Design Report

**E-service for educational training material on smartphones**

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15 p thesis
Abstract

The language education company KEEWORDS provides games for language learning using physical decks of cards. The words in the language are shown on one side of the card, and the translation in another language on the other side of the card. Research has shown that this type of repetitive learning is effective for practicing vocabulary. We had an idea that KEEWORDS could expand their product line also to the app market. The goal of this project is to design a proposal to the Keewords company how their training method could be turned into a mobile app service. The goal of the designed app is to help educators teach students in a new and interesting way by providing them with a tool to create content, services, and training tools using new mobile technology. This project shows the process of designing this type of card training for smartphones. The design is not just for the language learning; rather it is a general design for learning different education material. The end result of this project is a proposal of a graphical user interface.
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1. Introduction

1.1 KEWORDS
Keewords is a company that provides physical cards to learn different words of different languages. Words on cards are written on one side and its translation is written on the other side. This makes it possible to first try to think about what the translation is and then see the answer when the card is flipped. The company has been developed by Carl Jonas Sjönander in cooperation with language professors at the University of Stockholm and several other institutions around the Europe, and is based on the Common European Framework of Reference for Language (CEFR) (KEWORDS.COM)

1.2 Purpose
The aim of the project is to design a proposal for the user interface for a service-package for educators and students based on smart phones. This interface will contain a front-side that will be accessible to students from where they can download and use training material to smartphones for the purpose of study and learning. The interface will also have an admin panel where the teacher will be able to produce and assign training material. Like Keewords physical cards, this software design will contain software cards with questions on front side and its answers on back side.

1.3 Tools
This is a small project so only limited tools were used in this project. Paper, pencil were used for the paper prototypes, and PowerPoint was used for computer based prototypes. PhotoShop and MS paint was used for the designing the GUI and its elements.

1.4 Delimitations
There are indefinite rules for designing by different companies, experts which are always good to follow for successful design. This is a small project so all the usability rules which are necessary for successful and usability problems free
Graphical User Interface were not followed. This is a static interface so test can’t be performed properly, so we can’t say which of functionality is applicable and which is not.
2. Theories
2.1 Graphical User Interface
GUI provides pictures and symbols to help user to interact with electronic devices. It is very difficult to memorize the complicated commands and typing them, like we do in DOS. Before GUI computer didn’t help users to interact and what to do next. GUI was a revolution to solve this type of blank screen problem. In GUI these commands are hidden behind the scene. Most of the users know how to use GUI. It is an easy way to interact with computer.

Human-Computer Interaction means how people should interact with computer. A deep understanding of interaction between human and computer was needed. First GUI was developed by Xerox Palo Alto Research Center (PARC) in the early 1970s (wikipedia). People concentrated on layout and design rather than on command line. People tried to make computer more usable by making it more user friendly. As a result different Operating Systems were introduced.

We can compare GUI with car steering. When driving the car, the driver just move the car here and there by turning the steering, similarly users of computer move around the computer with the help of GUI.

Different types of elements are used in GUI. Most common elements are “window”, “icon”, “menu”, and “pointing device”. Basically these windows, icons, menu etc are pictures with the help of which users send commands to the computer to take some action.

2.2 Interaction Design
Designing interactive products which support users. This is actually creating users experience that increase the way users work, communicate and interact. Winograd (1997) describes it as “the design of space for human communication and interaction.” So interaction design is to find a way to support the people. In addition there are some basic characteristics of Interaction design process
• All potential users should be involved throughout the process.
• User’s goals and requirements should be identified, documented.
• Iteration through the process.

2.3 The goals of Interaction Design
When designing the interactive system always users needs and support should be kept in mind. Is the design very efficient system which will help users to be highly productive in their work, or the system will be challenging and motivating so that is supports effective learning or is it something else? This is basically usability and user experience goals.

2.4 Design Process
Designing a Graphical User Interface needs lot of planning. The designer must know what is he going to do and must be prepared mentally that changes can occur. If the designer wants to have an original plan he must not avoid these changes but rather have to change the plan accordingly. A complex process of designing a Graphical User Interface needs a lot of collaboration between different groups, for example ordinary users, usability specialists, programmers, and designers.

Here are some important terms used in design process.

2.4.1 Color
Using proper color in design is very important. Single color can create different reactions in two different persons. This could be the reason of personal liking disliking or could be the reason of different cultural backgrounds. How color can affect different people is researched. A little change in color can create different feelings. Different countries have different cultures, so something could be considered happy in one country and the same thing could raise depression in another culture.
2.4.2 Graphic symbols
Graphical symbols or icons design in a proper way is very important in effective GUI. *A picture is worth a thousand words* [1]. This means that a complex idea can be delivered with a very simple and single image. The same can be applied to icons which represent some functionality. Icon should design in such a way that by looking at it, user could understand what the purpose of this icon is. It should represent the actual functionality behind it.

Before starting icons design, one should consider some guidelines and principles that are very important to design an effective GUI. The designer should consider some approaches, for example audience, size of icons, its simplicity, lighting, and style.

It is highly recommended that first icons should be sketched on papers, and then can be improved by iterating the design. Designer can’t judged the users preference, so evaluating the design by testing with users and getting feedback is important.

2.4.3 Eight Golden Rules of Interface Design
Ben Shneiderman suggested a collection of principles to design a good usable user interface [2].

- Strive for consistency
  
  *Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout.*

- Enable frequent users to use shortcuts
  
  *As the frequency of use increases, so do the user's desires to reduce the number of interactions and to increase the pace of interaction. Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.*

- Offer informative feedback
For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.

- Design dialog to yield closure
  Sequences of actions should be organized into groups with a beginning, middle, and end. The informative feedback at the completion of a group of actions gives the operators the satisfaction of accomplishment, a sense of relief, the signal to drop contingency plans and options from their minds, and an indication that the way is clear to prepare for the next group of actions.

- Offer simple error handling
  As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible mechanism for handling the error.

- Permit easy reversal of actions
  This feature relieves anxiety, since the user knows that errors can be undone, it thus encourages exploration of unfamiliar options. The units of reversibility may be a single action, a data entry, or a complete group of actions.

- Support internal locus of control
  Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions. Design the system to make users the initiators of actions rather than the responders.

- Reduce short-term memory load
  The limitation of human information processing in short-term memory requires that displays be kept simple, multiple page displays be consolidated, windows-motion frequency be reduced, and sufficient training time be allotted for codes, mnemonics, and sequences of actions.
2.4.4 Some guidelines for designers

Four problems to be solved when creating GUI (Else Lecture 2009).
- How should data be presented to the users?
- How should the user move around the data?
- How should the user give order to the electronic device or computer?
- How should the user enter data to the system?

Key questions to the designer (Moyen Lecture 2009).
- What are the main audiences of the design?
- What are they doing?
- What is their attitude towards that activity?
- What is the environment of use?
- What kind of hardware platform will use this design?
- What is the general media being provided?
- What kind of relationship would you invite between participant and content?
- What kind of program they are using?

2.5 Prototypes

In software development, a prototype is a rudimentary working model of a product or information system, usually built for demonstration purposes or as part of the development process [3].

In early stages of design a model or sample is formed to test an idea or concept of a process that is then converted to a full functional design. It could be as simple as paper prototype or as complex as full working system. It is a good idea because by using prototype in the beginning of a design or a project early problems can be found, resulting in time and money saving. Paper prototype is simple and cheap way in early stages. Computer based prototypes can be created using power point and Dream weaver. Advantage of computer-based prototype is that it could be looked as real system. It’s a good idea to get different people’s opinions about the
design. This process gives you the ability to evaluate different options, adjust them, and then choose the best one.

2.5.1 Paper Prototypes
In this process designer interact with paper version of the interface. This process helps designer to design software or interface according to user’s expectations and needs. In this process a model of the design is created using papers, rough sketches, and drawing of an interface to use as a prototype of a design. Feed backs are taken from the end users who will use the system and changes are made according to their needs. It gives idea about the design. This is an entry point to the actual design.

2.5.2 Computer Based Prototypes
Based on paper prototypes, computer based prototypes can be creating using different software.

2.6 Interactive Design
Iterative design means to design the same user interface design a number of times until a specified result is obtained. It is very important because designer don’t know in the beginning what will be the actual and final design. Basically it’s the design according to the analysis of user’s requirements, getting feedback and then redesigns the interface until they are satisfied. 

User interfaces should be designed iteratively in almost all cases because it is virtually impossible to design a user interface that has no usability problems from the start. Even the best usability experts cannot design perfect user interfaces in a single attempt, so a usability engineering lifecycle should be built around the concept of iteration [4].
2.7 Scenarios
Description of a person’s interaction with a system. This represents a specific instant of Human-Computer interaction. It is helpful in finding the user’s requirements. Scenario should be understandable to layman who doesn’t have technical background.
- This makes it possible for the designer to design from experiment and observation rather than theory.
- Make designer capable to consider a set of phenomena.
- Give guarantee that the end result of the theory will be applied in HCI contexts.

2.8 Basic activities in Interaction Design
Some of the important activities involved in Interaction Design are as follow
- Finding out the needs and requirements.
- Developing substitute designs that fulfill those requirements.
- Developing interactive version of the design which can be tested by communication.
- Evaluation.

2.9 Evaluation
Designing is not an easy task. What kind of problems might be present in the system can be find out by evaluation. In evaluation the system is tested according to the needs of the users and is practices. We can get feedbacks by using evaluation that can help to improve our design. Evaluation should be used throughout whole design or development process in order to influence the final system [5].
Designer team have to choose when, why, what, and how to evaluate the system. Experts do the evaluation with users. It is important to get feedback from the user because they are the actual people who will use the system.
There are lots of evaluating methods. Here is a list of these methods.
2.9.1 Expert evaluation
Expert checks the system for design problem and try to find out these problems. But a problem is that the experts lack knowledge of the system, its users, and their tasks.

2.9.2 Heuristic evaluation
This method is basically a usability examination which can help in finding out usability problems in User Interface Design. Evaluators inspect the interface and determine the result with usability principles. This method gives quick feedback to the designers. But this requires a certain level of knowledge and experience to apply heuristics effectively [6].

2.9.3 Observation interview
This method can be applied to those systems that already exist. Designer and developers observe user, point out how they do the tasks and asks the questions.

2.9.4 Scenario based evaluation
This is done on those systems that are in development. The users do their tasks and scenarios to go with the system. The users are observed and are asked questions how they do the tasks and how they find the system.

2.9.5 Laboratory evaluation
This is usually done in usability laboratories. The users are given tasks by evaluators in laboratories and then they are observed by the evaluators. But the problem in this method is that users do the task in a different environment, and it is expensive too.
3. Smartphones

3.1 Smartphones

Smartphone is a device which is a combination of cell phone with computer, web browser, multimedia player, and camera. The smartphone opens up new possibilities for educational purposes. The ease-of-use and the mobility of such devices make it possible to use it on buses, public places, parks and train for studying. To utilize such a training device it must be easy for an educator to produce, edit, and upload training material and also to be able to follow the student’s progress.

Here are some features that differentiate smartphone from ordinary cell phone [7].

- Operating System.
- Software.
- Web access.
- QWERTY Keyboard.
- Messaging.
- Solid PIM Functionality (Plenty of info and fields for each contact. Good calendar view, flexible, etc).
- Universal Search.
- Office documents editing.

3.2 Smartphones role in Education

Technology helps to drive education forward. The smartphones can sparkle education and unleash childhood creativity, and alter the role of the teacher. It puts kids in “The Driver Seat”, and “Unlocks creativity”. The percentage of people that have computer is less than the percentage of people that have a cell phone. Even in developing countries the mobile usage is increasing. We use cell phones just for conversation and sending text but would it not be a great idea if we also could use it for our educational purposes?

In the past people used ordinary methods for education using blackboard with chalk or papers and pencils. These are still in use but technology is improving day
by day and is replacing these things with electronic devices. People now use computers to solve problems because these are more accurate and faster as compare to human being.

Fig 3.1

But using computer is a bit complicated. So scientists moved to laptop. But it is difficult and quite boring to take your laptop every where. So why not combine the features of computer and cell phone into one so it becomes easy and accessible every where? Scientists attacked the problem, a big one, and quite expensive and as a result smartphones were discovered.
3.2.1 How students can use Smartphones in Education?
One example is e-books. Students can access e-books through internet on their smartphones all the time. It is a cheaper way to study and an opportunity to access books permanently everywhere. Moreover the student’s status situations and exam results can be uploaded on the Internet and parents can access their children results online everywhere rather than go to school. With the help of interactive courses teacher can upload videos and photos on Internet and students can access it on their smartphones every where, in their homes, in busses, in airports etc. So with the help of Internet there could be online classes and online courses.
Smartphones usage for education has no limits. It will help in faster communication, faster learning, and will bring creativity in kids. If you put a three years old kid in front of TV, he/she will be relax by watching cartoon, but if you give him/her an iPhone with application of arranging letters etc, his/her mind will be busy and result in unleash childhood creativity.

3.2.2 Advantages
- Smartphones make administration more attractive in education.
- It attracts students with top-edge technology.
- Information are secure and confidential.
- It helps to improve institution communication.
- It helps to improve institution security precise data.
3.2.3 Some educational software for Smartphones

Lots of educational software are available in the market for smartphones, from dictionary to learn vocabulary, history, literature, religion, science, social, math, computer etc. Here is a list of some popular smart phones education Apps [8].

- Star Walk – 5 Stars Astronomy Guide: This app can be used for the education of Astronomy.
- ECTACO Flashcards: This app is used for learning new languages.
- Math Bingo: This app is used for learning mathematics.
- My Spelling Test: This app can be used to check the spelling of a language.
- Teach Me: 1st list: This app is used to read child written math and spelling answers.

3.3 Theory about learning

Learning is the lifelong process of transforming information and experience into knowledge, skills, behaviors, and attitudes (Jeff Cobb). Learning is a process that brings together cognitive, emotional, and environmental influences and experiences for acquiring, enhancing, or making changes in one's knowledge,
skills, values, and world views (Illeris, 2004; Ormrod, 1995). It emphasizes on what actually happens when someone learn something. Learning is acquiring new knowledge, behavior, skills, values, preferences, and understanding.

3.3.1 Knowledge
Acquaintance with someone or something, resulting in information, facts, descriptions, or skills gained through experience or education. Understanding or a subject theoretically or practically. It can be implicit with practical skill or expertise or explicit with theoretical understanding of a subject (Wikipedia).

3.3.2 Behavior
A response of a group or individual to an action, environment, person, or stimulus.

3.3.3 Skills
Propound knowledge to perform pre-determined results in least possible cost of time, energy or both. I could be domain-general or domain-specific. For example, in the domain of work, some general skills would be how to manage time, teamwork, and leadership, self motivation and others. Domain-specific skills would be useful only for a certain job (Wikipedia).

3.3.4 Preferences
Preferences could be having an idea of as an individual’s attitude towards a set of objects, typically resulted of an explicit decision-making process (Lichtenstein & Slovic, 2006). Or we can say preference is the evaluative judgment in the sense of liking or disliking an object (Scherer, 2005).
3.3.5 Understanding
Understanding means be able to think about an abstract or physical object, how to use concepts to deal with it. It is the relationship between the person who knows it and the object.

3.3.6 Who can learn?
Human, animal, and machine can learn. Machine includes both hardware and software.

3.3.7 How can one learn?
We can learn by play, personal experience, training, education. Learning could be the result of achieving some goals or we can learn unintentionally.

3.3.8 Types of learning
Learning can be non-associative and associative. Non-associative learning could be the result of some stimuli you get used to and you don’t react as strongly any more. You get sanitized to something so only small stimuli make you to react. Associative learning could be the result of association between elements.

Learning is a complex process. Basically it has two chief values according to Hill (2002). One provides us vocabulary and conceptual structure to explain the examples of learning that we discover. The other explain the plane where to look to find solution of practical problems. Actually theories do not give us solutions, but it can clarify the solution by directing out attention to those variables which are important.

Three categories of learning are behaviorism, cognitivism, and constructivism. Behaviorism explains objectively observable aspects of learning. Cognitive explains brain-based learning. And finally constructivism explains the process in which ideas and concepts are put together by the learner.

Learning and knowledge acquisition are different in nature. Everyday we learn new information, but we do not operate hold back within every bit of data we
face. However, to be knowledgeable about something we must take a brief look at new information. For example one must be able to apply their knowledge in various settings, examine with efficiency, penetrate knowledge to the bottom, and use it to teach new learners.

3.4 Theory about mobile use
Mobile devices are sources of learning. There are lots of applications available for children that motivate them to learn. Today most of the children have access to mobile devices. Mobile usage for children is increasing day by day. Lots of success stories are available for mobile learning in schools. For example there has been positive press coverage in September 2008 about mobile/cell phones in schools from the Daily Telegraph Newspaper that ran the headline: “Mobile/cell phones” boost school standards [9]. Educator can open new line of education, where the learning between educators and students is connected closely as a powerful vehicle for innovation. It is the duty of teacher to find out how they can use new technology in a reflective way. The ability of mobile to connect to Internet make these devices more useful. Research for Intel suggests that the number of mobile internet devices, i.e. devices that can browse the web, will increase to 1.2 billion by 2012 [10]. Mobile devices that expose themselves to learning are smartphones. Philanthropy alone cannot educate the poor illiterates, but if we use technology in a smart way, then we can do wonders. The innovation is happening with the high-end customers in the mind, iPhone, iPads, Android devices and so on. Mobile phones give us an outclass opportunity to make business sense out of making technology solutions for the poor, if we spend out energies at innovating for them. Nowadays most of the schools use computers. Technology is becoming cheaper, and now most of the students do have computers. Students interact with each other and teachers easily by using technology. The range of educational software is increasing dramatically particularly with the rise of very cheap apps of smartphones. Technology gives us opportunity to put more control of learning in the hands of learners.
But there can be disadvantages of using smartphones. Mobile phone companies are interested in selling their business in the shape of games for kids, which can keep away kids from study. However, it is up to parents to handle their kids responsibly. Cellphones can be misused like cigarettes and this can affect kids study. Parents should put down their own phones long enough to tech their kids the something. There is a lot of educational software available. With the usage of smartphones we can learn anything, anytime, anywhere.
4. Methods
This section explains all the methods used to design the process started from the paper sketches to the resulting prototypes and final design.

4.1 Design approach
The following flow chart in figure 4.1 was defined as how to move on throughout the design process. All the important GUI elements were defined. The first step of the process was to define some scenarios which are discussed in above section. According to these scenarios some paper prototypes were defined and were discussed with some students and teacher. After getting feedback changes were made in paper prototypes. After that computer based prototypes were designed in MS PowerPoint. Then the actual design was designed using Photoshop. Feedbacks were get from students and teacher and changes were made until final version.
On the basis of scenario discussed above paper prototypes were drawn on simple papers and were presented to teacher and students from different categories. On the bases of feedback from teacher and students changes were made in these prototypes.

**4.3 Computer Based prototypes**
Using PowerPoint paper prototypes were converted to computer based prototypes. Below are some examples of computer based prototypes.
4.4 Evaluation
The final design was evaluated on the bases of feedback and discussion with students and teacher. Here are some evaluation methods which were used during the design process.
Scenario based evaluation method was used by observing all the possible scenarios and according to these scenarios all the necessary GUI elements were defined.
To get quick feedback expert evaluation methods were followed to find out usability problems in the design.
The system was not exist before so no observation interview was conducted. No Laborites evaluation method was followed during the design process.
5. Results
In this section results of the project are discussed.

5.1 E-Service Software for Education
This Software is for learning different study material from learning language to mathematics, psychology, computer etc. This software makes teachers and student’s task easy and more fun. Let them study different subjects of different level and practice it at their homes, on busses, on trains, and in public places. This software is like a Coach for the student that will train and tailor the education accordingly. This is an extra element for the teachers. This is an easy and fast way to produce study material.

5.2 User Groups
This design is for education purposes. Its users are teachers and students. Teachers are those users who will produce education material and students are those users who will read and practice these materials. There could be different categories of students, from basic level to university level.

5.3 Scenarios
Scenario was covered in Chapter 2. Here are some scenarios which were considered during the design process.

5.3.1 Teacher login
Teacher wants to create some stacks. No one else should be able to get login to the system. So the system should only allow those people to enter who have special privilege. So teacher will enter user name and password.

5.3.2 Wrong Password
Teacher enters wrong username or password so the message of incorrect username and password is displayed.
5.3.3 Create new stack/Delete existing stack/Edit existing stack
Teacher gets login to the system. He wants to create new stack. So he clicks on create new stack button. He is now on new window which showing important fields required to create new stack, which he will fill. After filling the required fields he clicks on save button to save the stack.
Teacher wants to delete some existing stacks. So he selects the stacks which he wants to delete and click on delete button. A dialog box appears to confirm the deletion, so he click on Yes button of the dialog box and the stack gets delete.
Teacher wants to edit some existing stacks, so he selects the stack which he wants to edit, and click on Edit button. He is redirected to the existing stack with editable fields which he can edit and save.

5.3.4 Add Cards
Teacher wants to add cards to the stack. So after saving the stack information he clicks on add cards button and he is on the new window to add cards. There should be basically two types of cards. Simple Cards and Multiple Choice Cards. If he select simple card, he can add simple questions with picture, video or without video. He previews the card before saving. He adjusts the picture to fit in to the card, and then clicks on save button to save card information.

5.3.5 Student practicing
Student wants to practice. So he selects subject, level, and stack from dropdown list and click on start button to start practicing.

5.3.6 Shuffle
Stack of random cards appears to student for practicing. He clicks on shuffle button to sort the cards.

5.3.7 Flip Simple question
The first card appears to student with a simple question. He answers the question in his mind and click on flip button to see the answer. The answer of the questions
appears and if it is correct and student is confident in this question he clicks on remove button to remove the card from the stack or he can click on keep button to keep the card in the stack.

5.3.8 Flip multiple choice questions
Next card is multiple choice question. He selects the answers and click on flip button to see the answer. If question is correct he gets feedback of correct answer, and if the answer is wrong he gets the feedback of wrong answer.

5.3.9 Last card flipped
Student flips last card of the stack and he gets a congratulation message with practice more with Yes and No option. He can click on Yes to practice more or he can click button No to finish practicing.

5.4 Teacher Interface
This section discusses the teacher interface.

5.4.1 Login
Teachers are the administrators of the design. The following GUI shows the first windows when teacher starts to produce material. There should be an admin panel where teacher can produce different materials. This admin panel should be accessible only to teachers. So the first page is to authenticate the users, so no one else can use the system. Figure 5.2 show that only authentic users can access admin panel.
Fig 5.1
Fig 5.2
5.4.2 Create/Edit/Delete
The following GUI shows the first window when the teacher login to the software. There are three buttons in this interface. Create button is used to create new materials, Edit button is used to edit existing material, and Delete button is used to delete the material.

![Image of GUI with buttons: Create, Edit, Delete]

Fig 5.4
5.4.3 New Stack
Figure 5.5 shows how to create New Stack. This window has different fields to enter the basic information about stack. Stack Title text box is used to enter title for the stack. Description area shows description of stack. “No of Cards” text box shows how many cards Stack will have. There are 4 combo boxes to select Level of the stack, Language for the stack, Course, and target students. Fig 5.6, 5.7, 5.8, and 5.9 show how Level, Language, Course, and Target Students are Selected from the Combo Boxes.
Create New Stack.

Stack Title: Math 1.1

Description: Mathematics is the study of quality, space, structure, and changes. In this stack you will learn the basics of Mathematics.

No of Cards: 10

Level: Select

Language: Intermediate

Course: Select

Target Students: Select

[Buttons: Save, Clear, Add Cards, Close]

Fig 5.6
Mathematics is the study of quantity, space, structure, and change. In this stack, you will learn the basics of Mathematics.

Fig 5.7
Fig 5.8
In fig 5.10 Button Save is clicked and Stack information are now saved into Database. Button “Add Cards” which was disabled before saving is now enabled, so now Cards and Questions can be added to stack.
5.4.4 Add Cards
Fig 5.11 shows Add Cards window. This window has 2 browse buttons to add picture and video to the cards. It has a combo box to select type of questions. Either there could be simple questions or multiple-choice questions. Preview button is used to preview card. Button save is used to save cards or questions to stack. Button clear is used to clear all the fields.

![Add Cards Window](image)

*Fig 5.11*
Fig 5.12 shows how picture is browsed from local drive to add to the card.
Figure 5.13 shows what happens when Question Type dropdown list is clicked. Each stack will have different cards and each card will contain different types of questions. Basically there are two types of questions.

- Simple Questions: Simple Questions can be just simple text question or it can have picture or video and questions about these videos and pictures.
- Multiple Choice Questions: In multiple choice questions users are given a question and different answers. User can choose one from these answers and when the card is flipped it’s correct answer is shown on the other side of the card.
Fig 5.13
Fig 5.14 shows how card information is saved to stack.

![Add Cards interface](image)
Fig 5.15 shows the preview of simple question.
Fig 5.16 shows preview of simple question’s answer.

Fig 5.16
Fig 5.17 shows how picture which is added to card can be resized.
Fig 5.18 shows the preview of picture card, question part.

Fig 5.18
Fig 5.19 shows preview of answer with picture.
Fig 5.20 show how multiple choice question is added to stack.
Fig 5.21 shows how stacks and cards can be edit or delete. There are check boxes in front of all stacks which can be selected/deselected to edit/delete stacks.
Fig 5.22 shows how the stack is edit.
Fig 5.23 shows how stack can be deleted from database. When the check box in front of stack is checked and button Delete is clicked, a dialog box appears to confirm the deletion of stack from database.
5.5 Students Interface
This section shows how student can practice using these stacks and cards which were produced by teacher in the previous section.
The first window shows how student start practicing. This window has 3 combo box, Subject, Level, and Stack. When all these options are selected then button start will be enabled and can be clicked to start practice. Figure 5.25, 5.26, 5.27, and 5.28 show how these options are selected and button start is enabled.
Fig 5.25
Fig 5.26
Fig 5.27
Fig 5.28
Fig 5.29 shows the first window after clicking on button start in the previews section. Here student can click button shuffle to shuffle the cards or can click on button start to start practice. In figure 5.30 cards are shuffled.
Fig 5.30
Fig 5.31 shows the simple question on the card. The answer of this question is on the other side of the card. Button flip is used to show the answer, which is shown in figure 5.32.
Fig 5.32
Fig 5.33 shows picture card and fig 5.34 shows its answer.
Fig 5.34
Fig 5.35 shows a multiple choice question and fig 5.36 shows its answer.
Wrong

Psychology is the study of human mind and behavior.
Fig 5.37 shows what happens when the last card is flipped. Here student have two options, either he/she can practice the same stack again or can go to select another stack.
6 Discussions
With the design will be implemented or not but the basic goal of this project was to create a GUI for an e-service which can facilitate teachers and students to learn education material in an easy and acceptable way. Some of its functionality may not be implementable to full extent; however, most of its functionalities are applicable.

The teacher and students found it useful for learning material. This design has many advantages. First, it is a base to convert physical cards to soft or digital form. This design covers almost all levels of students from primary to university level. Teachers can create study materials easily everywhere. Similarly, students can access the service everywhere and can practice it again and again as many times as they want.

Using paper prototypes give you a big picture of the Interface but you can’t focus on the details. But anyhow it gives you a start point to start your work. Usability evaluation is not fully followed in this project because of the scope of the project, so there could be some questions according to usability expert which can’t be answered. There were very limited tests with limited participants on the static design so feedback can’t be expected from this design.

6.1 Future Work
The goal of this project was to design a GUI for e-service. With it will be implemented or not to a full-fledged software is yet to be seen. The teacher and students found it inspirational. This software can be implemented on Smartphone and on website as well. This design can be changed according to the needs of the users.
7. References


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