TOPIC: To build a mobile application that runs on JAVA, that integrates some vital time consuming daily Varsity tasks, running on a virtual server accessible to both the teacher and the students.

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DECLARATION

We hereby declare that this thesis is based on the results found by ourselves. Materials of work found by other researcher are mentioned by reference. This thesis, neither in whole nor in part, has been previously submitted for any degree.

Signature of Supervisor: Students' names & Signature:

_____   *Nazia Ahmed*

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                                            Biplab Kumar Saha

ACKNOWLEDGMENTS

First of all we would like to thank our supervisor A.S.M. Zillur Rahman for the guidance he provided in every possible way through this exertion. He arranged all the facilities and the necessary supports, which were indispensable for our thesis.

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Our sincere gratitude goes to MD. Mostofa Kamal Rasel and MD. Ayub Ali for helping us develop the application.

And lastly we would also like to thank all the BRAC University Students and Teachers who participated in the survey for developing the Application Varsity Buddy.

ABSTRACT:

In Bangladesh, various processes of business enterprise, school, college, hospital are run mostly on PC. But nowadays it seems that these processes consume more time, labor and money. As such if an application based on JAVA (J2ME) is developed within cell phones that can be accessed via internet (GPRS, EDGE) creating a user-friendly interface, would give multitasking a whole different level by decreasing those basic limiting factors.

Keeping this in mind, we have developed a cell phone application using J2ME (JAVA to Micro Electronics) as the interfacing environment. This would integrate 4 major Varsity tasks: a. Attendance marking b. Lecture Polling c. Routine Synchronization and d. Clubs, into one single application accessible to both the teacher and the students.

This would not only reduce the amount of time dedicated for each tasks in real life but will improve and modernize these methods by making it much more interactive than it was ever before. So the ultimate goal is to minimize interference with the task at hand and maximize interactions to expedite completion.

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Chapter 1: Introduction

1.1   Background:

Communication is a process of transferring information from one entity to another. It is commonly defined as the imparting or interchange of thoughts, opinions, or information by speech, writing, or signs. Increasingly, educators and their students use social networking to propel themselves into interactions that extend well beyond the constraints of the physical studio classroom.   For an increasing number of educators and students, this alternative space—while hardly utopian—holds potential for the formation of virtual communities that can extend and amplify the traditional classroom. The ability to produce effective multimedia learning applications for technology that is ubiquitous is very appealing. Mobile phones are becoming more technically sophisticated. They can create and play multimedia content: they have larger, high quality, color screens; many models can now capture, edit and play back video, audio and photographs, and can run Flash-based interactive applications (through Flash Light). They also have greater storage capacity and networking connectivity, can connect to the Internet and PCs and have Bluetooth and WIFI.

1.2 Students and cell phones around the globe

Surveys conducted with various University students all around the subcontinent each Semester since October 2005 shows that they own mobile phones that have multimedia and connectivity capabilities in increasing numbers. Harnessing the use of these devices for learning resources which are known to engage and motivate students could be a powerful way of providing learning materials to students who increasingly have other demands in their life and on their time and need more flexible learning solutions. Cell phones are whipped out, and fingers fly across keypads. Students are using technology for myriad reasons, from arranging lunch dates to checking e-mail. Although it is hard to understand how a majority of socialization can be virtual, today's students use cell phones, social sites and mp3 players hourly to make and break plans, break and make up and, generally, be teenagers.

The need for instantaneous communication between students and administration is such a necessity that USA Today reported that Morrisville State College in New York distributed cell phones to students and added the monthly bill to their standard school fees. Because newer cell phones and smart phones

include email access, students can use their cell phones to check their campus email accounts. Personal digital assistants (PDAs) like the BlackBerry feature web browsing, which enables students (especially those taking courses online) to access their course materials from almost anywhere. Phone calls, text messaging and instant messaging are heavily used on college campuses where students are expected to not only keep up with their friends and classmates but with their studies as well. As stated in the article "The Age of the Smart Cell Phone," numerous college campuses across the United States are utilizing cell phones and smart phones to send important messages to students regarding registration, financial aid and assignments.

1.3 Daily Campus Chores

Some of the most common and regular chores around campus turns out to be pretty time consuming considering the fast paced generation that we are a part of. When asked around in BRAC University campus, most students pinpointed some regular yet important tasks that they carry out every day in the Varsity campus.

Routine Matching: When there is a need for a makeup class, the teacher would call out to each students and ask whether they are free at a particular time, and in turn the whole class becomes a chaos and most of the time they don't end up coming to a unanimous decision based on each and everyone's timing. And this happens mainly because of the lack of transparency, and time consuming process that it is.

Evaluation: The existing process of teacher evaluation doesn't seem to accommodate the student's or the teachers' understanding about the course which fails to accomplish any goal in the end of the semester. The students and the teachers thus suggest that this system should be modified and they expect a better ground for both to interact.

Clubs and forums: Being a member of a club is mandatory in most universities as extracurricular activities are very much important aside from their majors. The club fairs each semester are a huge hit among the students, for it brings everyone in one single ground to interact and understand the clubs. Although this same ground can be made more fun and exciting according to the students

Latest News: Everyone needs to be updated about the latest happening and news around the campus.

1.4 Our Application: Varsity Buddy (Mobile Application for BRAC University students)

According to our Survey of BRAC University 100% students and Teachers uses Cell phones in our University. Thus mobile technology and its usages are easily accessible for all of the students in BRAC University. We used JAVA 2 Micro Edition (J2ME) and developed a mobile application named **Varsity Buddy** that integrates 5 important varsity tasks (that are usually done manually) namely: Attendance, Lecture Polling, Routine Synchronization, Clubs and Latest News updates which are accessible to both the students and the teachers via internet. With the help of JAVA we are creating a platform for a cell phone application which will run in any mobile having JAVA enabled in it. This application will help the students and the faculty in the University to interact with each other for the most regular tasks such as Evaluating a lecture by polling it, matching their routines without any hassle or chaos in the class room, being able to relate to a club and joining them and the everyday news updates and happenings in the campus. And the best part is all these can be done by simply following a link and downloading it into their cell phones and becoming a registered user of the application.

1.5   Our Application's Featured Tasks: Digital solution VS Manual

SL	Tasks	Manual	Digital Solution
1.	Attendance	a. The document is on paper which is required to be fed into the server manually. b. In case any change occurs, the teacher would have to make correction by hand which results in untidiness on the paper c. Any chore related to a student's presence or absence in the class is not directly accessible or easily found since the teacher would have to go back to the paper.	a. The document is being fed in the server automatically as the readings are taken. b. The teacher can simply toggle the changes when it arrives. c. Any chore related to a student's presence or absence in the class is easily accessible to the attendance document as it is directly linked to the server

2	Lecture poll (to replace the present Evaluation system)	a. The evaluation in the end of the semester is not enough to really understand the capability of the teacher and his/her lecture b. It is monotonous and time consuming c. It is important for both the teacher and the students to know his/her rating in a course. But the present system does not allow this to either one of them	a. The evaluation/polling will make sure there is a consistency in the course throughout the semester which will better the understanding between both the teacher and the student b. It will not take up too much time as it can be done at any time of the day using one's cell phone c. This system will provide an open ground for the student and the teacher yet keeping their privacy in check. As such they can access the polling information and make necessary amendments in real time.
3	Routine Synchronization	a. It is time consuming and complicated when students try to match their routine with each other in the class manually. b. Students and teacher don't get the access to the required information to synchronize their timings if it's done manually.	a. The digital system will take much less time and be effective and trustworthy both for the teacher and the students. b. The synchronization process in this case is just a click away eliminating all the possible odds.

4.	Clubs	a. Club preferences can mostly be sorted out when one joins the club and goes through the activities.	a. One can take a simple quiz and find out which club is best suited for him/her
		b. The process of recruitment being time consuming and monotonous slows down the spirit and main objectives of the club during the process.	b. The digital way is definitely time-efficient in terms of joining the respective clubs as every hit from the students tallies the desired club and this info goes directly to the club authority without being there in person.
5.	Latest News	a. Everyone needs to check the notice board hanging by the lift or the café or the dept office, which can be tiresome and most of the time slips our attention	a. This way everyone gets to be updated and it's just a click away!

1.6 Justifications behind our idea:

1. All the students and Teachers uses cell phones and are familiar with its internet and other important technologies.

2. Cell Phones are the future of internet

3. JAVA is the most useful and highly supported language in cell phones

4. As the web will take up more packet data, will not ensure user privacy and is not personalized.

Chapter 2: SURVEY REVIEW

2.1 Introduction

To implement this mobile application we were required to check its feasibility first. We conducted a survey with an objective to understand the needs of our university's students and teachers based on their common day to day tasks and their practicability and how they want various changes in those tasks.

We selected of our survey subjects on the basis of following characteristics:

- We decided to survey on only people with the age of 17 years or above considering them to be a full time undergrad student and full time teachers in BRAC University.

- We had collected informed verbal consent from them before we started with our questionnaire.

- They could give us time to have a one on one question answer session with them asking about their various needs in the campus.

- They all know how to use a cell phone and a computer.

2.2 Methodology

- **Study Site:** BRAC University, Mohakhali

- **Study Population:** Individuals (17+ years)

- **Sampling:**

Sample size = 45(students)+5(Teachers)=50

- **Data Collection Method:**

- In Depth Quantitative Interview

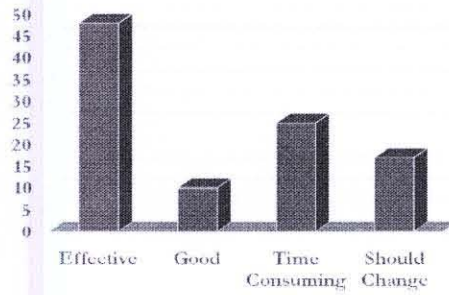- Collecting responses to structured questionnaire

2.3 Survey and Results:

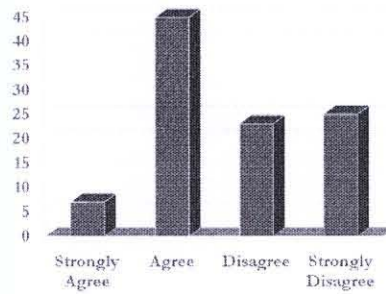Fig:1 Present advising procedure is effective according to 90% students

Fig:2 Trying to find a suitable time for makeup classes is very hard according to 80 of the students
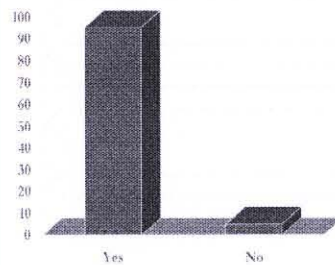
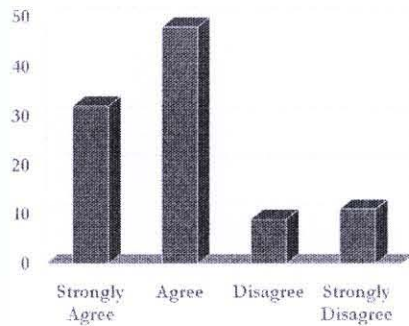Fig:3 All 100 students were a member of a club.

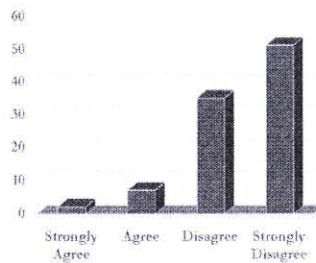Fig 4: 75 said they liked their club activities while the rest were neutral

Fig 5: 30 students said that the present faculty evaluation system is effective while the rest disagreed.
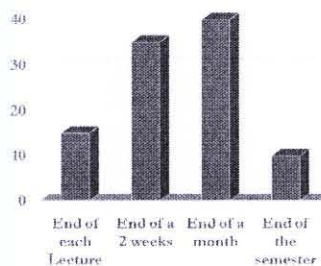
Fig 6: According to the following number of students evaluation should be followed
10 said at the end of each lecture
35 said at the end of 2 weeks
40 said at the end of a month
10 said at the end of the semester
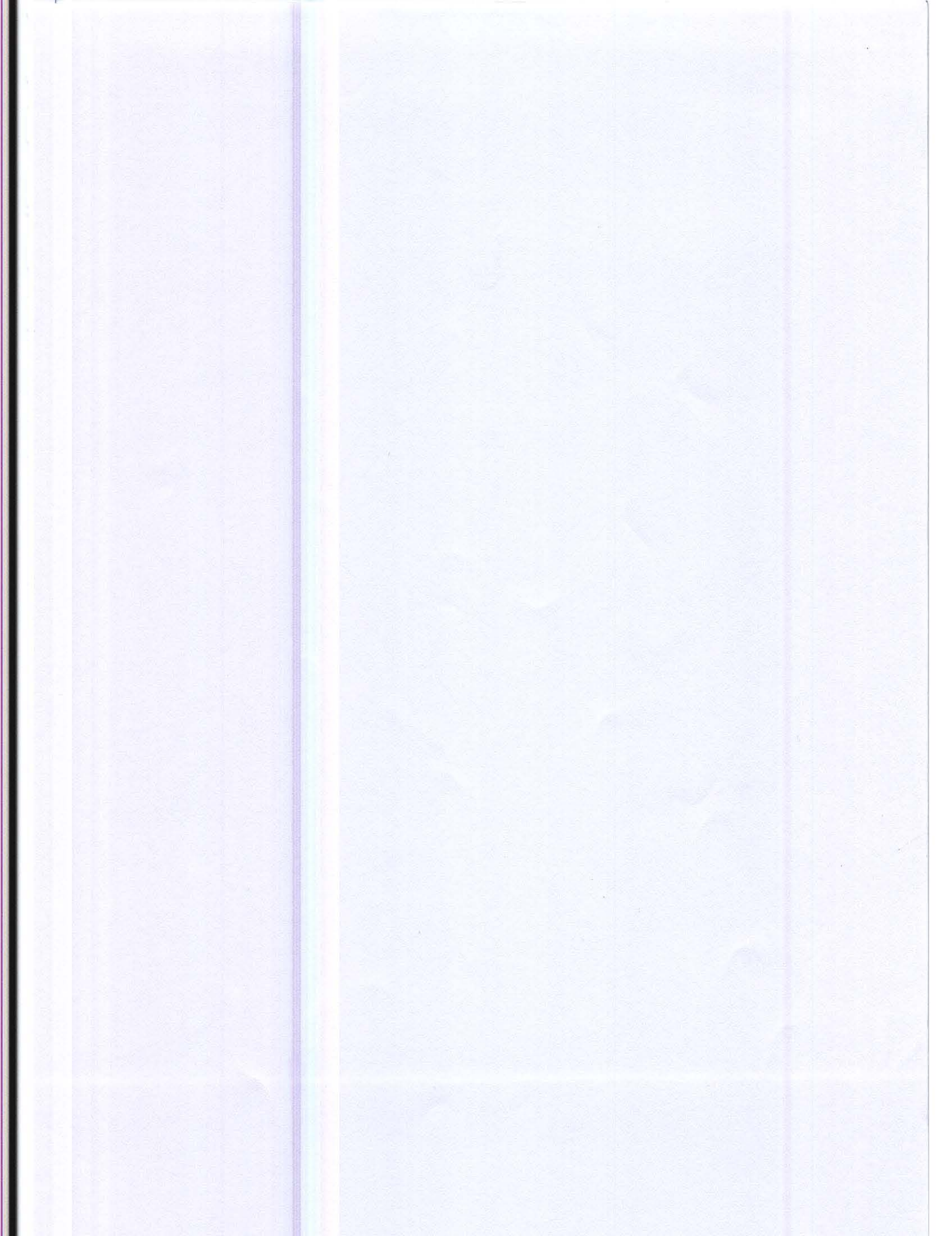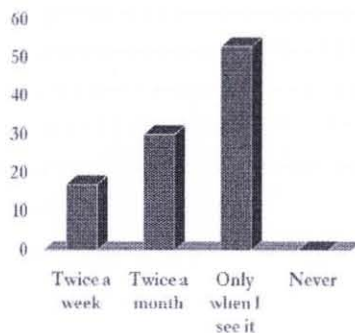
Fig 7: 50 students checks the Varsity notice boards when they are waiting for the lift or randomly standing near it while the rest 50 checks it on a weekly basis.
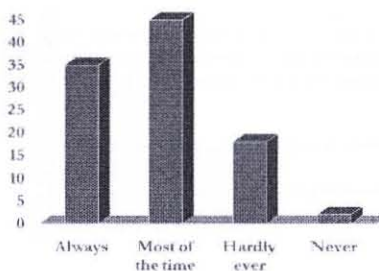
Fig 8: 85 students finds the BU PCs free most of the time, 15 hardly ever finds them free.
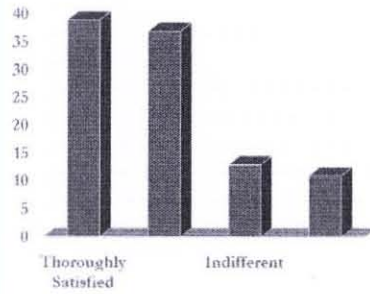
Fig 9: 78 is thoroughly satisfied while the rest are not with this
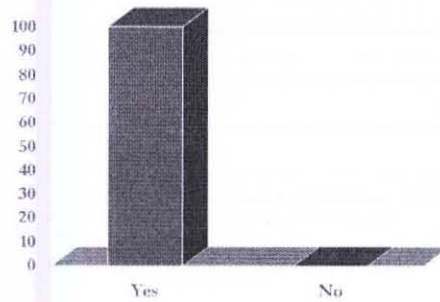
Fig 10: 100 students use a cell phone
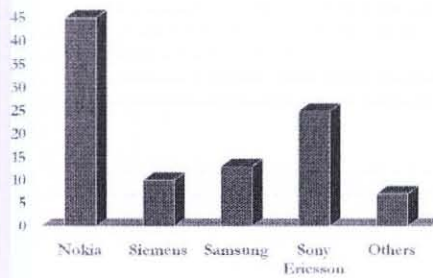
Fig 11: Among the brands that they use the most common are Nokia(60) Sony
Ericsson (30) and the rest uses Samsung and other models.
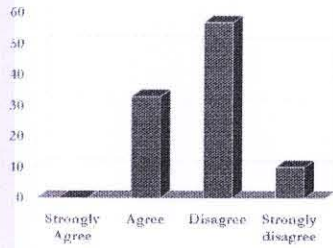
Fig 12: 30 students disagreed when asked if they would want to use their cell phones to do all their university tasks, 40 agreed and the rest remained neutral

Fig 13: **55** has—Java, Internet Browsing(Wap, Edge,CDMA), SMS, Music, Radio and Microphone.
30 has SMS, Music, Radio and Microphone. And **15** with only SMS and Radio.

Fig 14: Majority of them uses Grameen Phone connection, Banglalink comes second, Aktel and Teletalk are thirds while the rest goes for Warid or CityCell.

Fig 15:   10 uses over 400-500+ BDT per week
           15 uses over 300-399 BDT per week
           45 uses over 200-299 BDT per week
           20 uses over 100-199 BDT per week
           5 uses over 50-99 BDT per week

Among the 25 with internet options in their cell phones 70 uses facebook and googling and news, 20 only uses facebook, 5 uses BU website and others, and the rest 5 are indifferent.

Frequency of SMS / text messaging
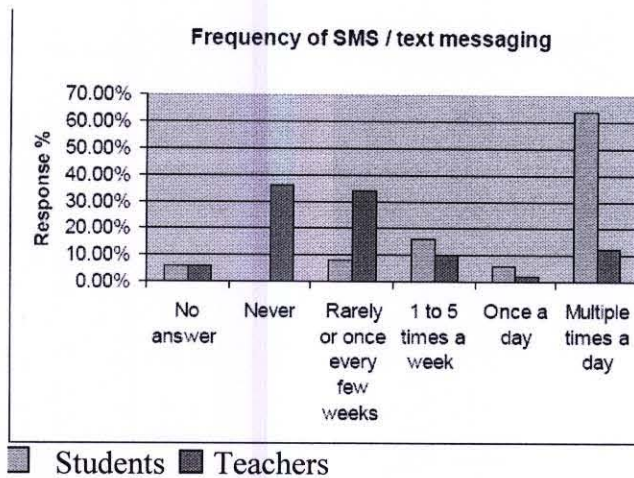
Students ☐ Teachers

Scenario	Students	Teachers
While in class	70%	66%
While at work	46%	54%
At a movie or a concert	70%	60%
While driving	16%	4%
While sleeping	18%	8%
Other	16%	22%
Phone is never in mute or vibration mode	6%	6%
Total	**100%**	**100%**

2.4 Survey Conclusion:

1: Present advising procedure is effective according to 90% students

2: Trying to find a suitable time for makeup classes is very hard according to 80 of the students

3: 100 of the students were a member of a club.

4: 75 said they liked their club activities while the rest were neutral

5: 30 students said that the present faculty evaluation system is effective while the rest disagreed

6: According to the following number of students evaluation should be followed 10 said at the end of each lecture 35 said at the end of 2 weeks 40 said at the end of a month 10 said at the end of the semester

7: 50 students checks the Varsity notice boards when they are waiting for the lift or randomly standing near it while the rest 50 checks it on a weekly basis.

8: 85 students finds the BU PCs free most of the time, 15 hardly ever finds them free.

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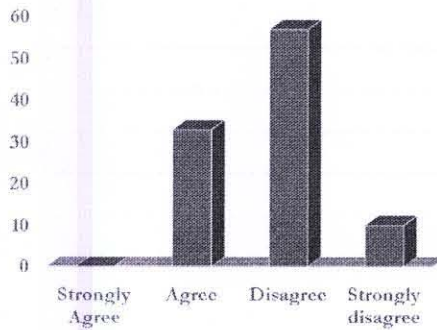
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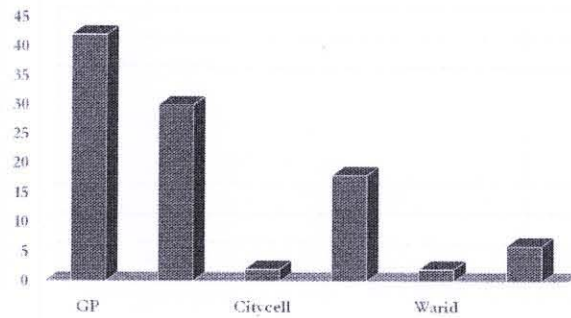
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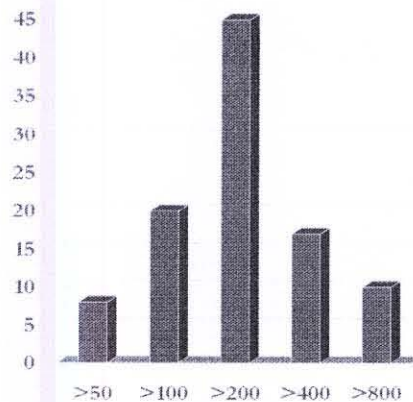
15: 10 uses over 800 per week; 15 uses over 400 per week; 45 uses over 200 per week ;20 uses over 100 per week; 5 uses over 50 per week

16: Among the 25 with internet options in their cell phones70 uses facebook and googling and news, 20 only uses facebook, 5 uses BU website and others, and the rest 5 are indifferent.

Chapter 3: SYSTEM DESIGN

3.1 A Brief as How a System is Developed (In General):

Software development consisted of a programmer writing code to solve a problem or automate a procedure. Now systems are becoming so big and complex that teams of architects, analysts, programmers, testers and users must work together to create the millions of lines of custom-written code that drive our enterprises.

To manage this, a number of system development life cycle (SDLC) models have been created: waterfall, fountain, spiral, build and fix, rapid prototyping, incremental, and synchronize and stabilize.

The oldest of these, and the best known, is the waterfall: a sequence of stages in which the output of each stage becomes the input for the next. These stages can be characterized and divided up in different ways, including the following:

- **Project planning, feasibility study:** Establishes a high-level view of the intended project and determines its goals.

- **Systems analysis, requirements definition:** Refines project goals into defined functions and operation of the intended application. Analyzes end-user information needs.

- **Systems design:** Describes desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudocode and other documentation.

- **Implementation:** The real code is written here.

- **Integration and testing:** Brings all the pieces together into a special testing environment, then checks for errors, bugs and interoperability.

- **Acceptance, installation, deployment:** The final stage of initial development, where the software is put into production and runs actual business.

- **Maintenance:** What happens during the rest of the software's life: changes, correction, additions, moves to a different computing platform and more. This, the least glamorous and perhaps most important step of all, goes on seemingly forever.
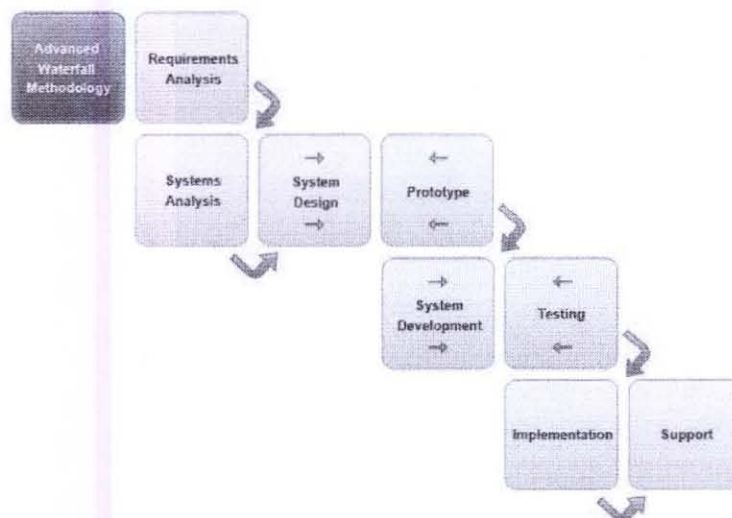
1.10: Advanced Waterfall Design Approach.

3.2 Our System

After studying (1) The needs of the teachers and students in BRAC University, (2) the survey outcomes and (3) the current scenario of services provided through cell phones, it can be decided that the proposed service must have following characteristics:

1. The complete process has to be very easy to understand and learn.
2. At every step, users have to be provided with thorough guidance.
3. The service has to be obtainable through cell phones (JAVA enabled).
4. The tasks that can be completed by this application must be easier than the original/manual version.

Now, a design has to be developed for the service and the complete system which fulfills this requirement. For that and to make it user-friendly, these measures were taken:

- The system was designed based on Human and machine interaction, a discipline of Computer Science, which basically studies machines' interactions with human beings and suggests effective ways for designs.

There are two different interfaces one for the Students and the other for the teachers in this application. The differences are:

Faculty Interface:

- This will have the option for Attendance that can be accessed by the teacher only.

- The lecture poll will have the Faculty view that can only start a poll for a particular course.

Student interface:

- This won't have the attendance option in it.

- The lecture polling option is only to cast poll and not start one.

Other than these features all the others remain the same throughout the application.

3.2.1 Human Interaction with the system:

Since our application is based on cell phone technology we tried to develop it in way that the Menu system and technology behind it is much user friendly in terms of Icons and graphics. As such the user will not be baffled by the technology that he/she is using.

Principles of User Interface Design:

Principles of User Interface Design are intended to improve the quality of user interface design. According to Larry Constantine and Lucy Lockwood in their usage-centered design, these principles are:

The structure principle:

Design should organize the user interface purposefully, in meaningful and useful ways based on clear, consistent models that are apparent and recognizable to users, putting related things together and separating unrelated things, differentiating dissimilar things and making similar things resemble one another. The structure principle is concerned with overall user interface architecture.

The simplicity principle:

The design should make simple, common tasks easy, communicating clearly and simply in the user's own language, and providing good shortcuts that are meaningfully related to longer procedures.

The visibility principle:

The design should make all needed options and materials for a given task visible without distracting the user with extraneous or redundant information. Good designs don't overwhelm users with alternatives or confuse with unneeded information.

The feedback principle:

The design should keep users informed of actions or interpretations, changes of state or condition, and errors or exceptions that are relevant and of interest to the user through clear, concise, and unambiguous language familiar to users.

The tolerance principle:

The design should be flexible and tolerant, reducing the cost of mistakes and misuse by allowing undoing and redoing, while also preventing errors wherever possible by tolerating varied inputs and sequences and by interpreting all reasonable actions.

The reuse principle:

The design should reuse internal and external components and behaviors, maintaining consistency with purpose rather than merely arbitrary consistency, thus reducing the need for users to rethink and remember.

3.1.3 System Design Overview:

According to our systems aspect our system design is consist of several methodologies. These are IVR, Desktop Application and simple Call flow design. Describing below:

1. **UML design:**

   UML stands for Unified Modeling Language. This is an object-oriented approach of notation for defining a system.

2. Mobile Application design:

Desktop based application are efficient and user friendly. Windows application can be operated by any user without any training. Administrative controls made our software re-usable and robust. On the other hand simple 3 step design approach made our navigation through Graphical User Interface much easier. Anyone with a modest knowledge of computer can easily learn and manage our software application.

3. Database design:

Database was designed following standard database design methodologies. Necessary illustrations are provided below:

3.2 Unified Modeling Language(UML) Design:

Our system has two types of actors-

1. Faculty   2. Student

- The functional goals of application Administrator and are as follows-

Faculty:

a) Add quiz and assignment schedule.

b) Able to take attendance

c) Mange routine to student

Student:

a) View the quiz and assignment schedule.

b) Able to join in the poll to justify the lecture.

c) Synchronize routine to

faculty or student.

3.3 Use case Diagrams:
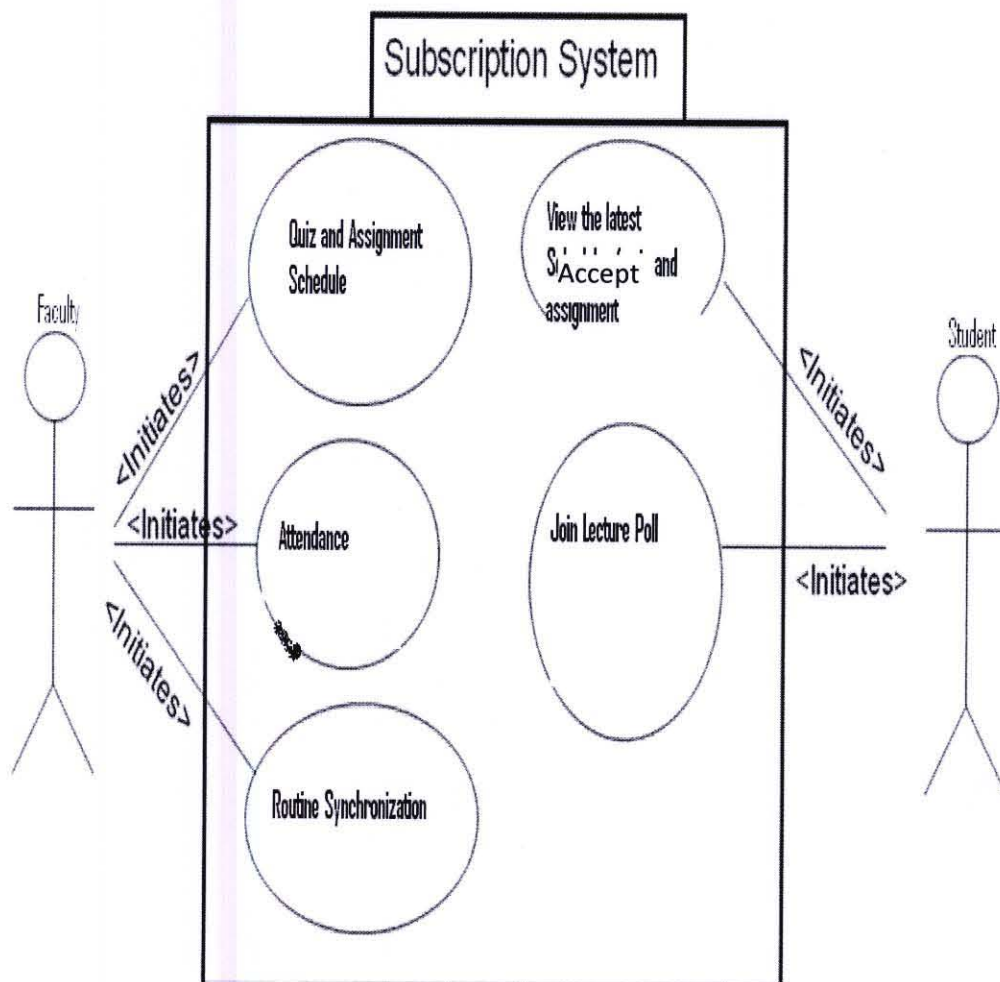
3.2.1 a: UML Design: Use Cases Diagram for Operation

3.4 Data Model for Application Server (ER Diagram):

1. Routine Synchronization:

Uid	Sunday	Monday	Tuesday	Wednesday	Thursday
05310007	8-9:30	9:30-11			
08301014					

2. Lecture polling

Course id	Faculty id	Date	Student id	Q1	Q2	Q3
CSE460	05221	21/2/09	05310027	A	A	B

3. Clubs

Name of clubs	Tally of polls	U-ids
BUCuC	2	05320014
		06854211
BUBizzB	1	07854122

4. Attendance

Course Id	Date	Student id	Section
CSE460	29/5/09	05310027	1
		05621135	
		06321104	
ECE421	30/5/09	07895441	2
		08988455	

3.5 Menu System

Faculty View

1.Faculty
    i) Latest News
        a)Department
            i)ARC
            ii)CSE
            iii)ESS
            iv)EEE
            v)ENH
            vi)MNS
            v)Special
        b)Clubs
            i)BUCC
            ii)BUEC
            iii)BUFC
            iv)BUPC
            v)Special
        c)Others
            -:Special Events
            -:Announcement

    ii)My Schedule
        i)Class
        ii)Lab
        ii)Exam
            i)Midterm
            ii)Final
            iii)Quiz
                i)Post New Quiz
                ii)View Upcoming Quiz
        iv)Assignment
            i)Theory
                i)Post New Assignment
                ii)View Upcoming Assignment
            ii)Lab
                i)Post New Assignment
                ii)View Upcoming Assignment

iii)Routine Synchronization
    i)View Request
    ii)Submit Request
iv)Attendence
    i)Theory
        i)Take Attendence
        ii)View Poll
        iii)View Poll Results
        iii)Compare Poll
    ii)Lab
        i)Take Attendence
        ii)View Poll
        iii)View Poll Results
        iii)Compare Poll

]

Student View
2.Student
    i) Latest News
        i)Department
            i)ARC
            ii)CSE
            iii)ESS
            iv)EEE
            v)ENH
            vi)MNS
            v)Special
        ii)Clubs
            i)BUCC
            ii)BUEC
            iii)BUFC
            iv)BUPC
            v)Special
        iii)CSO
            i)PSDP
            ii)Jobs
                i)IT & Telecommunications
                ii)Marketing & Sales
                iii)Customer support & Call center
                iv)Accounting/Finance
                v)Bank/Insurance/Leasing
                vi)Engineer/Architects
                vii)NGO/Development

Chapter 4: IMPLEMENTATION

4.1 Platform

Mobile:
> J2ME

Database:
> MY SQL Server

Server Side Language
>PHP

4.3 Components:

Mobile:

› Mobile Phone Network

› Internet service through cell phone

Chapter 5: Discussions

5.1 Challenges that we faced:

Finding resources necessary for our system: (Getting application through sms)
Phone companies in our country allows sms based application download. But it is a lengthy procedure. That's why we built this application on basis of theoretical concept.

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lengthy procedure. That's why we built this application on basis of theoretical
concept.

Working in a different software environment:
We have used J2ME as our simulation application development platform. To

maintain database of faculty/student we take the help of MY SQL Server. We have used PHP as server side language.

5.2 Our Future Plan:

A complete 'University Application' on Mobile phone will soon be actualized. The incomplete parts that we are planning to implement in near future are listed here:

1. To sit with the University faculty and authority and integrate our existing system into the application database and design it accordingly

2. Manage every single user in the database

3. Integrate every section of the University

4. Integrate Help & FAQS into the application

5. Implement a Grade tracker that keeps track of our grades and informs us about how any change would affect it, with a graph!

6. To Beta test it on BRAC University and finally launch it officially.

7. We can manage the sms based application download system from the phone companies; every university will be able to use this application to simplify the student and faculty interaction.

8. According to users feedback we will be updating features and simplifying as per needs.

5.3 M-Learning (Mobile Learning)

'm-learning' is the facilitation of learning and access to educational materials for students using mobile devices via a wireless medium. There have been an increasing number of investigative studies of m-learning over the last few years, mostly in the USA, Asia, Britain, Scandinavia, and Australia.

Our application can be further developed to contribute in M-Learning.

5.3.1 Suggested directions for m-learning action research

The gaps in the literature and the identified research needs requiring more investigation have guided the purpose and design of our suggestions for 2007 m-learning action research and development. These five suggested action research directions are all significant issues in m-learning and all need to be better investigated;

• Mobile supported fieldwork

• Fostering interactivity on-campus using mobile devices

• Ubiquitous learning supported by mobile devices

• M-learning for each discipline

• Strategies for low-cost m-learning use.

5.3.2 M-Learning in Bangladesh and contribution from our application:

Access to computer, mobile and electronic devices has increased drastically during 2000-2008. Such a change came not because of the increase in income, rather the decrease in cost of these devices. The feasibility of M-Learning in Bangladesh has been analyzed in respect of Nation Wide Coverage of Mobile Service, High Density of Illiteracy in Total Population, Low Higher Education Rate and Enhancing Adult Education Rate due to numerous advanced technological features in today's digital mobile phone with customizing functionality.

City Cell has a subscriber number 961,972; GP has a subscriber number 10,758,708; Banglalink has a subscriber number 3,641,811; Aktel has a

subscriber number 6,000,005; TeleTalk has a subscriber number 403,172; Warid Telecom has a subscriber number 1,002,063 which brings to a total of 22,773,731 number of subscribers all over Bangladesh. So from this list of Telecom Operators and their subscriber numbers, It can easily be realized that Bangladesh is the country of huge amount of mobile subscribers and it proves the proper feasibility of implementation of M-Learning.

Chapter 6: CONCLUSION

Even though the use of cell phones still isn't approved of in classrooms, the future beholds innumerable possibilities if the hurdles to such technology could be overcome. And once it is done, the campus will acquire a faster and more exciting pace and can reach new goals. The spirit of accomplishing something new comes from the scarcity of reaching to the heart of others. New ideas and new developments always bring

something good. We tried to build something which will eventually bring people closer..
We surveyed a group of people who represents the students and faculty of BRAC
University. From their desire we came to know that the campus wants something new
and exciting to better their Varsity days.

As there are lots of mobile service providers in our country, it is our utmost desire that
they will come forward and make the "Dream" of connecting people possible. It's a start
now. If we are successful at accomplishing our future goals properly we are hoping to go
broader and create a whole new dimension for interactive Teacher-Student platform.
On that note we would like to conclude by saying *"If you want to make the world a
better place, take a look at yourself and make that change"—Michael Jackson*

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