes individuals prefer online payments?

99 responses



Which method of payment do you currently use to pay for your child's school expenses?

99 responses





## 10.3 Appendix C

Parents Interviews and Answers	
Question1: What is your name? and what is your job title?	<ul style="list-style-type: none"><li>• Raghad AlAhmadi, Doctor.</li><li>• Ebtsam AlQahtani, Teacher.</li></ul>
Question2: Do you prefer to have a daily withdrawal limit for your children's school expenses? Why?	<ul style="list-style-type: none"><li>• Yes, I believe that would be really helpful since I could then make sure that my child did not spend too much money in school canteen.</li><li>• Actually, I do think it would be fantastic, and one of the reasons is that my child would be more responsible with his spending.</li></ul>
Question3: Have you ever forgotten to give your child his school form allowance? If yes, what did you do?	<ul style="list-style-type: none"><li>• Yes, and often the school would contact me to get my verbal approval.</li><li>• That never happened.</li></ul>
Question4: Would you prefer to see your child's purchases from the school canteen?	<ul style="list-style-type: none"><li>• I believe that we parents are constantly overprotective of our children since we can see how they spend their money it will be so useful.</li><li>• I believe that by keeping track of all of my child's school-related expenses, I will be able to keep tabs on what he consumes.</li></ul>
Question5: Do you prefer to manage all payments for your child's school via a website? In that case, what features do you think you will need on the website?	<ul style="list-style-type: none"><li>• Yes, it would be great; but I would suggest allowing parents to pre-order meals for their children. This would be especially helpful for elementary school pupils.</li><li>• Having all of my children on one website is fantastic, especially when they are enrolled in separate schools, so that's one thing I recommend.</li></ul>
Question6: Has your child ever missed lunch due to the crowd in the canteen? If so, how did you deal with it	<ul style="list-style-type: none"><li>• Yes, the unfortunate part is that I didn't realize it until she got home from school. After that, I began giving her money every Sunday for the following week.</li><li>• Fortunately, that has never happened because I typically make an effort to prepare his lunchbox in addition to giving him money, so he won't forget to eat, but this process takes time.</li></ul>



## 10.4 Appendix D

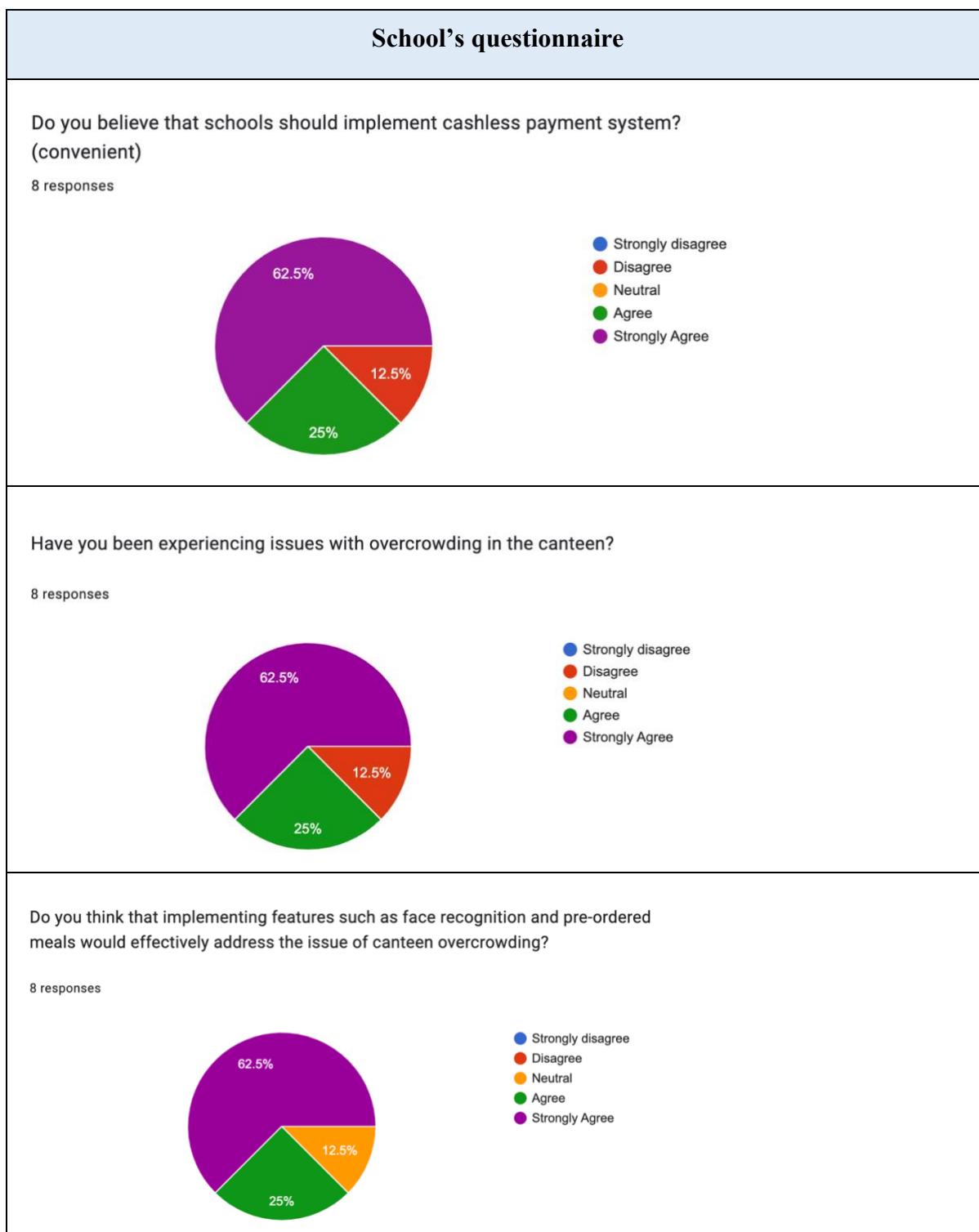
Schools Interviews and Answers	
Question1: What is your school's name? and what is the approximate number of students in your school?	<ul style="list-style-type: none"><li>• 48 High School, around 400 students.</li><li>• Manarat AlRiyadh Schools. We have more than 1800 students.</li></ul>
Question2: In terms of obtaining permission from parents and funding for school trips, what is your typical procedure?	<ul style="list-style-type: none"><li>• For obtaining documents from parents, we follow a single procedure. We print permission forms and pass them out to all students at the school, and then collect the documents the next day.</li><li>• Typically, we send the form to students at the end of the school day, and we expect students to bring the form after his parents have signed off on it the next day.</li></ul>
Question3: Have members of the school staff failed to collect money from students in the past? In that case, what are the consequences?	<ul style="list-style-type: none"><li>• Yes, but not always. As soon as students pay, we immediately place their money in the safety box, write down their names and let them sign. When some students' money is lost, we usually pay for it from our salaries since at the end it's our responsibility, and we can't ask them again for it.</li><li>• Yes, it has happened many times, and we cannot blame teachers because they have enormous responsibilities. The usual outcome is that parents become extremely upset and lose trust in school.</li></ul>
Question4: When it comes to extracurricular activities or school trips, how does the school handle financial difficulties?	<ul style="list-style-type: none"><li>• We encourage parents to volunteer. However, we don't go on trips or activities that exceed the budget of our school.</li><li>• Typically, we do not face many challenges unless some students forget to bring their money or school staff fails to collect money; therefore, we delegate this responsibility to more than four people to ensure that we can handle any financial difficulties.</li></ul>
Question5: What is the process for keeping parents informed about school news, events, and school trips?	<ul style="list-style-type: none"><li>• Sending SMS messages and handing out papers.</li><li>• We are attempting to use as many methods as possible, such as school forms, WhatsApp groups, and phone calls.</li></ul>



Schools Interviews and Answers	
Question6: How long is recess in your school?	<ul style="list-style-type: none"><li>• 20 minutes.</li><li>• 15-30 minutes.</li></ul>
Question7: What is your typical method of selling school uniforms to students?	<ul style="list-style-type: none"><li>• A local uniform store sells our school uniforms, and students purchase them there.</li><li>• We usually send an SMS message informing parents that we are selling uniforms and that they should come to the school to check the sizes and styles of the uniforms.</li></ul>
Question8: What is the method of managing and selling meals in the canteen at your school?	<ul style="list-style-type: none"><li>• It is all done manually. We write the stock; the quantity of the meals and we only take cash as payment.</li><li>• We don't have a set method for managing the canteen; instead, the moderator takes full responsibility for everything that happens in the canteen by recording student purchases in a notebook, which we hope to change one day.</li></ul>
Question9: What are your school's procedures for dealing with overcrowding in the canteen?	<ul style="list-style-type: none"><li>• We have more than one canteen moderator on hand to take students' orders faster. We sometimes let students buy before recess to give them time to eat.</li><li>• Our school tried numerous strategies to address the canteen crowd, but none of them were successful, so the problem persists.</li></ul>



## 10.5 Appendix E

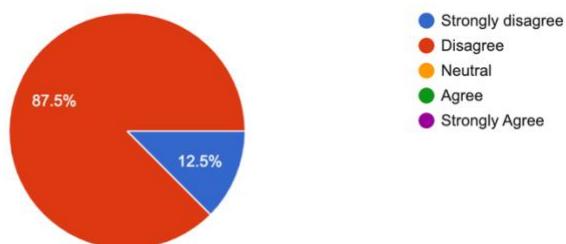




## School's questionnaire

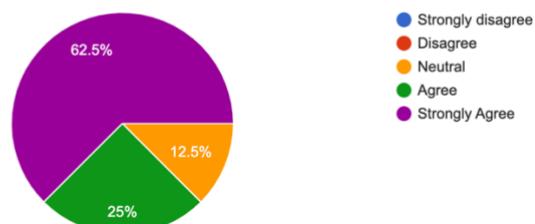
Do you have a systematic approach for allergic students?

8 responses



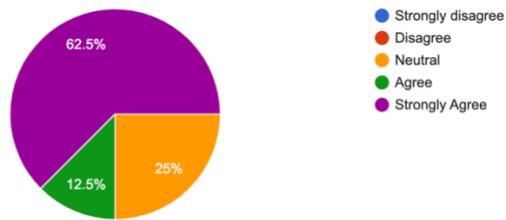
Do you think that the system's capability to prevent students with allergies from buying food items containing allergens will effectively enhance the safety and well-being of your students?

8 responses



As a school administrator, do you believe that implementing Masroofi for managing your school's canteen stock and sales would help reduce administrative costs and improve stock management, while also increasing efficiency?

8 responses

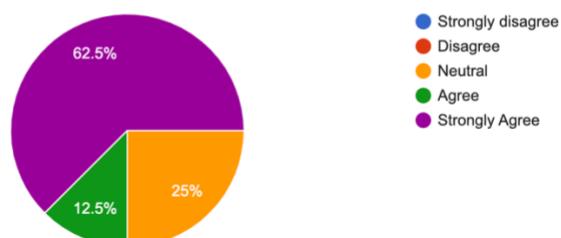




## School's questionnaire

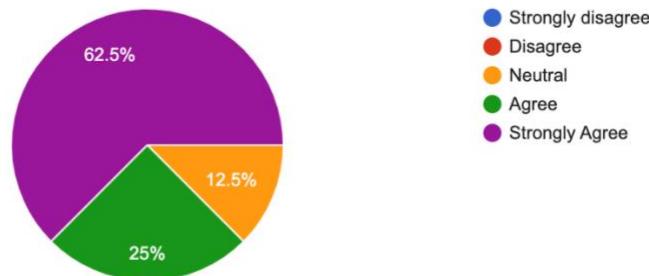
Did the ability to limit the amount of money students can deposit into their wallets meet your expectations?

8 responses



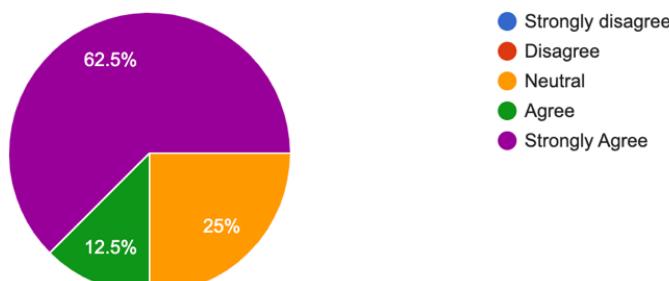
In your opinion, has the system successfully reduced the requirement for paper-based submissions and collection from students?

8 responses



Do you find the financial dashboard to be a user-friendly and informative tool for visualizing your school's finances?

8 responses

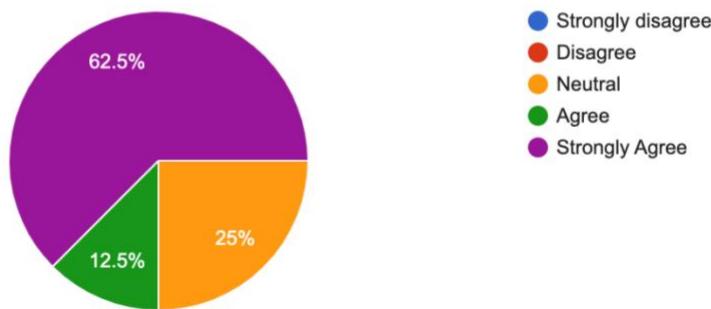




## School's questionnaire

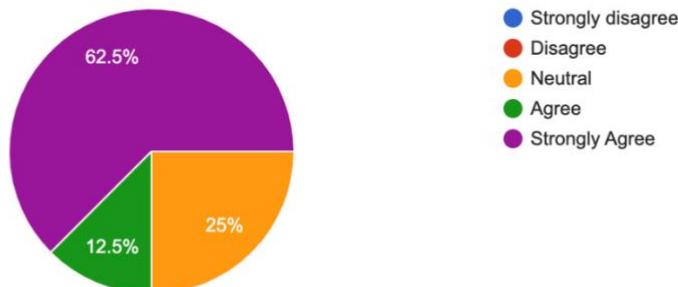
Do you think that masroofi system has been cost-effective in terms of productivity and generating efficient reports?

8 responses



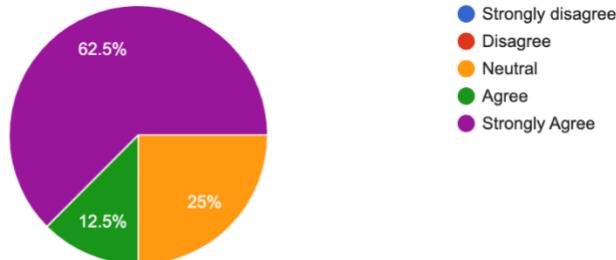
Do you believe Masroofi provides a fast and efficient payment process, quicker service, and shorter queues? (reduce crowdedness)

8 responses



In your opinion, would utilizing Masroofi for managing your school's trip clubs and uniforms help automate processes, reduce errors, and improve overall organization, compared to the current system?

8 responses

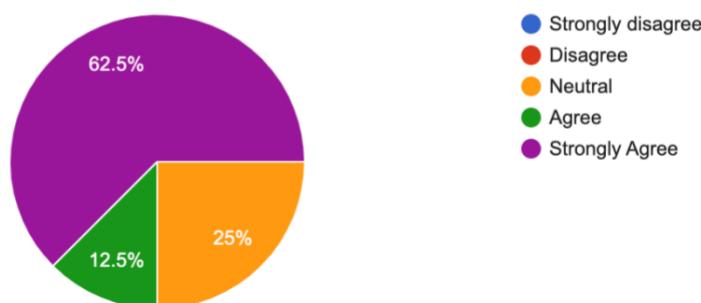




## School's questionnaire

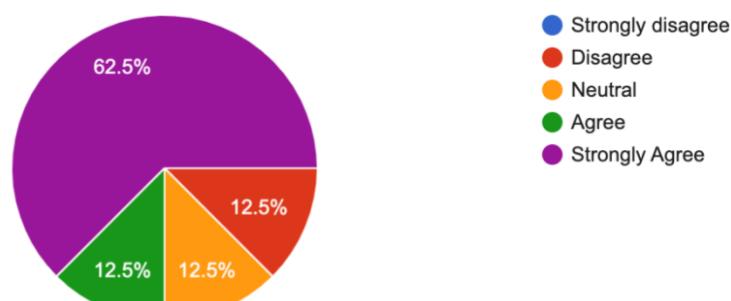
Is the system's user interface visually appealing and user-friendly?

8 responses



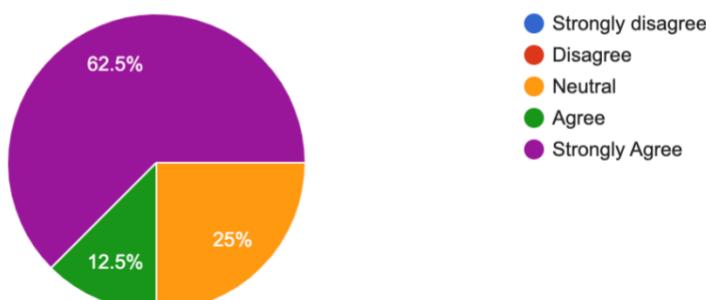
Is the system easy to use and navigate?

8 responses



Is the system easy to learn and train other users?

8 responses

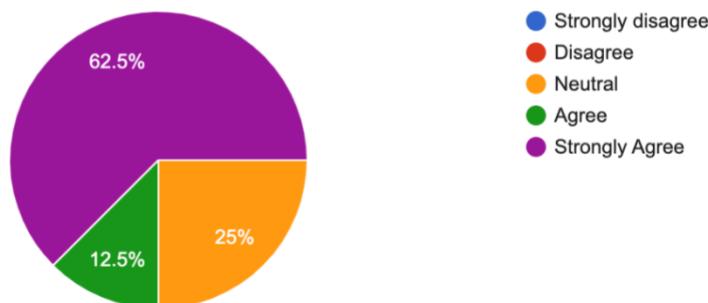




## School's questionnaire

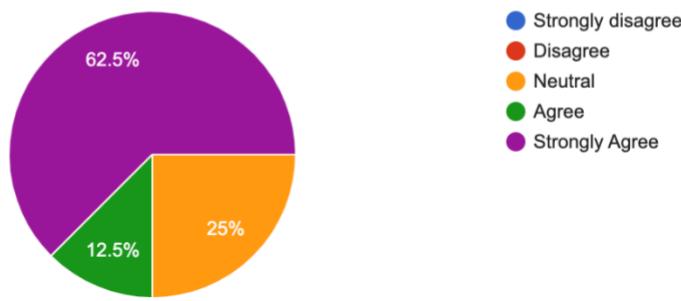
Is the performance of the system meeting your expectations.?

8 responses



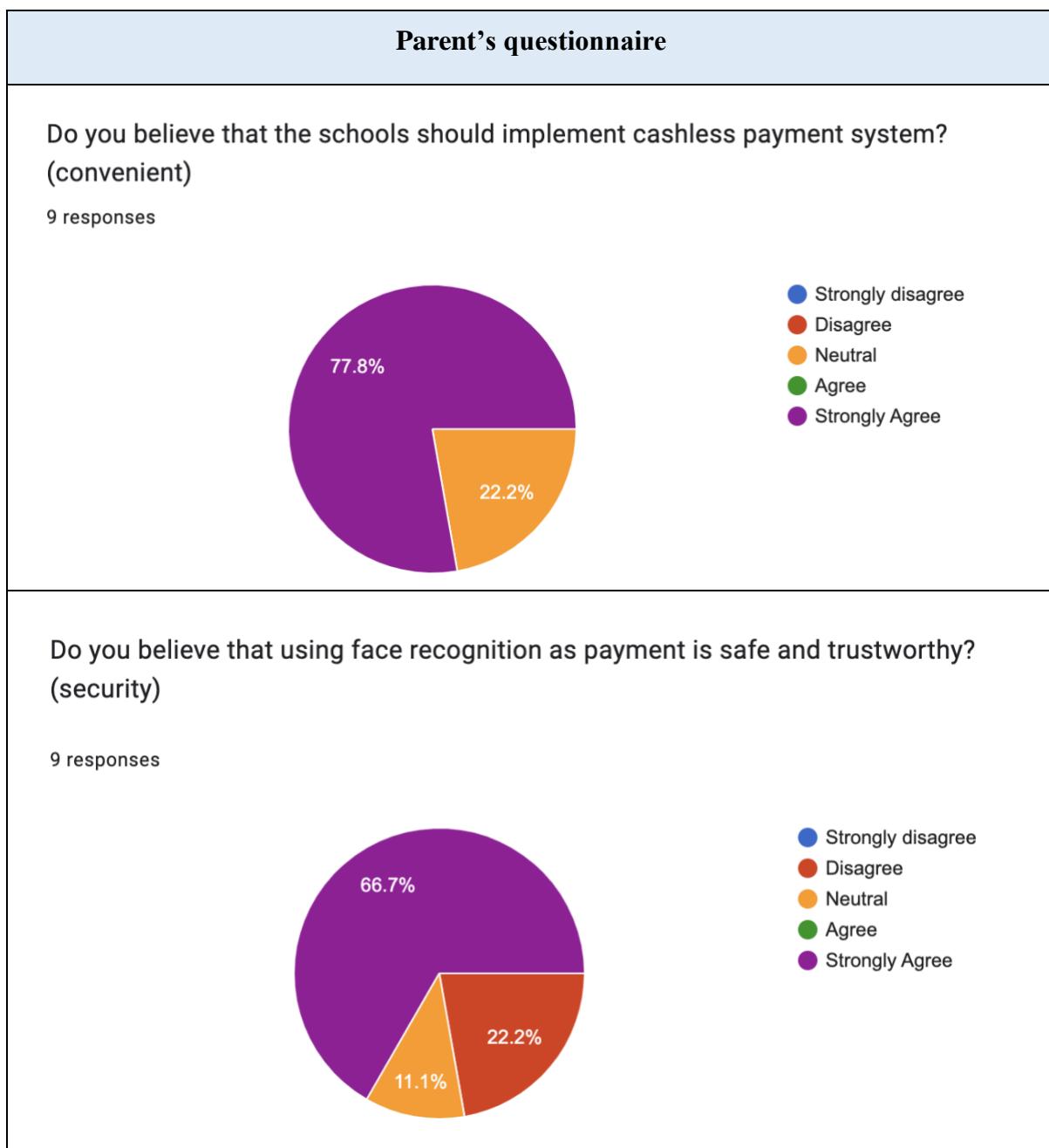
Overall, I am satisfied with this system.?

8 responses





## 10.6 Appendix F

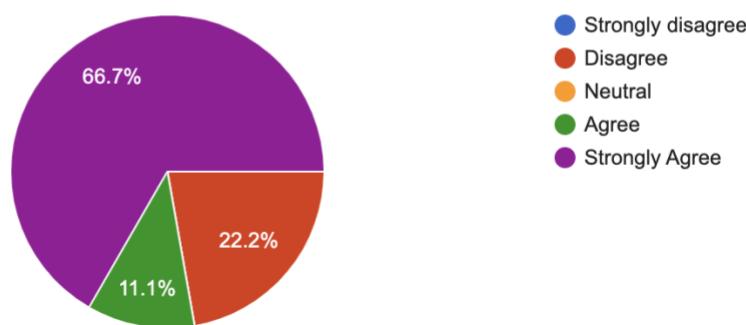




### Parent's questionnaire

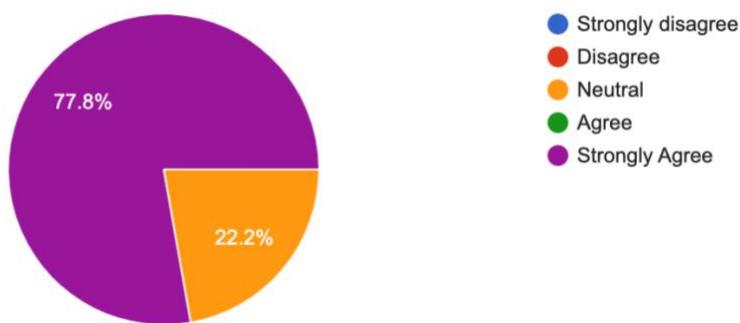
Does the ability to deposit money into your children's wallets eliminate the need to provide cash and change every day?

9 responses



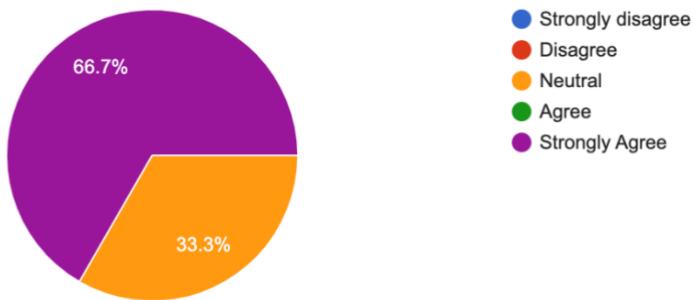
Did you feel comfortable setting daily limits for your child's canteen purchases?

9 responses



Was the purchase history tracking feature useful to you?

9 responses

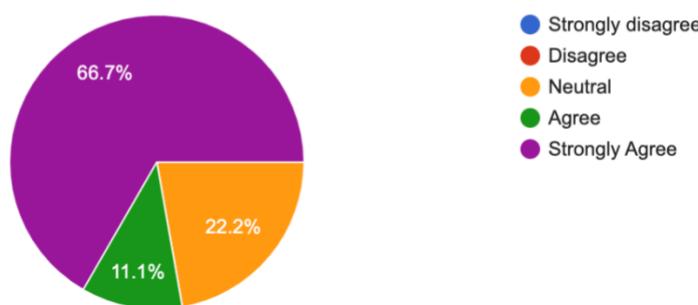




## Parent's questionnaire

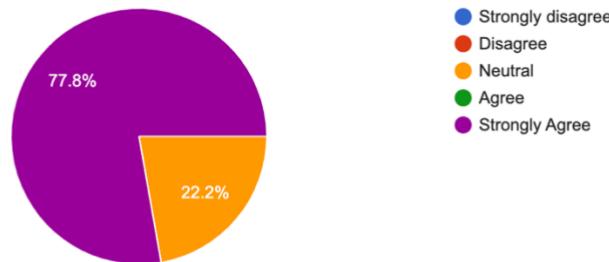
Are you satisfied with the notifications you receive when your child's wallet is almost empty?

9 responses



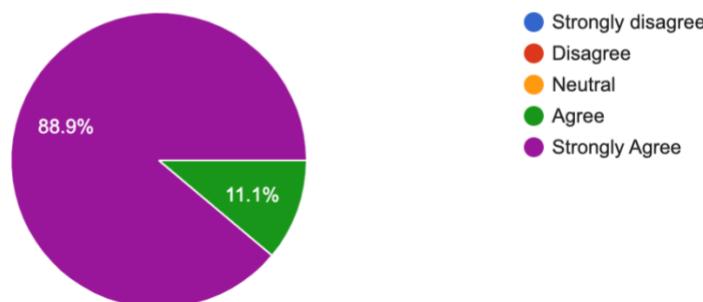
Is the meal pre-ordering feature useful to you? (better control on spending and food type)

9 responses



Is food-allergic feature important for you? (health and safety)

9 responses

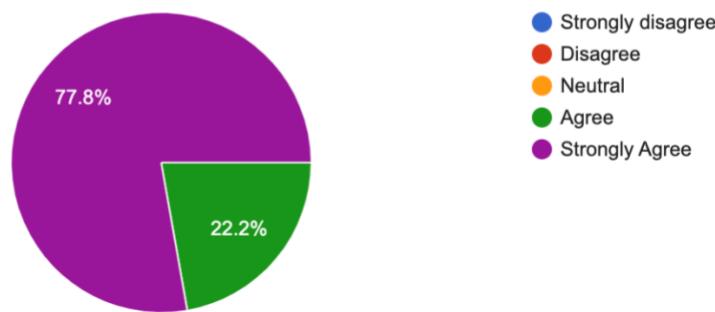




### Parent's questionnaire

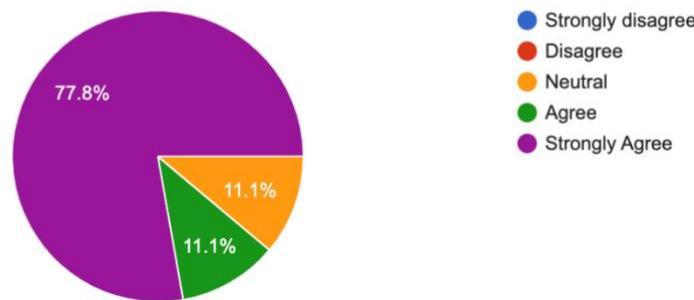
Has the system effectively blocked you from ordering items to which your child is allergic?

9 responses



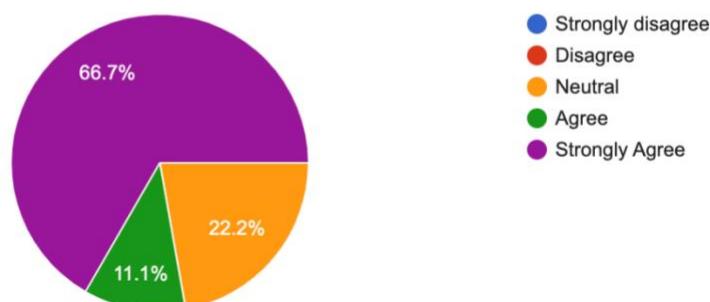
Do you think the food-allergic feature provided by masroofi improves your child's safety and well-being at school?

9 responses



Did the system make it easy for you to approve, register, and pay for your children's school trips and clubs?

9 responses

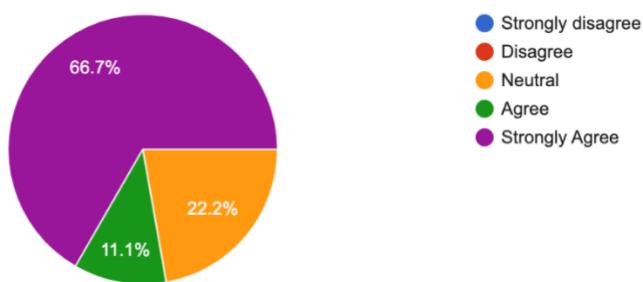




## Parent's questionnaire

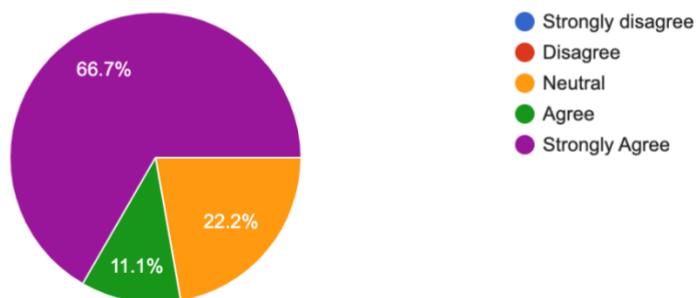
Was it easy to manage all of your children's accounts, even if they attend different schools?

9 responses



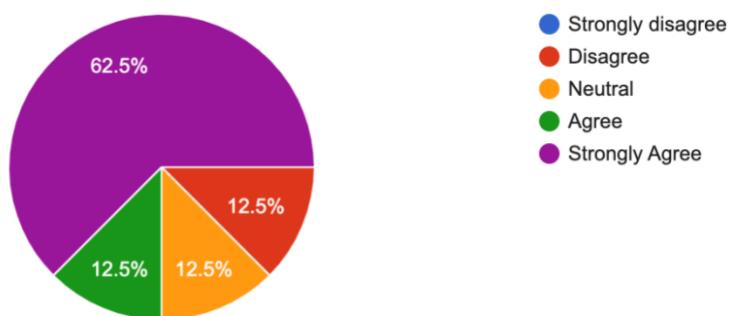
Is the system's user interface visually appealing and user-friendly?

9 responses



Is the system easy to use and navigate?

8 responses

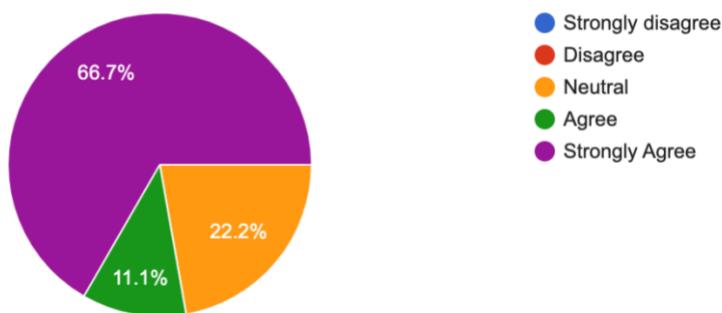




## Parent's questionnaire

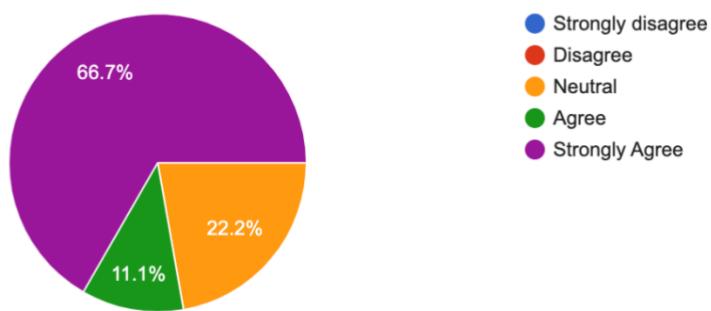
Is the performance of the system meeting your expectations.

9 responses



Overall, I am satisfied with this system.

9 responses



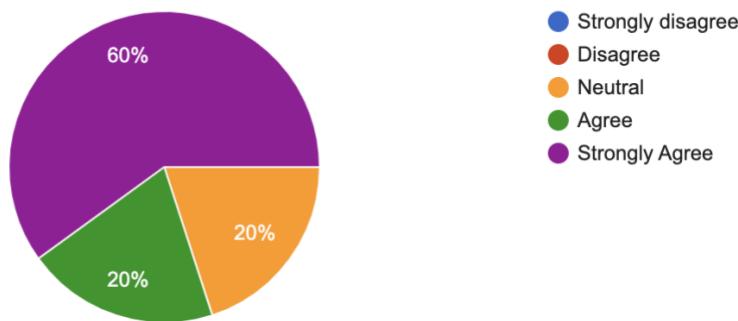


## 10.7 Appendix G

### Canteen moderator's questionnaire

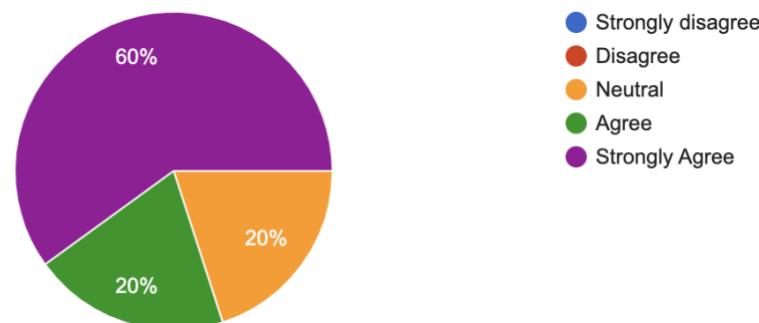
Do you believe that schools should implement cashless payment system?  
(convenient)

5 responses



In your opinion, would using Masroofi for managing your school's canteen stock and sales simplify the process, reduce the need for administrative staff, and improve efficiency?

5 responses

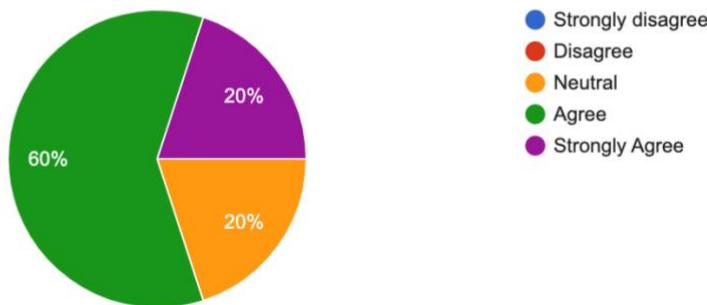




### Canteen moderator's questionnaire

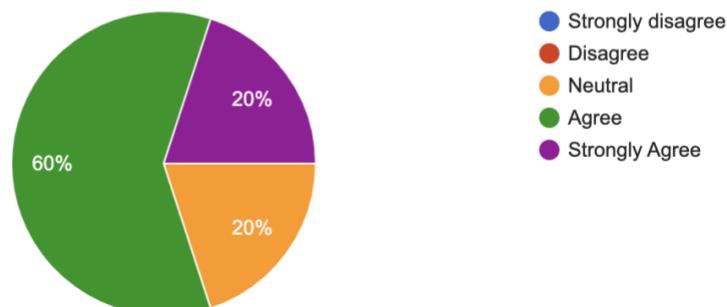
Is overcrowding an issue in your canteen?

5 responses



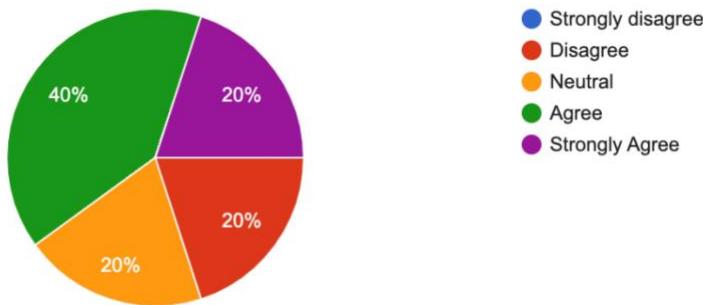
Would implementing features such as face recognition and pre-ordered meals be an effective solution for addressing the issue of canteen overcrowding?

5 responses



Have you faced any difficulties related to food safety, specifically regarding the risk of allergens causing harm to students?

5 responses

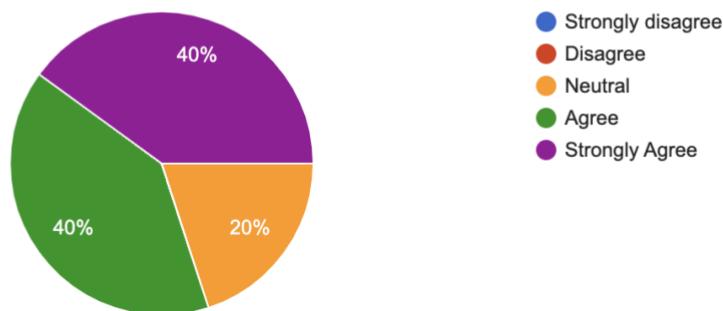




### Canteen moderator's questionnaire

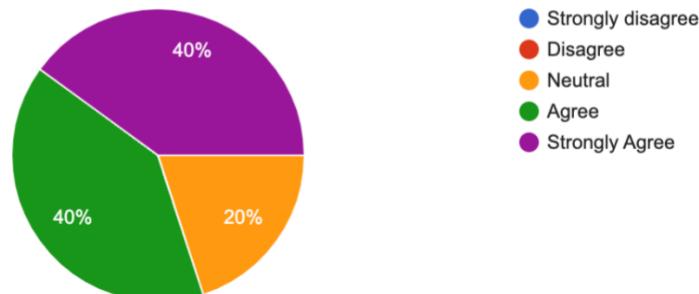
Do you believe that implementing a system that prevents students with allergies from purchasing food items containing allergens would effectively improve the safety and well-being of your students?

5 responses



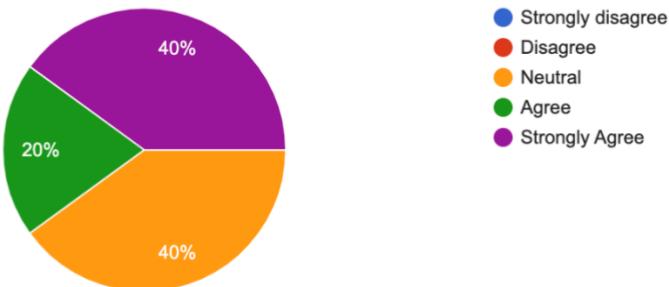
Do you believe Masroofi provides a fast and efficient payment process, quicker service, and shorter queues? (reduce crowdedness)

5 responses



Is the system's user interface visually appealing and user-friendly?

5 responses

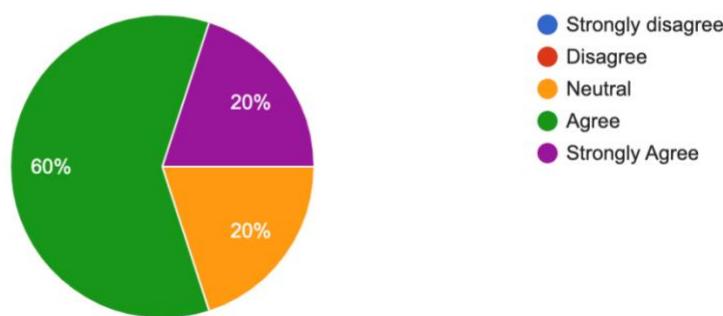




### Canteen moderator's questionnaire

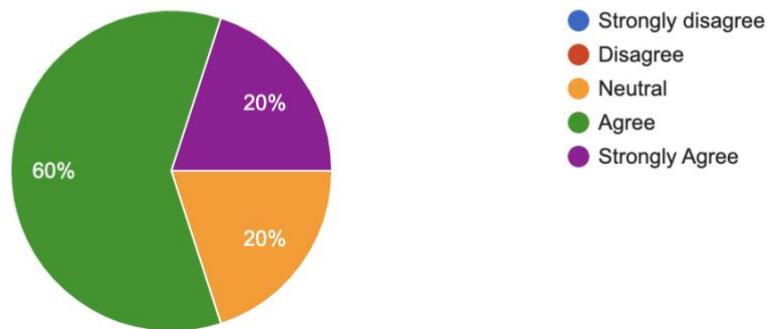
Is the system easy to use and navigate?

5 responses



Overall, I am satisfied with this system.?

5 responses





## 10.8 Appendix H



Article

### MASROOFI: Saudi Canteen Payment System Using Face Recognition Technology

Nouf AlFulaij, Noura AlSultan, Seba AlAhmadi, Hutoon AlOmran, Nourah AlRossais and Wejdan AlKaldi

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\* Correspondence: 441201159@student.ksu.edu.sa (N.AIF.)

**Abstract:** Traditional payment methods in schools can be time-consuming, inconvenient, prone to errors and fraud, and can potentially expose students to COVID-19. In Saudi Arabia, the majority of schools still operate their canteens with traditional ways, using cash as the most popular payment method. This cause canteen crowding during the limited recesses time, besides encountering managing cash issues for both schools and parents. The main objective of this paper is to explore the potential benefits and challenges of implementing Face Recognition Technology (FRT) for payments in school canteens. Using an Agile approach, a web-based application (Masroofi) was incrementally developed using HTML, CSS, JavaScript, PHP, and Python. Data were collected through interviews and surveys from both parents and schools. Interestingly, over 40% of surveyed schools are having trouble with student canteen payments, as they might get lost, waste time, stack up, etc. On the other hand, 99% of the surveyed parents indicated a strong desire to use cashless payment methods for their children's school expenses. This paper highlights the importance of implementing a biometric FRT for payments in school canteens. Biometric FRT payments offer more secure, efficient, and convenient payment method, as well as improve record-keeping and reduce errors.

**Keywords:** Canteen; Cashless; Payment management; Face Recognition Technology (FRT); Virtual Wallets

#### 1. Introduction

In many developed countries, there is a decline in the usage of cash payment [1] and contact-less payments are becoming more prevalent around the globe [2]. Traditional payment methods in schools, such as cash or checks, can be problematic due to potential logistical challenges. One of the major problems of traditional payment methods in schools is the lack of security. Cash payments can be easily lost or stolen, and checks can be easily forged. Additionally, they can be time-consuming and inconvenient for both the school and the parents. The traditional payment methods can be difficult to track, making it difficult for the school to keep accurate records of payments. These methods can also be potentially unsafe as large amounts of cash are often stored on school premises.

The recent Coronavirus (COVID-19) pandemic has put school food provision under severe pressure worldwide. While there have been fewer cases of COVID-19 among children, national responses to the pandemic have had significant effects on child nutrition and educational outcomes [3]. The traditional payment methods are no longer satisfying the current transaction demands. As a result, people lean toward more convenient payment methods. A recent study by [4] found that digital payment systems such as mobile payment and online payment platforms are more efficient, secure, and convenient to process payments in schools.

A research published in the Journal of Food Protection [5] found that contaminated banknotes and coins could potentially spread the virus. In response to these issues, many

**Citation:** AlFulaij, N.; AlSultan, N.; AlAhmadi, S.; AlOmran, H.; AlRossais, N.; AlKaldi, W. MASROOFI: Saudi Canteen Payment System Using Face Recognition Technology. *Journal Not Specified* **2023**, 1, 0. <https://doi.org/>

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schools have implemented digital payment systems to reduce the risk of transmission. With the widespread adoption of technology in today's society, many educational institutions are exploring innovative ways to modernize traditional processes, including school canteen payments.

This paper explores the potential benefits and challenges of implementing Face Recognition Technology in educational institutions and highlights the key factors for its successful implementation. In light of the recent COVID-19 pandemic, face recognition payment, along with other smart payment methods, has been highly recommended by local governments since it can minimize human interaction and prevent the spread of infection [6]. Educational institutions have implemented various technological tools, including virtual and augment reality, the internet of things, artificial intelligence, 3D printing, telepresence, blockchain, and biometrics [7]. However, biometrics is gaining the attention of the educational community as students can quickly and easily make payments without the need for cash or cards [8]. Facial recognition payment is more convenient, free from the restrictions of mobile phone and other hardware device-based payment methods [6]. Additionally, it reduce the risk of errors and fraud, providing a more reliable payment system for the canteen.

In terms of the development of Face Recognition Technology (FRT) systems, the Agile approach has been shown to be an effective methodology. This approach involves the iterative and incremental development of software, allowing for frequent feedback and adaptation to changing needs and requirements. This can be particularly useful in the development of FRT systems, which can involve complex algorithms and require significant testing and refinement. The system was developed using HTML, CSS, JavaScript, PHP, and Python. Data were collected using interviews and surveys from more than 95 parents and 20 schools.

Although more than 40% of surveyed schools reports trouble managing students canteen payments, the majority of the schools are still operating their canteens using cash only. On the other hand, 99% of the surveyed parents indicated a strong desire to use cashless payment methods for their children's school expenses. Parents favored online payments by a staggering 76% due to their convenience. The survey results highlight the value and success of Masroofi's deployment. With the continuous use of AI technology, biometric payment via facial recognition will enter the mainstream and eventually be used commercially in physical stores on a large scale [6].

In this paper we implement Masroofi - an advanced web based biometric technology for school payments in the Kingdom of Saudi Arabia. Our study revealed that no other schools in the region have adopted such technology, positioning us as pioneers in this space. Our research findings further indicate that alternative payment solutions, such as electronic bracelets, are not as effective as facial recognition. The use of electronic bracelets for payment incurs additional costs for both parents and schools, and poses challenges associated with student carelessness or damage to the device. Our unique approach to school payments, through the utilization of facial recognition technology, promises to enhance operational efficiency, reduce administrative burden, and improve the overall student experience.

The rest of the paper is organized as follows: Section 2 summarizes related work. A complete description of the Masroofi system is presented in Section 3. The architecture approach to implement system is carried out in Section 4. Finally, conclusion and future work are given in Section 5.

## 2. Related Work

We can categorize cashless payments systems in school into biometric and non-biometric. *ParentPay* [9] offers an online payment system for school meals, school fees, and other expenses, allowing parents to monitor their children's spending and reducing the need for cash. *OSP* [10] and *OnlineSchoolFees* [11] provide online payment systems for schools, allowing parents to pay for fees, tuition, and other school-related expenses from

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anywhere. *PaySchools* [12] offers a comprehensive online payment platform for schools, including meal ordering and payment, fees, and other expenses. *Eduspot* [13] provides a range of school management tools, including online payments for fees and expenses, along with other administrative features.

Sharma et al [14] develop an online application to manage the cafeteria menu and orders. Students will be able to place orders through the application and make payments using enables instant money transfers between bank accounts through UPI app or cash, with SMS alerts being sent to confirm the status of the order. Ya'Acob et al [15] utilizes Low Frequency (RFID) technology and a database system to facilitate cashless transactions for students. The system aims to replace physical cash with virtual money, allowing parents to monitor their spending through transaction data stored in the database. Mobile based approach to canteen ordering system is introduced by [16]. Users can place orders and make payments through the android application, with options including credit/debit cards, netbanking, and PayLater. Zul et al propose a food ordering and management application to allow parents to place orders for their children's food, with payment made through a digital food wallet [17]. Although the above systems do not incorporate biometric technology, they offer valuable case studies for schools looking to transition to cashless payment systems and improve the payment experience for students and parents alike.

Many payment systems are based on biometric techniques[8]. Some of the most commonly proposed systems include Fingerprint scanning [18], Radio-frequency identification (RFID) [15] [19], Global Positioning System (GPS) [20], and Closed-Circuit Television (CCTV) [21] for security and surveillance purposes. However, facial-recognition technology, detects and describes feature vectors without physical contact, directly contributes to overall efficiency, performance, and accuracy as indicated by Zhang et al [22].

Alibaba's Ant Financial Services Group has developed a payment system called "Smile to Pay" which utilizes facial recognition technology for identity verification and payment process [23]. This system eliminates the need for cash, cards, or mobile phones, making payment faster, convenient and more secure than QR-code payment. Customers are more likely to use it in more frequent scenarios such as in canteens and supermarkets as indicated by Zhong et al [23].

The main contribution of this paper is to highlight the benefit of using face recognition technology in schools payment systems. Masroofi does not require any physical devices or mobile phones for students to make payments at school canteen. Credit card payments may be quick and easy, but the risk of losing the card or forgetting the password is high. Similarly, QR payments require the use of a smartphone which can be easily misplaced or have signal and battery issues. Masroofi offers all the benefits of these systems, including pre-orders, digital wallets, and monitoring student spending. The use of biometric face recognition technology is not only more reliable but also safer for students, without incurring any additional costs. Overall, our work builds upon the existing related work by incorporating facial recognition technology as a payment method, offering a unique and innovative solution to improve the payment experience and align with Saudi Arabia vision of 2030 which promote digital transformation in education sector [24].

### 3. Proposed System

Masroofi, is a web based canteen payment system that uses face recognition technology. Its goal is to eliminate the use of cash or any other type of physical method of payment in school canteens. By using advanced facial recognition technology as a method of payment, it enables students to pay for their canteen purchases. Furthermore, it provides parents with an effortless means to deposit funds into their child's digital wallet. Additionally, parents can pre-order meals for their children, reducing canteen overcrowding and tracking their child's latest purchase activity from the canteen, get notified when student's wallet amount is low. Moreover, Masroofi ensures the safety of students with food allergies by preventing parents and students from ordering items that cause allergies to the student.



### 3.1. System Development

The system was developed using a combination of programming languages, including HTML, CSS, JavaScript, PHP, and Python. In particular, the face recognition module of the system was developed using Python frameworks. This study explores several face recognition frameworks, including OpenCV, TensorFlow.js, and FaceNet.

#### 3.1.1. OpenCV

OpenCV [25] is an open-source computer vision library that includes face detection and recognition algorithms. The library contains more than 2500 advanced algorithms including an extensive set of both typical and state-of-the-art computer vision and machine learning algorithms [25]. OpenCV supports multiple programming languages, including Python, Java, and C++, making it flexible and accessible to a wide range of developers. However, the advanced image processing and computer vision concepts implemented in OpenCV makes it difficult to understand by new developers.

#### 3.1.2. TensorFlow.js

TensorFlow.js [26] is a library used for building and executing machine learning algorithms in JavaScript. The TensorFlow Object Detection API is an open-source framework built on top of TensorFlow, aiming to make it easy to construct, train, and deploy object detection models [26]. TensorFlow is highly customizable, allowing developers to fine-tune their facial recognition models to meet specific requirements. However, it can be complex and difficult to learn, particularly for developers who are new to machine learning. It also requires significant computing resources to run effectively.

#### 3.1.3. FaceNet

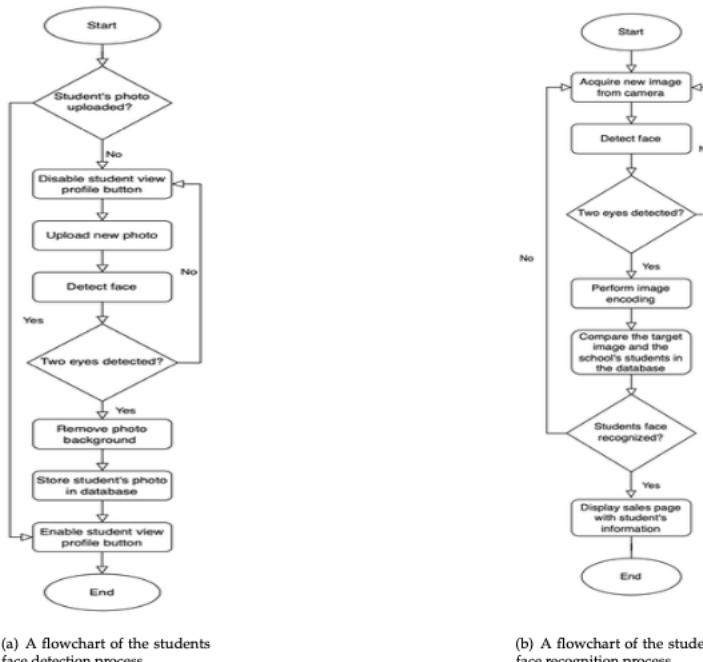
FaceNet [27] is a neural network that maps distances from face images to a compact Euclidean space that corresponds to the face similarity measure [27]. It is highly accurate and can recognize faces even in low-light conditions. It is also scalable and can be used to recognize faces in large databases. However, FaceNet requires significant computing resources to run effectively. It also requires large amounts of data to train the model. This can be difficult to obtain for some applications.

### 3.2. System Implementation

The system uses python face-recognition library along with dlib [28], a modern C++ toolkit containing machine learning algorithms and tools for creating complex software in C++. Numpy library [29] was also used to support large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. We ran several tests and evaluations to assess the system accuracy and speed. The face recognition algorithm used in the system has shown an accuracy rate of 99.38% on the labeled faces in the wild benchmark, indicating a high level of accuracy in recognizing student faces. In terms of speed, the system has been designed to process facial recognition transactions in a matter of seconds, providing a fast and efficient payment process for students in school canteens. Overall, Masroofi offers a reliable and convenient payment method, ensuring the safety and security of students while streamlining the payment process.

### 3.3. Face detection

The process starts after parent upload student image. The uploaded image is scanned for face using Python CV2 face detection library and Cascade Classifier algorithm. The image must contain only one face; if more than one face is detected, the parent must upload another image as shown in Figure 1 (a). Upon successful recognition of the valid image, the student's image is saved into the database with the student's unique ID.



(a) A flowchart of the students face detection process.

(b) A flowchart of the students face recognition process.

**Figure 1.** face detection and recognition process

### 3.4. Face recognition

The system utilized several object detection and face recognition libraries, including Python face recognition, dill, and NumPy, to implement its facial recognition technology. The facial recognition payment process uses the device webcam to captures the image of the student's face and processes it to identify the student's identity. It is equipped with a facial recognition python algorithm and a display screen that shows the canteen sales with student's wallet information.

The back-end system is responsible for managing payment transactions and storing transaction data. It includes a database and an administrative interface for managing student orders. To use the proposed system, parents are required to register via their child's school by providing their personal information and uploading a photo of their child's facial image to their account. Upon successful registration, the canteen moderator can process payment by capturing student's face. As shown in Figure 1 (b), the students' photos that are to be recognized as the intended targets are matched against the saved photos in the database. Upon identification, the system retrieves the student's ID. The canteen's sales can then be processed, ensuring that only the appropriate items are made available to the student and warning any food allergies. After the transaction is completed, the system automatically deduct the payment amount from the student's virtual wallet and record the transaction in the database.

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#### 4. Methodology

The agile software development is a lightweight approach that was proposed to overcome the convolutional development methods' limitations and to reduce the overhead and the cost while providing flexibility to adopt the changes in requirements at any stage [30]. It is a flexible and iterative approach for software development that emphasizes collaboration, continuous improvement, and responding to change. This makes it particularly well-suited to Masroofi's web development, which often involve frequent updates and changes in requirements. The methodology for developing our face recognition system involved several key steps:

- **Step 1: Problem Definition and Scope**  
The first step was to clearly define the problem and scope of the face recognition system. This involved identifying the specific features and requirements of the system, as well as any constraints that must be considered.
- **Step 2: User Stories and Requirements Gathering**  
This involved interviewing stakeholders and users to understand their needs and expectations for the system, as well as identifying any technical requirements and constraints.
- **Step 3: Agile Development and Iterative Prototyping**  
This involved breaking down the system into smaller, manageable components, and developing and testing each component in isolation before integrating them into the larger system.
- **Step 4: Evaluation and Validation**  
Once the system has been developed, we evaluated and validated its performance against the user stories and requirements gathered in Step 2. This involved testing the system against various scenarios and datasets, and ensuring that it met the performance criteria specified by the stakeholders and system users.
- **Step 5: Deployment and Maintenance**  
In this last step, we deployed the system in a real-world environment and monitored the system's performance to identify and resolve any issues or bugs.

This study applies a mixed approach to gather data and requirements, utilizing both qualitative and quantitative approaches. The approach taken for gathering qualitative data involved conducting interviews with parents and schools from diverse backgrounds in order to gain a more comprehensive understanding of their requirements. Additionally, a quantitative approach was utilized through surveys, which were completed by a total of 99 parents from diverse backgrounds, to gain a more comprehensive understanding of their daily challenges and needs with respect to school-related payments. Furthermore, the study extended its survey to 21 public and private schools, to obtain a wider range of data. The survey was conducted using Google Forms, and data was collected over a period of one week. This combination of methodologies enabled the study to obtain a rich and multifaceted understanding of the research topic.

The Client-Server Architecture pattern as shown in Figure 2 was utilized. The model consists of various clients, servers, and a network. The front-end of the website is handled by the clients while the backend servers communicate with Masroofi's database and third-party payment processors.

#### 5. Conclusion and Future Work

This paper present the development of Masroofi, an innovative cashless payment system that leverages facial recognition technology for seamless and secure transactions in school canteens. By adopting an Agile approach to software development, we were able to build a system that meets the needs of parents, schools, and students, offering a convenient and efficient way to manage canteen payments. The paper revealed that the use of traditional payment methods can be problematic, especially during the ongoing pandemic, due to security issues, logistical challenges, and the risk of virus transmission. As a result, digital payment systems have gained popularity, with biometric payment

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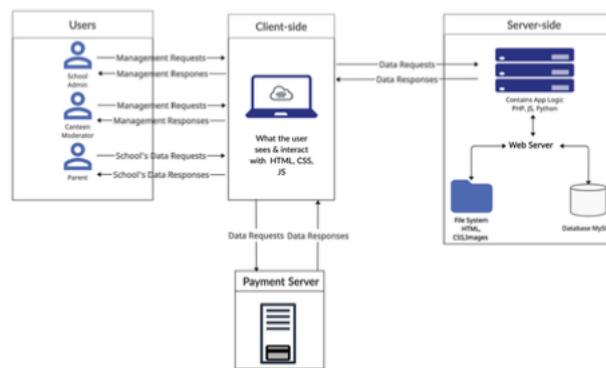


Figure 2. MASROOFI's architecture design.

systems such as FRT offering even more benefits in terms of convenience, accuracy, and security.

Masroofi has been designed to address these challenges by offering a reliable and user-friendly way to manage canteen payments, eliminating the need for physical devices or mobile phones. The system has been built using a client-server architecture, making it scalable and easily accessible from various locations. The combination of programming languages and object detection libraries has resulted in an accurate and efficient system, achieving a 99.38% accuracy rate on the labeled faces in the wild benchmark. Overall, Masroofi has the potential to revolutionize the way schools manage their canteen expenses, offering a more efficient, secure, and convenient way to manage transactions. This paper has shown that there is a strong desire for cashless payment methods for school expenses, and the adoption of Masroofi could not only benefit schools and parents but also contribute to the digital transformation of the education sector.

Further research and development are needed to explore the full potential of facial recognition technology in school payments and to address any potential concerns regarding privacy and security.

#### References

1. Khiaonarong, T.; Humphrey, D. Cash use across countries and the demand for central bank digital currency. *Journal of Payments Strategy & Systems* **2019**, *13*, 32–46.
2. Bounie, D.; Camara, Y. Card-sales response to merchant contactless payment acceptance. *Journal of Banking & Finance* **2020**, *119*, 105938.
3. WFP, F.; UNICEF, et al. Interim guidance note: Mitigating the effects of the COVID-19 pandemic on food and nutrition of schoolchildren. *World Food Programme, Food and Agriculture Organization of the United Nations* **2020**, *7*, 1176274247–1587377809.
4. Castelblanco, G.; Guevara, J.; Mesa, H.; Flores, D. Risk allocation in unsolicited and solicited road public-private partnerships: Sustainability and management implications. *Sustainability* **2020**, *12*, 4478.
5. Feng, Y.; Archila-Godínez, J.C. Consumer knowledge and behaviors regarding food safety risks associated with wheat flour. *Journal of Food Protection* **2021**, *84*, 628–638.
6. Zhong, Y.; Oh, S.; Moon, H.C. Service transformation under industry 4.0: Investigating acceptance of facial recognition payment through an extended technology acceptance model. *Technology in Society* **2021**, *64*, 101515.
7. Hidrogo, I.; Zambrano, D.; Hernandez-de Menendez, M.; Morales-Menendez, R. Mostla for engineering education: Part 1 initial results. *International Journal on Interactive Design and Manufacturing (IJIDeM)* **2020**, *14*, 1429–1441.

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8. Hernandez-de Menendez, M.; Morales-Menendez, R.; Escobar, C.A.; Arinez, J. Biometric applications in education. *International Journal on Interactive Design and Manufacturing (IJIDeM)* **2021**, *15*, 365–380. 296  
297  
298
9. ParentPay Limited. ParentPay, 2022. 299
10. OSP. OSP | Online School Payments, 2022. 300
11. Online School Fees. Online School Fees, 2022. 301
12. PaySchools. PaySchools, 2022. 302
13. Eduspot UK Ltd. Eduspot, 2022. 303
14. Sharma, T.; Jha, S.; Gupta, S.; Singh, V.; Gautam, S. CASHLESS & ONLINE QR-CODE BASED CANTEEN MANAGEMENT SYSTEM **2021**. 304  
305
15. Ya'Acob, N.; Yusoff, A.; Sarnin, S.S.; Ali, D.M.; Naim, N.F.; Kassim, M.; Azni, N.A.B.M. A cashless payment transaction (CPaT) using RFID technology. *Indones. J. Electr. Eng. Comput. Sci* **2019**. 306  
307  
308
16. Masurkar, S.; Dhagadi, A.; Kulkarni, Y.; Aylani, A. CANTEEN ORDERING SYSTEM USING ANDROID. *International Journal of Engineering Applied Sciences and Technology* **2022**, *6*, 199–202. 309  
310
17. Zul, N.S.; Zin, N.A.M. Canteen Food Ordering and Management Application. *Applied Information Technology And Computer Science* **2022**, *3*, 1094–1112. 311  
312
18. Ahmed, A.; Parvez, M.R.; Hasan, M.H.; Nur, F.N.; Moon, N.N.; Karim, A.; Azam, S.; Shamsugam, B.; Jonkman, M. An intelligent and secured tracking system for monitoring school bus. In Proceedings of the 2019 International Conference on Computer Communication and Informatics (ICCCI). IEEE, 2019, pp. 1–5. 313  
314  
315  
316
19. Kale, G.; Dube, S. Web based E-wallet Canteen Management System using RFID. *Int. Res. J. Eng. Technol* **2020**. 317  
318
20. Newcomb, D.; Johnson, H. GPs in schools: what do students and staff want from a school-based healthcare service in Queensland. *International Journal of Integrated Care* **2021**, *20*. 319  
320
21. Tran, K.; Nguyen, T.; Phan, L.; Tran, M.; Trinh, M.; Pham, L. Stakeholders' attitudes towards the installations of closed-circuit television cameras in reducing school violence. *Helijon* **2022**, *8*, e10645. 321  
322  
323
22. Zhang, W.K.; Kang, M.J. Factors Affecting the Use of Facial-Recognition Payment: An Example of Chinese Consumers. *IEEE Access* **2019**, *7*, 154360–154374. <https://doi.org/10.1109/ACCESS.2019.2927705>. 324  
325  
326  
327
23. Zhong, Y.; Moon, H.C. Investigating Customer Behavior of Using Contactless Payment in China: A Comparative Study of Facial Recognition Payment and Mobile QR-Code Payment. *Sustainability* **2022**, *14*, 7150. <https://doi.org/10.3390/su14127150>. 328  
329  
330
24. Alkhairy, M.; Alqahtani, H. Digital transformation in Saudi Arabia: Opportunities and challenges. *Education and Information Technologies* **2019**, *24*, 933–951. 331  
332
25. Bussa, S.; Mani, A.; Bharuka, S.; Kaushik, S. Smart attendance system using OPENCV based on facial recognition. *Int. J. Eng. Res. Technol* **2020**, *9*, 54–59. 333  
334
26. Mustamo, P. Object detection in sports: TensorFlow Object Detection API case study. *University of Oulu* **2018**, *1*. 335  
336
27. Tunç, A.; Yıldırım, M.; Taşdemir, Ş.; Altun, A.A. Development of face recognition system by using deep learning and face-net algorithm in the operations processes. In Proceedings of the Trends in Data Engineering Methods for Intelligent Systems: Proceedings of the International Conference on Artificial Intelligence and Applied Mathematics in Engineering (ICAIAIME 2020). Springer, 2021, pp. 93–105. 337  
338  
339  
340
28. Boyapally, S.R.; Supreethi, K. Facial Recognition and Attendance System Using Dlib and Face Recognition Libraries. *2021 International Research Journal of Modernization in Engineering Technology and Science* **2021**, pp. 409–417. 341  
342  
343
29. Obid o'g, A.S.J.; Kamalidin o'g, A.A.M.; Kamoliddin o'g, A.N.N.; et al. Numpy Library Capabilities. Vectorized Calculation In Numpy Va Type Of Information. *Eurasian Research Bulletin* **2022**, *15*, 132–137. 344  
345  
346
30. Al-Saqqa, S.; Sawalha, S.; AbdelNabi, H. Agile software development: Methodologies and trends. *International Journal of Interactive Mobile Technologies* **2020**, *14*. 347  
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## 10.9 Appendix I



Article

### MASROOFI: Saudi Canteen Management System and more

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**Abstract:** The education sector has been slow to adopt online payment systems, resulting in outdated manual and paper-based processes that lead to inefficiencies and errors. School canteens, in particular, often face long waiting times and limited options for students with dietary restrictions. While there are existing systems that aim to address these issues, they often lack important features and fail to fully address the needs of schools and parents. To better understand the challenges faced by school canteens, this study conducted interviews and surveys with parents and schools. The findings revealed several issues, including payment delays, manual record-keeping, and a lack of cashless payment options. To address these challenges, we propose Masroofi, a mobile-friendly web-based cashless payment management system that offers a unified platform for parents, canteen moderators, and school administrators to manage payments, orders, school activities, and student information. Using an agile approach, we incrementally built Masroofi using HTML, CSS, JavaScript, PHP, and Python, while keeping users' needs at the forefront through a user-centered design approach. Our findings suggest that embracing a school payment management system such as Masroofi can improve communication with parents and lead to more effective and efficient school finance management. This article examines the potential advantages and challenges of Masroofi, as well as critical factors for its success. By adopting Masroofi, schools can reduce inefficiencies, improve record-keeping, and offer a more convenient and secure payment experience for parents and students alike.

**Keywords:** Canteen; Cashless; Payment management; Face Recognition; Digital Wallets

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#### 1. Introduction

The education system has historically been slow to adopt new technologies and systems, and this is especially true in schools, where outdated manual and paper-based systems can lead to inefficiencies and errors in school management. Gurumoorthy et al. [1], argue that manual payment management in schools can result in errors, delays, and inefficient use of resources, leading to increased administrative costs and dissatisfied stakeholders. Despite the prevalence of digital and online systems, many schools still rely on traditional payment methods, such as cash or checks, for collecting school fees, purchasing meals, and other school-related activities [2]. This reliance on cash transactions creates several challenges, such as tracking and reconciling payments, resulting in payment delays, record-keeping errors, and disputes. Therefore, schools must find ways to modernize their processes and move towards more efficient digital solutions to save time and resources, reduce errors, and provide a better learning environment for students.

School canteens, in particular, often face long waiting times and limited options for students with dietary restrictions [3]. While there are existing systems that aim to address these issues, they often lack important features and fail to fully address the needs of schools and parents. For instance, some systems may not allow for real-time menu updates or



may not provide an easy way for parents to customize orders for their children. As a result, schools and parents are often left with limited options and a frustrating payment experience [4]. However, with the increasing popularity of cashless payments, schools can utilize payment management systems to address these issues and provide a better canteen experience for students. For example, Masroofi provides a comprehensive canteen management system that allows for real-time menu updates, custom orders, and dietary restrictions. By utilizing online payment technology, schools can increase efficiency, reduce costs, and improve convenience for parents and students alike.

This paper proposes Masroofi, a mobile-friendly web-based cashless payment management system that improves schools' payment experience. Masroofi provides parents, canteen moderators, and school administrators with a unified platform to manage payments, orders, school activities, and student information. Financial dashboards can help schools track their income from various sources, such as school activities and events. By tracking income from various sources, schools can better understand which activities and events are generating the most revenue. This information can be used to optimize their offerings and focus their resources on the most profitable activities. By using a user-centered design approach that considered the needs of all users, Masroofi was designed to be easy to use and intuitive.

Agile was used to incrementally build the system using HTML, CSS, JavaScript, PHP, and Python. The development process followed an iterative pattern, where feedback from users was incorporated into the design. The system was tested and evaluated throughout the process to ensure a successful product.

Data were gathered through interviews and surveys with parents and schools. The findings reveal several issues that can be addressed by Masroofi. Most schools struggle to collect money from students, which results in payment delays. More than 90% of schools manage their canteens manually, resulting in inefficiencies and errors in record-keeping. While almost all parents prefer cashless payment systems, they are not widely available in schools. Private and public schools still rely on paper-based communication. Additionally, 42% of parents encounter difficulties enrolling and paying for their children's school activities, leading to missed opportunities for students. Deng et al. [5] support the idea that payment management systems can increase parent engagement and participation in school activities. This is done by providing an easy and accessible way for parents to register their children for extracurricular activities and events. These systems can also reduce schools' administrative burden, by automating payment processes and providing real-time financial data to school administrators.

Embracing a school payment management system, such as Masroofi, can improve communication with parents. This can lead to more effective and efficient school finance management. The benefits of digital payment systems in schools have been highlighted in several studies. A study conducted by the Education Advisory Board found that digital payment systems could reduce payment errors and processing time by up to 75% [6]. Similarly, a report by the National School Boards Association suggests that digital payment systems can improve communication between schools and parents, leading to more effective and efficient school finance management [7]. In summary, school payment management systems provide a range of benefits for schools, parents, and students, including increased efficiency, security, and transparency, as well as improved canteen management and the promotion of responsible spending habits [8].

The rest of the paper is organized as follows: A complete description of the Masroofi system is presented in Section ???. The approach to implement system is carried out in Section ???. Finally, conclusion and future work are given in Section ???.

## 2. Related Work

The first system discussed is the CASHLESS & ONLINE QR CODE BASED CANTEEN MANAGEMENT SYSTEM [9], which seeks to develop an online application to manage the cafeteria menu and orders. Students will be able to place orders through the application and

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make payments using UPI apps or cash, with SMS alerts being sent to confirm the status of the order. Another system analyzed is the CASHLESS PAYMENT TRANSACTION (CPaT) USING RFID TECHNOLOGY [10], which utilizes Low Frequency RFID technology and a database system to facilitate cashless transactions for students. The system aims to replace physical cash with virtual money, allowing parents to monitor their spending through transaction data stored in the database. Additionally, the CANTEEN ORDERING SYSTEM USING ANDROID [11] is a wireless canteen management system based on the android platform. Users can place orders and make payments through the android application, with options including credit/debit cards, netbanking, and PayLater. Finally, the CANTEEN FOOD ORDERING AND MANAGEMENT SYSTEM [12] proposes a food ordering and management application to allow parents to place orders for their children's food, with payment made through a digital food wallet. This application also aims to make order management in the canteen more efficient and reduce overcrowding, thereby mitigating the spread of Covid-19.

#### 2.1. Comparison with existing systems

The purpose of the study is to examine current systems and identify their flaws. Based on this study, improvements can be made by comparing existing systems. Table 1 presents a comparison between existing applications for cashless school systems and canteen food ordering management systems. The comparison reveals deficiencies in current systems, including a lack of ability to manage canteen sales and inventory, as well as limited solutions to payment needs across all school activities.

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**Table 1.** Comparison with existing systems.

Feature/System	Cashless & Online QR-CODE Based Canteen Management System	A Cashless Payment Transaction (CPaT) using RAFID Technology	Canteen Ordering System using ANDROID	Canteen Food Ordering and Management Application	Masroofi
Digital student wallet	✓	✓		✓	✓
Use a technical solution for canteen payments	✓	✓	✓	✓	✓
Provide payments for other school activities					✓
Notify when wallet money reach limit		✓		✓	
Canteen orders	✓		✓	✓	✓
Payment history		✓			✓
Manage canteen inventory					✓

### 3. Proposed System

Using cash as a payment method for school activities and canteen purchases presents several issues for school administrators, canteen moderators, and parents. These include the difficulties of handling and keeping track of large amounts of cash, managing change, the risk of theft or loss of money, and challenges in monitoring spending. In order to deliver an effective solution, we propose Masroofi, an efficient cashless payment system for schools that aims to eliminate the use of cash and paper-based communication between schools and parents. With the utilization of advanced facial recognition technology as a payment method in school canteens. Masroofi Developed using a combination of programming languages, including HTML, CSS, JavaScript, PHP, and Python. Notably, the face recognition module of the system was developed using Python frameworks, further demonstrating the system's innovative and sophisticated nature. By implementing Masroofi, schools can expect a significant improvement in payment management and overall efficiency, freeing up valuable time and resources that can be better utilized in other areas. This paper explores the numerous features and benefits that Masroofi offers to schools and parents, making it the go-to platform for modern and innovative payment management.

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### 3.1. School administrator's Point of View:

Masroofi is a comprehensive solution designed to assist school administrators in managing their school's finances and activities more effectively. The system offers financial dashboards that enable administrators to monitor and visualize their revenue, simplifying the financial planning process. Additionally, Masroofi provides a feature that allows schools to set a limit on the amount of money parents can deposit into their children's wallets, eliminating deposit errors and streamlining financial management.

Moreover, Masroofi offers a student management feature that allows administrators to add, edit, delete, and transfer students to the next grade. This feature eliminates the need for manual record-keeping, saving administrative staff valuable time while reducing errors. The system also includes an allergen setting to ensure students' safety.

Masroofi provides an easy-to-use system for managing school activities, enabling administrators to add, edit, and delete activities while viewing registered students for each event. This feature simplifies the organization and planning of school activities, saving time and streamlining the process. Lastly, Masroofi provides a uniform management feature, allowing administrators to add, edit, delete uniforms and view student uniform orders, streamlining the uniform ordering process and ensuring students receive the correct uniform. In summary, Masroofi offers a wide range of efficient tools for school administrators, from financial tracking to student management, simplifying operations and enhancing the payment experience for all users involved

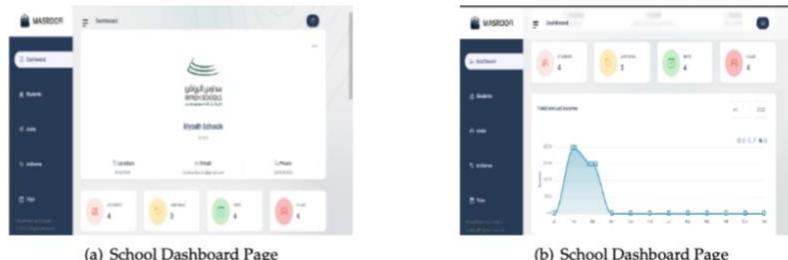


Figure 1. School administrator's Point of View

### 3.2. Parents Point of View:

Masroofi is a cutting-edge system, with it, parents can bid farewell to the inconvenience of managing cash expenses, envelopes, and coupons for their children. This system allows parents to manage all their children's accounts across all schools using a single account. With the feature to deposit funds into their children's digital wallets, parents no longer have to worry about the hassle of providing cash or change every day. Furthermore, Masroofi sends email notifications to parents when their child's wallet balance is low, helping them stay on top of their child's expenses. Masroofi also offers a daily limit feature for parents to set limits on their child's canteen purchases, providing more control over their child's spending habits. Additionally, parents can track their children's canteen purchase history and ensure their child does not buy any allergen-causing items from the school canteen. Masroofi also provides parents with a convenient platform to approve, register, and pay for their children's school trips and clubs, as well as order and pay for their children's school uniforms. With Masroofi, parents can stay informed and in control of their child's activities and expenses in school.

In addition, Masroofi provides parents with the ability to order meals and uniforms in advance and view their status. Refundable orders are also available for both canteen and uniforms, allowing for cancellations and refunds if necessary. Overall, Masroofi offers parents a user-friendly and convenient system to streamline their children's activities in schools.

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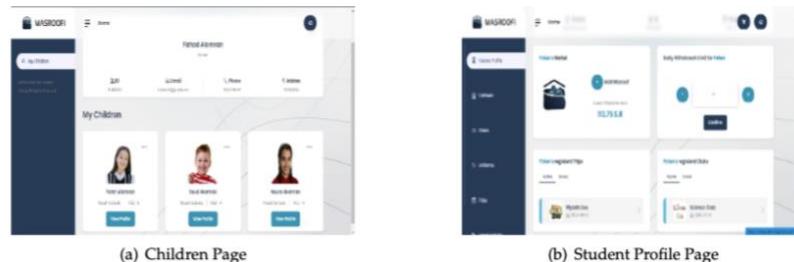


Figure 2. Parents Point of View

### 3.3. Canteen moderator point of view:

Masroofi provides a comprehensive solution for canteen moderators to manage their inventory and reduce waste. One of the key features of the Masroofi system is its advanced inventory management capabilities, which allow schools to keep track of their canteen inventory in real-time. The system is designed to ensure that all items are within their expiration date, and it includes a feature that blocks the sale of any items to which a student may have an allergy, creating a safer and healthier environment for all students. Masroofi also includes a powerful real-time tracking dashboard that provides schools with detailed information on the total number of sold items, the current stock, and the total wasted items. This feature allows schools to make informed decisions on reducing waste by detecting expired items and updating the total number of wasted items. With the Masroofi solution, canteen moderators can monitor their inventory, reducing unnecessary costs and promoting sustainability.

In addition to its inventory management capabilities, Masroofi offers a solution to canteen overcrowding. With pre-ordered meals and face recognition technology, the system streamlines the ordering and payment process, reducing lines and waiting times. This feature provides a better experience for students and staff, and it helps ensure that students have enough time to eat their meals before the next class.

Overall, Masroofi offers a comprehensive solution that allows canteen moderators to efficiently manage their inventory, reduce waste, and create a safer and healthier environment for students. With Masroofi, schools can optimize their canteen operations, improve the overall experience for students and staff alike, and promote sustainability for a better future.



Figure 3. Canteen moderator point of view

## 4. System Evaluation

This section presents a summary of User Acceptance Testing (UAT) conducted on the system. The UAT aimed to evaluate the system's acceptance by its intended users by

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performing three phases of testing. The first phase involved five canteen moderators with varying technical expertise. The second phase involved eight school administrators from both private and public schools to obtain a more representative sample. The third phase involved nine parents. The testing results were extensively analyzed to determine the system's ability to meet its intended objectives. In addition, they were used to identify areas for improvement. The UAT proved to be an invaluable tool in evaluating user experience. It ensured that the system is fit for purpose and caters to the needs of its intended users. The insights gained from the testing are instrumental in further improving the system. We are confident that the improvements made based on the UAT results will enhance the system's effectiveness and user satisfaction.

#### 4.1. UAT Questionnaire Results:

The Masroofi system underwent User Acceptance Testing (UAT) with 8 school administrators, 5 canteen moderators, and 9 parents. Participants were provided with UAT testing scenarios and a questionnaire consisting of questions related to the system's functionality and usability. The UAT results indicate that the system was well-received by the majority of participants, with most being able to successfully complete all assigned tasks.

Among school administrators, 62.5% believed that the implementation of a cashless payment system would be convenient, and the same percentage agreed that features such as face recognition and pre-ordered meals would effectively address the issue of overcrowding in the canteen. Only 12.5% of school administrators had a systematic approach for allergic students, but 62.5% strongly agreed that the system's capability to prevent students with allergies from buying food items containing allergens would effectively enhance student safety and well-being.

For canteen moderators, 60% strongly agreed that schools should implement a cashless payment system, and the same percentage believed that using Masroofi for managing their school's canteen stock and sales would simplify the process, reduce the need for administrative staff, and improve efficiency. 60% of moderators also agreed that implementing features such as face recognition and pre-ordered meals would be an effective solution to address the issue of overcrowding. Only 40% of moderators faced difficulties related to food safety, but 4% believed that implementing a system to prevent students with allergies from purchasing food items containing allergens would effectively improve student safety and well-being. Additionally, 40% of moderators agreed that Masroofi provides a fast and efficient payment process, quicker service, and shorter queues to reduce crowdedness.

Among parents, 77.8% strongly agreed that schools should implement a cashless payment system, and 66.7% strongly agreed that using face recognition as payment is safe and trustworthy. Furthermore, 66.7% of parents strongly agreed that the ability to deposit money into their children's wallets eliminates the need to provide cash and change every day. Additionally, 77.8% of parents strongly agreed that they felt comfortable setting daily limits for their child's canteen purchases. Moreover, 66.7% of parents strongly agreed that the purchase history tracking feature was useful to them. However, only 11.1% of parents had a neutral opinion on whether using face recognition as payment is safe and trustworthy, and 22.2% of parents disagreed with it.

Overall, the UAT results indicate that Masroofi is a well-accepted and user-friendly system that effectively addresses the needs of school canteens and parents. Some of the detailed results of the questionnaires can be found in figures ??and 5. These results suggest that implementing Masroofi could improve the efficiency, safety, and convenience of school canteen operations.

#### 5. Conclusions and Future Work

This article discussed an innovative cashless payment system for school canteen and other activities . The system employs advanced technologies, such as facial recognition and digital student wallets, and has the potential to revolutionize the way schools manage their finances, management, and communication with parents in Saudi Arabia.

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Figure 4. Questionnaire Results



Figure 5. Questionnaire Results

The research findings suggest that the proposed cashless payment system can significantly enhance the payment process in schools by reducing the use of cash, increasing transaction speed and security, allowing for better management of school finances, and improving communication with parents. The system provides several benefits for schools and parents, including reduced canteen overcrowding, improved stock and waste management, enhanced student and activity management, and real-time financial monitoring for schools. Parents can conveniently manage all school payments for their children through one account, set daily limits on canteen purchases, and receive notifications for low wallet balances.

Despite the many advantages of the Masroofi payment management system, further development and improvement are still necessary. Future research could explore the system's scalability and its potential application to a wider range of educational institutions. Additionally, the security and privacy of the system could be enhanced through the implementation of additional encryption and authentication measures.

Overall, the Masroofi payment management system represents a significant advancement in the field of school payment systems. As further research and development are conducted, it is likely that the system will continue to evolve and improve, offering even greater benefits for schools, parents, and students alike.

#### References

1. Gurumoorthy, K.; Kiranmayi, P.; Prathima, B. A Review on Digital Payment Systems for School Management. *Journal of Critical Reviews* **2020**, *7*, 1192–1196.
2. National School Boards Association. Understanding Payment Processing in K-12 Schools, 2021.
3. Kale, R.B.; Balwade, R.K.; Gawai, V.B. Online Food Ordering System for College Canteen. *SAMRIDDHI: A Journal of Physical Sciences, Engineering and Technology* **2020**, *12*, 64–68.
4. Kumar, A.; Singh, R. Online Payment System for School Canteen. *International Journal of Computer Science and Mobile Computing* **2020**, *9*, 41–47.
5. Deng, X.; Chen, X. The Design and Implementation of a School Payment System. *International Journal of Computer Applications* **2020**, *179*, 6–12.

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6. Education Advisory Board. Improving Payment Processing in Higher Education, 2020. 273
  7. National Education Association. Status of the American Public School Teacher 2020-2021, 2021. 274  
[Online; accessed March 29, 2023]. 275
  8. Chiu, M.C.; Wang, H.M.; Lee, M.R.; Huang, Y.W.; Su, W.H.; Liu, W.C. Development and Implementation of a School Meal Nutrition Management System to Promote Healthy Eating. *International Journal of Environmental Research and Public Health* **2020**, *17*, 6756. 276  
*277*
  9. Sharma, T.; Jha, S.; Gupta, S.; Singh, V.; Gautam, S. CASHLESS & ONLINE QR-CODE BASED CANTEEN MANAGEMENT SYSTEM. 278  
*279*
  10. Ya'Acob, N.; Yusoff, A.; Sarnin, S.S.; Ali, D.M.; Naim, N.F.; Kassim, M.; Azni, N.A.B.M. A cashless payment transaction (CPaT) using RFID technology. *Indones. J. Electr. Eng. Comput. Sci.* **2019**. 280  
*281*
  11. Masurkar, S.; Dhagadi, A.; Kulkarni, Y.; Aylani, A. CANTEEN ORDERING SYSTEM USING ANDROID. *International Journal of Engineering Applied Sciences and Technology* **2022**, *6*, 199–202. 282  
*283*
  12. Zul, N.S.; Zin, N.A.M. Canteen Food Ordering and Management Application. *Applied Information Technology And Computer Science* **2022**, *3*, 1094–1112. 284  
*285*