2015

ECS: Educational Communication System

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ECS: Educational Communication System

A Thesis Project

Presented To

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Cheney, Washington

In Partial Fulfillment of the Requirements

For the Degree

Master of Computer Science

College of Science, Health and Engineering

By

Nasmah Alnaimi

Spring 2015
THESIS PROJECT OF NASMAH ALNAIMI APPROVED BY

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Date ________________
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Date
Abstract

The characteristics of school organizations and their reactions to change are critical to success in educational reform and necessary to the health of an organization and the well-being of its members. Organizational change, in order to be effective and sustainable, can use technology but it must also accommodate the need to simplify complexity in schools. Organizing student attendance, current grade status and school bus information, such as between the school and bus stops, on field trips or traveling to other activities outside of school, including sporting events, will ensure that parents know their kids are safe and physically accounted for at school events. In response to the need for better organization of student records and communication between parents and children in the school environment, this thesis concentrated on the development of an electronic communication system, the Educational Communication System (ECS). The ECS system was developed as both an iPhone App and a web interface. As a result of this system, parents will be able to track their children in real time plus ECS will reduce errors that may occur when there is misinformation between the student and parent or between the school and students or parents. Preliminary user feedback showed the usefulness of this system for parents, teachers and school administrators with an overall likeability rate of 92.3%.
Acknowledgements

I would like to thank Dr. Carol Taylor and Dr. Kosuke Imamura, Eastern Washington University’s College of Science, Health and Engineering, and Dr. Tara Haskins, Eastern Washington University’s College of Education, and everyone at EWU who assisted me during my work to achieve my Master of Computer Science. I want to thank the Ministry of Education in Saudi Arabia for giving me the opportunity to achieve this degree and I dedicate this ECS project to the school children of Saudi Arabia. Additional gratitude goes to my husband, my son and my entire family back home. Thank you all for your support.
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CHAPTER ONE

Introduction

Over the past few years, there has been an explosion of communication technology through the use of cell phones, GPS devices and wireless computing devices such as tablets and laptops. This technology has allowed people to communicate and keep track of each other in spite of vast geographical distances. Another component of this technology is the capability to constantly update family, friends and co-workers on a daily or even hourly basis, through social media outlets such as Facebook, LinkedIn, Twitter and a number of other applications.

One area where there is a need for better communication, using improved communication technology, is between the school, parents and their children when they are away at school. The need arises when children are traveling to or away from school, either for special field trips or on their daily bus routes. In the event of bus route changes, or even failures, parents want to be notified of those changes. A system that provides better tracking of children by parents and administrators would help solve the problem of communication in real time for those children traveling on a school bus. Thus, a computerized system has been created, and described in this thesis project, that provides assistance with student management during travel to and from school, including any busing events. This system is the Educational Communication System (ECS) and the application is currently available at the Apple store for no charge.

ECS has been designed with three main stakeholders in mind: parents, teachers and school administrators. For parents, the ECS will help reduce the use of paper and improve the likelihood that parents will have better information about their children that is timely
and more precise; reducing worry and upset. Specifically, parents can keep track of their children via their smart phone and/or a web interface. Within the school system, where staff is responsible for large numbers of students, the need to reduce complexity is especially important, as is real time information that can be shared with other school personnel and with parents. Administrators and teachers will be able to track and receive information via the ECS Smart phone application or through the web interface in real time, regardless of the time of day, as can parents. Finally, teachers and parents will know students' locations whether they are on field trips or on their daily bus routes.

The Educational Communication System (ECS) is intended to provide a computerized interface for all student data, organization and database storage as well as any related components. The application is hosted at a secure website and the system has been designed as an iPhone application that ensures secure user login. The system will contain information about students enrolled at a specific school and will keep track of student status at all times. School administrators can add, delete or update student information and parents can check on their own children attending that school. Those with user rights will be able to access grades, attendance and exact bus locations; updated via GPS. Bus routes, via the regular daily bus schedule, have been inputted with GPS coordinates for real time tracking and any special trips, such as field trips, can also be accessed at any time. Routes are updated in real time so users can see if a route is detoured for some reason. The ECS app allows images to be uploaded and those with access rights can see images of students and field trips. The app includes Facebook and Instagram capability and allows sharing via private settings. Additionally, email and a SMS messaging system is available in the app, so the ECS can send messages or texts to designated parents for
updates if needed.

Every parent knows how common it is to worry about a child when the bus is a few minutes late or when their children are on a field trip or attending an athletic or scholastic event that is in another county or part of the state. It is easy to generate many different scary possible scenarios while waiting for a child’s bus to return to the school’s parking lot but with ECS, that worry is nominal or non-existent. Parents can have peace of mind and not worry about their children who ride a bus for any reason. Additionally, parents can track grades, attendance and other academic information through ECS which will help reduce anxiety and worry. Helping parents help children, to support learning and knowledge acquisition, is much more likely with the ECS application. Reducing any daily anxiety will allow parents to devote more positive energy to their children.

1.1 Motivation for Project

As a former teacher pursuing a Masters Degree in Computer Science at Eastern Washington University, I considered combining teacher expertise and computer science knowledge and skills in order to create a technical solution for monitoring students in a way that can be shared with parents, in real time. As a parent of a young child, I recognize the peace of mind this kind of application will bring to many parents and it will help them to be more involved with their schools.

1.2 Problem Statement

This project is a management system used to replace all paper copies needed for tracking students throughout the day. The basic idea here is to solve a certain problem in the work environment, making the job easier, increasing productivity and aiding administrators and parents. This automated system will serve management needs as well as reduce anxiety
levels for parents not able to know where their children are or how they are doing in school with a fast and easy software system.

1.3 Objectives

This project has several objectives, but the most important one is to create a database that achieves the following goals:

1. Handle all students’ information, with the capacity to store and hold large amounts of data.
2. Provide capability for the data to be easily changed, updated and stored in the database from anywhere and at anytime.
3. Make it easy to create forms, reports, queries and tables. Creating all these documents with the ECS reduces the need for paper.
4. Increase accuracy and timeliness of student records through creation of a student database.
5. Parent-school interface: ECS makes it easy to track and check on children by parents, teachers and administrators.

1.4 Project Preparation

This author’s experience and training in preparation for this project includes:

- Graduate studies in Computer Systems Development
  - Studies in Software Engineering and Development
  - Studies in Database Management Systems
  - Studies in Human-Computer Interface
  - IOS research and training
  - Attaining a Master in Computer Science from EWU
• Training as an Education Specialist

• Two years working as a Teacher

• Practical experience as a parent and as a teacher has shown me the importance of being able to know when my children/students are when off campus as well as having the ability to check attendance, grades, and the field trips.

1.5 Project Plan

The development time frame for the ECS (Education Communication System) project is summarized in Table 1.1 Planning for this project began by determining how to clarify and define the project details and all the tasks that would need to be done in Winter 2013/2014; the direction of the project, a basis for measuring project progress and performance and defining the high-level milestones which are key checkpoints of the project. Furthermore, this process enabled the author to check the dependencies and resources to ensure a successful project. The project should be completed, according to the time plan, over a range of stages and phases a year from the project’s start.

<table>
<thead>
<tr>
<th>ECS Project Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Initial idea for project.</td>
</tr>
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</table>

Table 1.1 – Education Communication System Development Time Frame

1.5.1 Planning Phase

• Understand the project.
• Discuss existing solutions: a discussion and literature review was made before attempting to define objectives and goals.

• Define objectives: after understanding the project and seeing other related projects, define the system objectives clearly taking into consideration other system advantages and disadvantages.

1.5.2 Analysis Phase

• Functional requirements: these requirements define all system functions including user actions and system outcomes. They must be collected and defined clearly to avoid misunderstanding later [1].

• Non-Functional requirements: this is to specify the criteria that can be used to judge the system operation rather than specific behaviors [2].

• Milestone: Functional & Non-Functional requirements.

By Spring 2014, the needs of the project were fully understood, existing and potential solutions discussed, and the objectives were finalized after further study on IOS. Thus the project began to clarify itself into well-defined system objectives and the initial connections needed for the application’s completion were made. In Summer 2014 classes, GPS systems were researched to define exactly how they can be used to track locations on a mobile device and the necessary steps overall became clearer; the ECS application would soon be ready to start working. The IOS app was not fully functioning at this time because more research was needed on the subject before connecting a series of small applications that would function together for the final ECS. Later in the summer quarter and into the fall quarter, during the testing phase, additional data was collected to increase the researcher’s knowledge of it.
In the Fall of 2014, the website was developed using ASP.net. The project website and IOS app was not fully functioning until Winter quarter 2014-2015. At that time, research on how to connect GPS capability to the ECS app design was needed; it was then implemented and testing began. In Spring 2015, testing will be finalized and consumer testing will begin.

Thus, it is possible to say that this project will create a successful interactive communication system for parents and teachers using mobile phones based on prior research and coordination of information.
CHAPTER TWO

Expectations of the ECS System

The previous chapter introduced the ECS System and the rationale behind it. Chapter 2 will introduce common school management challenges and application domain issues. Subsequently, the introduction of the ECS project to a school district will be presented. In both scenarios, the point of view of bus dispatchers, parents and teachers will be presented.

2.1 Common School Management Challenges

The average office worker in a school generates approximately 2 pounds of paper and paperboard products every day. From mistakes printed on the laser printer, bad photocopies, old memos and reports, to old periodicals, 90 percent of all office waste is paper [3]. This paper waste can be reduced if we use technology to communicate within the system as well as saving and sharing student information online on a web server instead of generating paper. This will reduce waste and improve communication between teachers, administrators, and between parents and the school.

There are 295 school districts [4] and 782 private schools in the state of Washington, serving a total of 101,100 students [5]. The lack of communication between parents and teachers, and sometimes children, causes confusion, mistakes, and worries and it can allow students to take advantage of this lack of communication in order to escape school or lie about their grades or performance. Under a manual system, mistakes occur frequently. Reducing such errors, such as when a teacher can immediately enter information that the parent can access in real time will enable everyone to keep better track of children. The project is designed to allow parents to securely log in to their children's school information without having to call the school or go over to the school...
out of worry or upset. Parents will also be able to access their children’s grades (see Figure 2.1) and communicate with the school easily and at any time, on a mobile connection through their iPhone, without the need for a static computer.

Additionally, parents will be able to see where their kids are when they are travelling on the bus for school trips or between the school and home. This allows parents to have more peace of mind as they will not worry or have to wonder where their children are. Parents will be able to see bus locations in real time. Among the challenges faced by any school system is whether every student boarded the bus that is supposed to be there and if they are going to the right place. The ECS allows administrators, bus dispatchers, and parents to immediately know whether or not a particular bus, or a particular student, has arrived at the correct destination.
2.2 Project Domain

The ECS project will assist school administrators, teachers, and bus personnel by facilitating the job of storing all relevant student information. The project will also serve parents by giving them access to important documents or grades in a timely manner as well as allowing them to track their child’s bus location at any time. Bus activity or location (see Figure 2.3) and student attendance (see Figure 2.4) is uploaded in real time.

Teachers, and anyone at the school with the authority or approved access, can add, delete or update student information as needed so all data is current. Access rights will be strictly monitored and secured according to the special security system built into the application. Anyone without those rights will not be able to log in or access any of the information. Security codes will only be known by the administrator of the database.

2.3 System Analysis

This section will present a hypothetical scenario to illustrate a typical response and how the ECS system works in real time.
2.3.1 Simulated ECS

It’s a typical first day of school and all of the teachers are busy with welcoming students. The ECS app has been published, secure logins assigned, and parents, administrators and teachers have downloaded ECS using the App Store. Parents can add information and images for their children if they so choose. Administrators and teachers can access current information for every child and update, delete and add information as needed, including attendance and grades. School personal update data for parents to access information about their own children.

Every day, school children ride their bus to and from school and their bus drivers will use the ECS app to quickly record students who are riding the bus. Thus, parents will be able to see if their children are on the bus or not.

On the day the school has a scheduled field trip, parents will be able to login and see what activities their children are doing, including pictures with the date and name of the trip posted by the teacher and shared with those parents with the correct access accounts, using the school’s private Facebook or Instagram accounts located inside the ECS App. Parents will know at all times where the bus is located and that their child is on the bus.

If parents want to send an email to the school asking for more information or for informing the school that their child is sick, the ECS app provides this capability. The app can also send short messages (short message service or SMS) to all parents or to just specific parents since the ECS provides that service as well.

The ECS app provides a significantly better connection between parents and teachers and between families and the school system, which helps to engage the entire community in the educational process.
CHAPTER THREE
System Analyses

The previous chapter defined the expectations for the ECS application and spells out what is helpful about the system. This chapter will talk about system requirements that are classified into two categories: functional requirements and non-functional requirements.

3.1 Functional Requirements

A function requirement is described as a set of inputs, behavior, and outputs. Functional requirements may be calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish [1].

3.1.1 Maintain and Provide Data for the System

The system functional requirements have two sides, the first being the Mobile side of the ECS App. The second set of requirements relates to the website, which also allows student record management.

3.1.2 Mobile ECS Requirements

1. Buses need to have functioning GPS systems that send current locations of all buses on all bus routes. The on-board GPS system will report the current longitude and latitude coordinates. That data will be sent to an xml or GPX file within the application to hold the tracking data associated with each bus.

2. The database will hold information about student information and current status, who is riding the bus and who is not on a certain day and all related information about the bus route and scheduled stops.

3. The administrator of the database must be logged in to make any changes to the data.
4. The parents and members of the teaching staff must login to the system with their secure username or password to be granted access to the data.

5. Parents can add their own student’s information.

6. Teacher data management requirements:

   Can add / edit / delete the following:
   
   a. Students (First Name, Last Name, Age, Address, Telephone).
   b. Images.
   c. Route and Stops.
   d. Also the teacher can update student grades.
   e. Teachers can input student attendance, whether present or absent.

7. Administrators and teachers can send Short Message Service (SMS) to parent(s).

8. Parents can see child’s attendance status.

9. Bus personnel logs must be kept that will log the assigned bus riders for that trip.

10. The GPS tracks bus locations in real time.

3.1.3 Website ECS Requirements

The example URL for the website is http://www.ewu-nasmah.com/ecs/

The website is kept simple in order to test how easy it is to track, add or obtain other information about a student.

1. The website will show students’ current information and image.

2. The database for the mobile side of the app will store information about student data.

3. Student records can be updated or edited by assigned personnel only.

4. Parents can only add their child’s information.
5. Communication between the website and application see Figure 3.1.

http://ewu-nasmah.com/ecs/

Figure 3.1 Communications in the ECS System
3.2 Non-Functional Requirements

3.2.1 Availability

The system should be accessible at any time.

3.2.2 Performance

The system should be capable to handle all users’ requests and process them immediately, should be simple, interactive "user friendly"; that means it must be easy to use by all assigned users.

3.2.3 Security

The system should be secured; no end-user or administrator can use anyone else’s account. The user logs in with a unique user name and password that no one else can access. If an incorrect password is used, there is an alert saying invalid information (see Figure 3.2). If a user does not enter any information into the fields, there is an alert telling them to fill in the field (see Figure 3.3).

![Figure 3.2 Alert Invalid Information](image1)

![Figure 3.3 Alert Fill the Filed](image2)
The manager and parents’ access are separated so neither can access the other one’s account; only the database manager (in this case, this author) has access to passwords or other information. The database is completely secured from being able to disclose users’ information.

3.2.4 Capacity

The system should handle user requests in parallel. The ECS format should be familiar to anyone who has used an IPhone or computer.

3.2.5 Reliability

The system should recover automatically from any sudden crashes or add or delete or edit within not more than 2 minutes.

3.3 Feasibility Study

3.3.1 Economic Feasibility

The purpose of the economic feasibility assessment is to determine the positive economic benefits to the organization that the proposed system will provide. This assessment typically involves a cost/benefits analysis.

3.3.2 Benefit Analysis

The benefits of the system will be demonstrated when it is implemented (see Table 3.1 below).
### Table 3.1 - Analysis of Benefits

<table>
<thead>
<tr>
<th>Factor</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time And Effort</td>
<td>The old system is a paper-based process. That means archiving and retrieval process are from papers and files. This can take a lot of time. The proposed system is an electronic one. The archiving and retrieval process is automatic in the database, which is timeless and involves very little time to manage.</td>
</tr>
<tr>
<td>Quality Of Work</td>
<td>In the old system, data entry is done by handwriting, which is prone to errors and mistakes and it is not easy to correct errors or locate them; often it is hard to read the handwriting. In the proposed system, ECS, the data entry is done on the keyboard. If errors are found, they can be corrected without any trouble.</td>
</tr>
</tbody>
</table>

3.3.3 Cost Analyses

This will be very affordable during the testing phase because the school district will have the ECS App donated as part of testing (until June 2015). This ECS system will be available in the App store at a cost of $99 per school year. The cost of the webserver will be between $100-200 each year.

3.4 Operational Feasibility

After analyzing the technical and economic feasibility studies, the next step is the operational analysis. This helps to determine if the redesign of the workspace environment would work. This information was obtained from interviews with the chair of the EWU Education department.

3.4.1 Process

**How do the end-users feel about a new process that may be implemented?**

*The end-users will be very happy about the new process that may be implemented, because it will help them to keep their work more organized and efficient while letting them quickly and easily keep in contact with their students’ parents.*
3.4.2 Evaluation

The only requirements to use this system are very basic IPhone skills and web browsing ability.

3.4.3 Implementation

Identify resources both inside and outside that will work on the redesign.

Stakeholders: whose task it is to maintain the process, evaluate it and upgrade it.
Managers: department head who is the decision maker on this system; he defines what should be done on the data workflow.
End-Users: school department employees and parents will perform the data entry, and maintain the correctness of the data.

3.4.4 Resistance

Some parents, schools and individuals will be more resistant, because this system shares children's images with other registered users on a secure database but they can choose to opt out.

3.4.5 Strategies

**How will the organization deal with the changed workspace environment? Do new processes or structures need to be reviewed or implemented in order for the redesign to be effective?**

*The process has to be reviewed to be able to adapt the change in data entry. For example, should more information be collected on the ECS system for each child? Should there be another ECS system that is only for access by school personnel? Another database for storing more elaborate school records only to be read by teachers and administrators.*
CHAPTER FOUR
System Design

The previous chapter examined the system requirements, classified into two categories: functional requirements and non-functional requirements. This chapter will elaborate on the system’s design, its architecture and system tiers.

4.1 Multi-tier System Architecture

The ECS System is designed on a multi-tier architecture which means this system has three layers that will control the data flow within the system. The following sections will

**Presentation tier**
The top-most level of the application is the user interface. The main function of the interface is to translate tasks and results to something the user can understand.

**Logic tier**
This layer coordinates the application, processes commands, makes logical decisions, and evaluations. It also moves and processes data between the two surrounding layers.

**Data tier**
Here information is stored and retrieved from a database or file system. The information is then passed back to the logic tier for processing. And then eventually back to the user.

![Figure 4.1: System Architecture](image-url)
describe the design of each tier. Figure 4.1 illustrates the data flow between tiers.

4.2 System Tiers

4.2.1 Front End Design (Presentation Tier)

The ECS App is a mobile application developed for this Master’s research using Xcode 6 and SDK that uses iOS 8 for the programming platform. iOS 8 is the current operating system on the Apple iPhone. Xcode 6 requires a Mac running OS X version 10.9.4 or later. This application was developed with a Mac OS X version 10.10.2 and was written in the Objective-C language. The web application is part of the presentation tier and is written in C# for the ASP.Net 4.5 platform using Visual Studio Express 2013.

The ECS user will interact with the system through an iPhone or website. On the server side, there will be a web server that processes users’ requests see Figure 4.1(above).

4.2.2 Object-Relational Mapping (Logic Tier)

This is the tier where data is retrieved. Retrieving data from the database occurs when the user presents a set of criteria by a query. Object-Relational Mapping (ORM) are data management tasks in object-oriented programming that are typically implemented by manipulating objects that are almost always non-scalar values (complex value types that represents objects). However, many popular database products, such as structured query language database management systems (SQL DBMS), can only store and manipulate scalar values such as integers and strings organized within tables. The programmer must convert the object values into groups of simpler values for storage in the database (and convert them back upon retrieval) [6]. Whatever the object is, ORM is used to exchange data between client and server.
For the ECS App, data will be exchanged by sending and pulling data from the web, using a MySQL database, an RDBMS (relational database management system) that’s available on most hosts on the web. The author used the PHP language because it is easy to write and is available on servers all over the web. PHP and MySQL will generate JSON, a JavaScript Object Notation. It is a text-based open standard that is designed for human-readable data interchange. It’s used to represent simple data structures and associative arrays called objects [7] and will be used primarily to transmit data between the server and the ECS application.

The web application will exchange data using ODBC (Open Database Connectivity), which is a standard programming language middleware API, for accessing database management systems (DBMS). The designers of ODBC aimed to make it independent of database systems and operating systems. An application written using ODBC can be ported to other platforms, both on the client and server side, with few changes to the data access code [8]. The author used Arvixe hosting (http://www.arvixe.com) to host the PHP files and create the database. (See Figure 4.1 above).

4.2.3 Data Tier
In this tier, the information will be stored and retrieved from the database. The information is then passed back to the logic tier for processing using MySQL. This will prepare the queries for selection, deleting, adding or updating and eventually back to the user to be stored in a file, printed, or viewed on the screen.
4.3 The Components of the Application

4.3.1 Welcome Page

This will be the first page that the user will see. It contains the links to the login to the system for both parents and school personnel, as this is an internal, restricted system (see Figure 4.2). There is a sidebar menu to help navigate between pages easily (see Figure 4.3).

![Figure 4.2 Welcome Page](image)

![Figure 4.3 Sidebar Menu](image)

4.3.2 Login Page for Parents

Figure 4.4 will be the page or screen where parents will login to the ECS system. Each parent is assigned a unique username and password, saved in a secure database, and used to retrieve data using techniques explained in Section 4.2. If the user enters valid information, the user will be taken to the parents’ home page (this will be explained later). If the user did not enter valid information, or one of the text

![Figure 4.4 Login Page for Parents](image)
fields has no information, an alert message will be shown saying to enter valid
information. Additionally, there is a link to a sidebar menu if the user wants to switch to
the welcome screen.

4.3.3 Home Page for Parents
This section describes the home page for parents, where the user has links to tasks and
can also sign out from the home page. There is a function for sending email, which is one
of the features that Mobile devices include and this feature helps parents to easily and
quickly send a message to the school. The school’s email address is automatically loaded
but the subject and message body is up to the sender (see Figure 4.5). This home page for
parents has links to the following: Add Student, Gradebook, Social Media, Location and
Instagram (see Figure 4.6).

Figure 4.5 Sending Email

Figure 4.6 Home Page for Parents
1. Add Student

In this section, parents should add the child’s information, including Student Id, Bus Route and Bus Stop, First name, Last name, Age, Telephone, Address and Name of Image. Users can select an image from their device and upload images to the server. All information will be sent to the database except the image, which will be sent to the server. When images are uploaded onto the server it will be automatically compressed and sampled down to a smaller file size than the original, by adjusting width according to max height and adjusting height according to max width. This is done to keep the app from crashing or slowing down navigation speed between pages or commands when retrieving an image from server. Moreover, the parents can receive alert messages when they press the Info icon and get more details (see Figure 4.7).

![Alert Messages](image)

Figure 4.7 Alert Messages.
2. **Gradebook**

Parents login to the Gradebook page and when they put in their child’s Student ID, the database sends back current grades as illustrated in Section 2.1, Figure 2.1. See section 4.2.2 on the Logic Tier for more information on how to retrieve data.

3. **Social Media**

Parents can save their images privately, just on their own phone or they can share images on Facebook or Instagram accounts using the Share button (see Figure 4.8). If a user has not set up a Facebook account for the school in the settings, the app will send the user an Alert message about the need to set up a school Facebook account (see Figure 4.9). Additionally, the Facebook section of ECS will allow the user to choose an audience to share with (personal, friends, public). The user can choose where the field trip was located and what photo album to put the images in (see Figure 4.10).
For Instagram, the user types in the name of the image, can make comments or add information about the trip, or share it by using the Instagram button. The images sent to Instagram will be saved at the web server, and comment and name of image will be saved in the database; parents can see the images and comment on the field trip at Instagram (see Figure 4.11).

Figure 4.11 Transfer Information between Social Media Page and Instagram Page.

In the ECS application, images from school field trips can be added, deleted and edited. Parents can select and upload a picture, name and date it, and give additional information about the image or the field trip see Figure 4.12 (below).
This section of the ECS app uses Core Data because it is a good fit for this type of activity. Core Data is the best non-trivial data storage tool and can reduce memory needs and increase responsiveness. Managed objects are those that tie into the Core Data framework. A Managed Object Model provides a description of the managed objects, or entities, used by the ECS application, as illustrated in Figure 4.13. In order to retrieve data...
or images using a Managed Object Context, a Fetch request is generated. Sending a Fetch request to a Managed Object Context sends it to persistent stores in order to retrieve and return the requested object. Managed objects must be registered with a Managed Object Context, so when they are fetched they are registered automatically with the context you used for fetching.

4. Instagram

In this section, all parents that have access to the ECS App can see images and comments shared by other parents or teachers using the Share button (Instagram) in the Social media section as illustrated in Figure 4.14.

This page allows parents to delete the image or entry or they can cancel and go back to the Home page. As explained before, under social media (#3) above, the comments and the names of images will be sent to the database while images will be stored on the Arvixe server. When the parents visit the Instagram page, the image will be retrieved automatically from the server by their name that was stored in the database. Images will be shown in imageView and comments will be shown in TextView.

Figure 4.14 Instagram
5. Location: Attendance and Bus Location

When a user presses the location button at Home page, it contains the two links as illustrated in Figure 4.15.

![Two Links – Attendance and Location](image)

Figure 4.15 Two Links – Attendance and Location

The first page will show information on the user’s child so parents can see if their children rode the bus or not. When a user enters a child’s student ID into the text field, the correct ID is sent using MySQL to the database and the parent can immediately see if their child is on the bus as illustrated previously, in Figure 2.4. For more information on how to retrieve data, see Section 4.2.2 about the Logic Tier. The link for bus location will let parents see where the bus is at that moment, when they select Route1 or Route2.

During the testing phase, the author has only activated Route1 for tracking bus location. The Bus needs to have a functioning GPS system that sends the current location of a bus; reporting current longitude and latitude coordinates. This will allow ECS users to track
the bus on the Map, in real time. For this project, the MapKit, a framework of Type Hybrid, was used. This map has a collection of pre-written classes used to display maps as well as custom information. Hybrid includes photographic maps, roads and city names plus the map is scrollable and zoomable. The data received from the GPS will be sent to an xml or GPX file to hold the data associated with tracking the bus and then shown on the map as previously illustrated in Figure 2.3.

4.3.4 Login Page for School Management

This page is the login page for school management. Each user in the school is assigned a unique username and password that will be saved in the secure database and used to retrieve data using techniques explained earlier in Section 4.2. If the user enters valid information, the user can go to the School Management Home page (explained in a later section). If the user did not enter valid information, or a text field has no information, their alert message will say: “enter valid information” as illustrated in Figure 4.16.

![Login Page for Manager](image-url)
Additionally, there is a link to a sidebar menu if the user wants to change to the Welcome screen or Login parent screen.

4.3.5 Home Page for School Management

This section describes the Home page for School Management. The user can manipulate it to do all his tasks and can also sign out from the Home page. This Home page has links to the following: Manage, Student Record, Social Media, SMS and Location (see Figure 4.17).

1. Manage

Figure 4.18 shows the Student Information Page and it is the first page shown when the user presses the Manage button at Home page. On this page, there is a TableView that will show a list of all the students in the system; each cell gives information about a student: the student’s image, student name and student ID. In this section, there are four links that will help to manage student information. The first one lets the user press the edit button to delete student
records (see Figure 4.19).

The second one lets the user press the correct cell in TableView taking the user to the other View controller page. See Figure 4.20 for the page where teachers can update student grades or cancel to go back to the Student Information page. The info button (i) (see Figure 4.18 above) is available in the right corner of the cell and when the user presses it, the user will go to the Edit page. This page will enable the user to edit the information of a specific student as illustrated in Figure 4.21.

The fourth link will be a sidebar or menu bar to allow the user to choose more options as illustrated in Figure 4.22 (below).
The first option is that the user can go to the Home Page, for manipulating the app to do all the user’s tasks. On the Home page, the sidebar or menu bar will appear in the lower left to help the user to do more task (see Figure 4.23).

Choosing the Student Information option will redirect the user to the Student Information Page, with a list of all students. Another option will be to Add Student where the user can go to the Add Student page and add new records about students (see Figure 4.24 below). The Sign Out option will redirect the user to the Log In page. Moreover, all information will be
retrieved and sent to and from the database. Also, images will upload to the server as the author has detailed above.

![Add Student Records](image)

Figure 4.24 Add Student Records

2. Student Record

On this page, the manager can quickly search for a student using their student ID and then this page will show the student’s information: First and Last Name, Address, Telephone and Image. (See Figure 4.25).

![Student Record](image)

Figure 4.25 Student Record
3. Social Media

In this section, school management can do exactly what parents do; this information will be private on the associated parent’s iPhone and school management can edit, add, or share images on the school Facebook account or the parent’s private Instagram inside the ECS app. (See Section 4.3.3, # 4 for more information).

4. Short Message System (SMS)

In this section, the author used a MessageUI.framework, which provides specialized view controllers for presenting standard composition interfaces for email and SMS (Short Messaging Service) text messages. School Management can use these interfaces to add message delivery capabilities without requiring the user to leave the app [9]. The user can send SMS messages to parents using a Student ID or they can send messages to all parents as illustrated in Figure 4.26 and Figure 4.27.

Figure 4.26 Send SMS

Figure 4.27 Send SMS to Specific Parents using Student ID
5. Location: Student Location and Bus location

When school management users press the Location button on the Home page, it contains the two tabs as illustrated in Figure 4.28 at the bottom of the screen. The Student Location Page (tab on bottom left) will show students who live in this region and selected Route and Bus Stop. The school personnel assigned to register each child as they enter the bus allows parents or school management to exactly identify children who live on this route. Management selects Route and Stop; there are two Routes and three Stops (the author has activated Route 1, Stop 1 and Route 2, Stop 3 for the testing phase). When the manager user chooses a Route and Stop, the annotation will appear on maps that will describe the name of Route and Stop (see Figure 4.29).

Figure 4.28 Location

Figure 4.29 Student Location
If that user presses the info button inside the annotation, it will redirect them to “Who is on Bus?” Page and will show a list of students on the same Route and Stop. Additionally, this page has a close button, in the upper left corner, to take the user back to the previous page and a start button (upper right) that lets the user take bus attendance easily (see Figure 4.30).

Moreover, this page will show an alert message to the user to make sure they add students who are riding the bus. If they choose the exact same Route and Stop and press the start button, bus attendance will start over and it must be done again (see Figure 4.31).

![Figure 4.30 Who is on Bus Page](image1)

![Figure 4.31 Alert Message](image2)
This is the page that will communicate with parents; when each person responsible for adding each student’s bus attendance, the parents can see if their children rode bus or not (see Figure 4.32).

![Figure 4.32 Transfer Information Between Who is on Bus Page and Attendance Page](image)

The other tab will be the “Where is Bus?” Page and this page will show the exact bus location via GPS location. (For more information see Section 4.3.3 Location, #5).
4.4 The Architecture of the Website

The website is kept simple in order to test how easy it is to track, add or get other information on a student. The architecture of the website is described in the following sections.

4.4.1 Home Page

This screen (see Figure 4.33) is the front page of the system. It contains a preview about the system along with links to About Us, Family Access, Employee Access, Facebook and the ECS App. This page will show the Welcome Screen with information about the website and the ECS App.

Figure 4.33 Home Page

On the left side of home page is the Facebook button that will redirect the user to the school’s Facebook page. Family can access student information that other families have
posted. Under the Facebook button is the ECS App link that will redirect the user to the Apple store where the application can be downloaded. (See Figure 4.34).

![Figure 4.34 Apple Store](image)

4.4.2 Read More Page

Under Student Registration, there is a Read More button that will redirect the user to the Read More page that will provide more information (see Figure 4.35).

![Figure 4.35 Read More Page](image)
4.4.3 Family Access Page-Log IN

This page is the place where parents can register for an account (see Section 4.4.4). Once the user has set up their account, they will add their child’s information through this page (see Section 4.4.5). This page is for validating inputted text (see Figure 4.36).

![Family Access Page](image)

Figure 4.36 Family Access Page

4.4.4 First Time Log IN Page

Once the user has received their unique user name from their child’s teacher (see Figure 4.37 below), they can create their own user name and password and input their email address on this page. Validation occurs here as well (see Figure 4.38 below).
Figure 4.37 First Time Log in Page

Figure 4.38 Create Account Page
The First Time Log IN page will show an alert if the wrong UserName is used (see Figure 4.39) as a function of the security system.

4.4.5 Add Student Information Page

This screen allows the parent to add their student's records to the system with all the related information: Student ID, First and Last Name, Age, and Address. The registered user will see Welcome User and a Logout button at the top of the page (see Figure 4.40 below).
4.4.6 Employee Access-Log IN Page

This page is where an Employee can register for an account (see Figure 4.41 & Section 4.4.4). Once the user has set up their account, they can access the page and Update Student Information Page where can update student’s information (see Section 4.4.8).
4.4.7 First Time Log IN Page

Once the employee has received their unique user name from the ECS administrator (see Figure 4.42), they can create their own user name and password and input their email. User will get an alert if the wrong UserName is used (see Figure 4.39 above). This is a function of the security system.

![First Time Log IN Page](image)

Figure 4.42 First Time Log in Page for Employee

4.4.8 Update Student Information Page

This screen will show a Welcome User and Logout button at the top of the page. The page gives access to students’ ID numbers, First and Last names and students’ images (see Figure 4.43 below).
Once the employee selects a student, they can access student information (see Figure 4.44) and edit student records in the system with all the related information: Student ID,
First and Last Name, Age, and Address, Bus Stop, Bus Route, and Grades (see Figure 4.45).

![Update Student](image1)

**Figure 4.45 Update Student**

The employee can also add new students (see Figure 4.46) or delete students.

![Add Student’s Record](image2)

**Figure 4.46 Add Student’s Record**
4.4.9 About Us Page

This page has information about the author and provides contact information (see Figure 4.47).

![About Us Page](image)

**Figure 4.47 About Us Page**
CHAPTER FIVE

System Results and Future Iterations of the Project

The previous chapter elaborated on the system’s design, its architecture and system tiers. This final chapter includes the analysis results, the current state of the project and provide a preview to features that have yet to be implemented.

5.1 Current Status of the Project

This section covers the status of the ECS System and the basic functionality of the system as currently implemented. The author used a survey to collect user information in the testing phase and this data will provide the foundation for further development. This will help improve the application before a reliable test of the system can be deployed in an actual school district.

5.1.1 Test plan

At this point, the author began the final testing phase of the iPhone app and website. Table 5.1 is a summary of the initial test results done by the author before it was sent to the Apple Store for their testing procedures and was then deployed by the Apple Store (see previous Figure 4.34). At this point, the app was ready for testing by volunteer subjects via an online survey.

<table>
<thead>
<tr>
<th>Conducted Test</th>
<th>Result</th>
<th>Action After Test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PORTABILITY TESTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Browsers &amp; Devices Test</td>
<td>Pass</td>
<td>-</td>
</tr>
<tr>
<td>Connection to database</td>
<td>Pass</td>
<td>-</td>
</tr>
<tr>
<td>Connection Speed Test</td>
<td>In Progress</td>
<td>When the user uploads a large image the connection speed slows down but overall the connection is fast.</td>
</tr>
<tr>
<td>Test</td>
<td>Status</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>--------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Send Image to server</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Send Image to Facebook and local Instagram</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Deploy on App Store</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Alert</td>
<td>In Progress</td>
<td>Still need more Alert warnings.</td>
</tr>
<tr>
<td>Notification</td>
<td>Future Development</td>
<td>-</td>
</tr>
<tr>
<td>Location detection</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td><strong>Functional Requirements Test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add New User Test</td>
<td>In Progress</td>
<td>Need to add teacher’s name.</td>
</tr>
<tr>
<td>Choose</td>
<td>Future Development</td>
<td>Need to choose school name and class.</td>
</tr>
<tr>
<td>Status Update</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Login and Logout Test</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Add Field and Image</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Delete Field</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td><strong>Non-Functional Requirements Test</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>Capacity</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The user cannot access any resource</td>
<td>Pass</td>
<td></td>
</tr>
<tr>
<td>The name of the user should appear at top of page on website</td>
<td>Pass</td>
<td></td>
</tr>
</tbody>
</table>

| Table 5.1 - Summary of the Tests |
5.1.2 Test Results

The testing used a survey method, which was approved by Ruth A. Galm, EWU Human Protections Administrator (see Appendix A) as required. This survey was advertised at the EWU Graduate Symposium [10] as part of a poster as well as in the education building and childcare center (see Appendix B). The volunteers were given a contract stating that they would remain anonymous and that no one would be hurt in the process of taking the survey (see Appendix C).

The ECS project used a quantitative survey method to evaluate and assess the Educational Communication System (ECS). From March 30, 2015 until April 28, 2015, approximately a one-month period, the survey received data from 32 respondents but a majority of the questions showed that only 29-31 subjects had answered the question. The survey did not require that every question had to be answered in order to be valid.

5.1.3 Analysis Results

SurveyMonkey.com was used to facilitate product analysis based on user opinion. Respondents were given six questions and asked about the product, including ease of usage. A seventh question was a space to allow comments.

The first question, concerning ease of use, found that 43.75% of users found ECS to be “Very Easy” to use while 53.13% found it “Easy” to use. One subject (3.13%) found the app to be “Very Hard” to use and no one said it was “Hard” to use. The results for this one survey question showed that 96.88% of subjects found the ECS application easy or very easy to use. Further questioning would be needed to determine why the one respondent found the app “Very Hard” to use. In the additional comments text box, one respondent said “I would be so grateful to have this for my kids” (see Figure 5.1).
Asking subjects if they believe the app will facilitate communication between a school and parents, the results were again overwhelmingly positive: 96.77% said yes while 3.23% (one respondent) said “I don’t know” and no one said it would not aid communication (see Figure 5.2).
When asked if the subjects thought the ECS application would make it possible to dispose of paperwork, 90% said “Yes” and 10% said no. One person added a comment here that while it would probably not completely eliminate paperwork, it would help a lot (see Figure 5.3).
When users were asked if they liked being able to track their children’s location, 31 users responded. 70.97%, or 22 subjects, said they “Really like it” and 22.58% (7 users) said they “Like it.” One respondent said, “I do not care” and one said, “It is ok” while no one “Did not like it.” When they were asked if they liked being able to see their children on a field trip through Instagram or Facebook, 31 responded and 96.88% responded very
positively (64.52% “really liked it” and 32.36% “liked it”). No one chose “didn’t care,”
one said “it was ok” and one said, “did not like it” (see Figure 5.4). This result was
duplicated in a unique interview of the chair of the education department - some parents
will resist sharing their child’s image on social media (see section 3.4.4 above).

Figure 5.4. About App’s Additional Features
The fifth question asked the users what they thought about the application and 84.21% felt it would be very helpful for them and their family while 13.79% said it was helpful but could be improved (see Figure 5.5).

![Bar graph showing user responses to the app](image_url)

**Figure 5.5. Do you like the app?**
When asked about improvements, 16 respondents (51.61%) said it did not need improvement and 14 subjects (45.16%) said it only needed a little improvement. One subject (3.23%) said it needed a lot of improvement. It is not clear if this person was the subject who stated that a better presentation and use of colors would be an improvement as stated in the last question (see Figure 5.6).

Figure 5.6. Improvements?
The final question was in an open-ended question format and asked users for additional comments. Seven subjects responded, mostly positively, saying it was a good idea and would help them. One person said that the colors and presentation could be improved (see Figure 5.7).

Figure 5.7. Additional Comments
5.1.4 Final Analysis

In the final analysis, the project could have benefited from a bigger pool of respondents, however 32 subjects seemed sufficient for this phase of the testing. Overall, the ECS application had a very positive response but the author learned of some needed improvements before proceeding to the next testing phase, which includes teachers or other school personnel.

5.2 Future System Features

This application will be enabled for use in any school district and will have expanded data capability for each student. Every bus route will be added for all students who ride the buses can be tracked throughout the day, including all bus stops. The application will be able to monitor grades for all classes. Before the next testing phase, the presentation and screen colors will be enhanced in order to provide a more feature rich experience for the user.

5.3 Summary and Discussion

Because technology has allowed people to communicate and keep track of each other in spite of vast geographical distances, the idea for an application that can track student attendance, grades and location was considered and then designed. The Educational Communication System (ECS) was created to improve communication between the school, parents and their children when students are away at school, including when they are traveling to or away from school, either for special field trips or on their daily bus routes. In the event of bus route changes, or even failures, parents will be notified of those changes and sent an SMS message. ECS, a computerized system, was designed and implemented and tested for this project and is currently available at the Apple store.
without charge. After further design changes, ECS will be expanded and tested in numerous school districts.

ECS was designed with three stakeholders in mind: parents, teachers and school administrators. For parents, the ECS is likely to reduce the use of paper and improves the likelihood that parents will have better information about their children that is timely and more precise; reducing worry and upset. Specifically, parents will keep track of their children via their smart phone and/or a web interface. Within the school system, real time information will be shared with other school personnel and with parents. Administrators and teachers will be able to track and receive information via the ECS Smart phone application or through the web interface in real time, regardless of the time of day, as can parents. Finally, teachers and parents will know students' locations whether they are on field trips or on their daily bus routes.

In the initial testing phase, with 32 volunteers, 96.88% of the respondents thought the ECS app was easy to use and 90% felt it would improve communication between parents and schools. Asked if the subjects liked using the application, 93.55% did and 96.88% liked having the ability to interface with Facebook and Instagram. Ninety-eight percent of the respondents said the ECS application would be helpful to them and their families.

Every parent knows how common it is to worry about a child when the bus is a few minutes late or when their children are on a field trip or attending an athletic or scholastic event that is in another county or part of the state. It is easy to generate many different scary possible scenarios while waiting for a child’s bus to return to the school’s parking lot but with ECS, that worry is nominal or non-existent; that is peace of mind for every parent whose child rides a bus for any reason. Additionally, parents can track grades,
attendance and other issues that will help reduce any anxiety and worry. Helping parents help children, to support learning and knowledge acquisition, is much more likely with the ECS application. Reducing any daily anxiety will allow parents to devote more positive energy to their children.

The first testing phase proved that the application was easy to use and would benefit both school personnel and parents. It would reduce paperwork, increase communication between the school and parents and would give parents more peace of mind as well as a way to be more involved with their children’s education. It is expected that the ability to track attendance and grades, will help parents be more proactive with their kids’ education because they will know a problem areas in real time rather than waiting 10 to 12 weeks for a report card to be sent home.

The next testing phase will survey teachers and school personnel on expanded features that will be added to ECS. The next version of the application will cover all bus routes and bus stops, every class a student attends, and all grades the student receives. It is expected that more work will be needed to update the database and other changes will likely be needed after the next testing phase.

Overall, the application fills a void and will help parents and schools provide more support for students and the education process. When people know that they will be held accountable within a short amount of time, they often perform better and it is expected that students will be more involved in their own learning when they know their parents can easily and quickly check their grades and attendance.
References


<http://www.k12.wa.us/employment/k12opportunities.aspx>.


APPENDICES
APPENDIX A

Approval of IRB Application HS-4780

TO: Nasmah Alnaimi, Department of Computer Science

FROM: Ruth A. Galm, EWU Human Protections Administrator

DATE: March 20, 2015

SUBJECT: Educational Communication System (ECS) – HS-4780

Human subjects protocol HS-4780 entitled “Educational Communication System” has been approved as an exemption from federal regulations under CFR Title 45, Part 46.101(b)(1-6).

Student research qualifying for an exempt IRB review is valid for a period of one year. If subsequent to initial approval, the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departure from the original proposal must be reviewed through a Change of Protocol application submitted to the IRB before the protocol may be altered. Please refer to HS-4780 on future correspondence as appropriate as we file everything under this number.
APPENDIX B

EDUCATIONAL COMMUNICATION SYSTEM (ECS)

Thank you for taking the time to fill out the survey and give me your opinion! I really appreciate it. There are only a few questions and then a place for you to add free form comments.

If there is anything you think I should have asked and didn't or if there is any advice you have for me, PLEASE feel free to enter it in the comment box below.

Nasra Alhaimi

1. Was the application easy to use?
   - very hard
   - hard
   - easy
   - very easy to use
   - Other (please specify)

2. Do you think the application will facilitate communication between the parents and the school?
   - yes
   - no
   - I didn't know

3. Do you think that the program will make it possible to dispense with paperwork to communicate with parents?
   - yes
   - no
   - Other (please specify)

4. Please choose one answer
<table>
<thead>
<tr>
<th>didn't care</th>
<th>didn't like it</th>
<th>it was ok</th>
<th>I liked it</th>
<th>I really liked it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you like being able to track your child's location?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did you like being able to see the school's field trip in Facebook or Instagram?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. What you think of my project?
   - It would be very helpful for me to use.
   - It is ok; but needs some changes.
   - I do not like it.
   - Other (please specify)

6. How I can improve it?
   - It needs a lot of improvement.
   - It needs a little improvement.
   - It does not need any improvement; it is very professional.
   - Other (please specify)

7. Thank you very much for filling out the survey! Please feel free to leave any additional information that would like. I appreciate any feedback as it will help me make this application better!
   - Other
Dear Volunteer:

My name is Nasmah Al Naimi and I am conducting a study on Computer Science as a part of my thesis at Eastern Washington University. I am hoping that you will take just a few minutes to answer the questions below. Please know that your participation in this study is completely voluntary and your responses are anonymous as they do not require you to disclose any identifying information. Also, you may skip any questions that you are not comfortable answering.

With this survey, I hope to learn your thoughts, feelings, and attitudes about the ECS App that was developed to assist school administrators, teachers, bus personnel and parents by facilitating the job of storing and sharing student information with assigned users. After you have experimented with the ECS application, I hope you feel free to provide feedback because this is an important step in improving the product.

When answering these questions, please consider how this App will assist you and your child's experience at school. This survey is intended to help us understand different aspects of the parent/school relationship and improve it. Your answers and suggestions will be used in my Thesis project but as all information in the testing phase is anonymous (the beta version of the app is private and securely protected as is the actual application intended to be), no personal details can ever be shared.

To download the App for testing, please go to the App Store and write: ECS Project. For testing purposes, insert the following:

- the username for parents is "usernamep" and your password is "passwordp"
- the username for Manager is "username" and the password is "password"

After you have finished using the application, please go to https://www.surveymonkey.com/s/QKK2SL2 at surveymonkey.com and complete the questionnaire about your experience. Feel free to give as much feedback as possible about your experiences using the application; your opinions will make this application better and more user-friendly.

Note:
Please do not input any real information about your child. You can just write in the file name "asset.jpg" as an image placeholder where a photograph would go.
Feel free to contact me, Nasmah Alnaimi, at nhrn966@eagles.ewu.edu, if you have any questions or need more information. I appreciate you for volunteering to test the ECS App and providing feedback that will make this app a better tool for parents and school districts. Your participation is appreciated and all of your information will remain anonymous. Thank you so much!

Sincerely,

Nasmah Alnaimi
VITA

NASMAH ALNAIMI
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Skills

- Four years of technical software experiences providing database development, app development, and network routing.
- Used iOS Xcode software to create an Educational Communication System (ECS) app, designed to share student information between the school and parents.
- Highly skilled in Database development, and Software Development Life Cycle (SDLC).
- Advanced experience using Microsoft Office to create research reports, professional presentations, and financial/contact spreadsheets.
- Able to use Adobe Photoshop and Dreamweaver to create posters presentations and educational videos.
- Databases: Oracle 8.x/9.x, SQL Server, MS Access.
- Networking Tools: TCP/IP, Routing Protocols, VPN, ATM, MPLS.
- Office Tools: MS Word, Excel, PowerPoint, Outlook, Visio.

Education

MS, Computer Science 2015
Eastern Washington University - Cheney, WA, USA

- 3.5 GPA
- Presented at the National Council on Undergraduate Research (2015) on “Education Communication Systems”.

Certificate, Language Skills 2012
English Language Institute - Cheney, WA, USA

Certificate, Language Skills 2012
WSU- Intensive American Language Center - Pullman, WA, USA

Certificate, Language Skills 2011
EF International Language Center - Seattle, WA, USA

Certificate, Secretary-Computer Services 2007
New Horizon - Jubail Ind., Eastern Province , KSA

BA, Computer Science 2006
University of Dammam - Jubail Ind., Eastern Province, KSA

- 3.25 GPA

Relevant Experience

Student Jan 2014 to Current
Educational Communication System (ECS) Project - Cheney School District, USA

- Designed complex interfaces to support third party systems.
- Provide a computerized interface for all student data, organization and database storage as well as any related components; the application is hosted at a secure website.
- Provide assistance in the management and operation of school services.
- Reduce paper usage and improve parent linkages to ECS information that is timely and precise.
- Designed as an iPhone application that requires secure user login.
Student Apr 2014 to Jun 2014

Comparing MongoDB and MySQL Database - Eastern Washington Univ., USA
- Compare performance between MongoDB and MySQL databases, to determine if MySQL should be prevalent.
- Provide feasibility of NoSQL solutions replacing SQL.
- Connected MySQL for Java and MongoDB 2.4.6, using Java Driver 2.11.3 with Eclipse 4.3.
- Tested ten different Select queries. The selects were divided into two categories: simple and complex. The simple queries involved selecting data of only one object type. The complex queries involved multiple object types, nested queries, and aggregate functions.

Student Sep 2013 to Dec 2013

Routing Protocols - GNS3 - Eastern Washington Univ., USA
- Applied Intra-Autonomous System routing protocols to RIP and OSPF.
- Connected Interior Gateway Protocols (IGP).
- Linked RIPv2 Area routers, and OSPF in the OSPF Area routers.
- Configure and Enable OSPF and add networks.
- Capture streaming traffic for Wireshark.
- Created Real-time Streaming Protocol (RTSP), RTP, TCP and TLSV1 protocol.

Student Mar 2013 to Jun 2013

Project Management - Operating System - Eastern Washington Univ., USA
- Write the shell for operating system for accessing Shared Memory.
- Linex, GNUC, Algorithms, Data Structures.
- OS utilities like gawk; cmp, grep, cp, cat, ... Also written in p5 language.

Student Sep 2012 to Dec 2012

Java Programming - Football Team - Eastern Washington Univ., USA
- Program will read CSV file to access information for football team.

Kindergarten Teacher Jun 2007 to Oct 2009

Royal Commission - Jubail Ind., KSA
- Attended workshops on learning goals, classroom management, student motivation and engaging learning activities.
- Integrated technology into the classroom as an instructional tool such as the PowerPoint.

Secretary Sep 2006 to Mar 2007

Head Administrative Assistant - Jubail Ind., KSA
- Head Administrative Assistant for Hospital Director
- Created databases and spreadsheets to improve inventory management and reporting accuracy.
- Used Microsoft Word to write letters to companies and departments detailing patient information and operating procedures.
- Assist director with filing medical records, delegating phone calls, and organizing appointments.

Presentations
- Conducted a poster presentation for an educational software application designed to provide communication linkages between parents and schools systems.

- Give a complete picture of open source (HBase), how it works and how it provides a fault-tolerant way of storing large quantities of sparse data; where it was written with Java.

Research Experience
- Examined the effectiveness of storing medical images (DICOM) using fast and easy methods in cloud computing.

- Examined the usage of Information & Communication Technologies (ICT) technologies to significantly reduce water and energy consumption, decrease the amount of petrol-based fertilizers and pesticides, and protect scarce water sources from pollution.

Publications

There is currently one app out in the Apple Store that I have written or contributed to. (April 2015)
- https://itunes.apple.com/app/ecs-project/id968827974?
Web site for Education Communication Systems
- http://ewu-nasmah.com/ecs/

References

*References Available Upon Request