CHILD'S LIFE AT SECURE HAND AND SCHOOL'S DATA SECURITY USING CRYPTOGRAPHY

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ABSTRACT

School Notification Systems (SNS) are in wide use in higher education, including community colleges. Literature published between 1990 and 2010 is examined in regards to theuse of SNS in the community college setting in light of the distinct community college broadbased mission and recent reductions in funding sources. The analysis produces eleven recommendations to guide planning and implementation of SNS in an open community college environment, for use by community college technology and safety administrators. In this paper we will focus on developing a medium of interaction between school and parents, we aim to focus on providing maximum security to parents regarding their student's extra-curricular activities as well as academic growth aiming towards overall growth of the children. This project will provide the academic details of the student to their parents and even the regular Notice Board notification, so that parents are updated about each and every activities organized for the well fare their children.

Keywords:*Emergency notification system, Emergency alert system, Mass notification system.*

I. INTRODUCTION

Mobile technology along with internet access hasovercome barriers to information and has madeenormous information available at fingertips. Mobiletechnology is altering the ways in which individualswork. Activities like, buying and selling, accessingsocial networking sites, watching videos, readingnewspapers, etc. can be performed from anywhere and atany time using the mobile devices. In fact, the usage ofmobile is accelerating day by day which is evident fromvarious reports.

• The Ericsson (NASDAQ:ERIC) Mobility Report states that mobile subscriptions are expected toreach 9.3 billion by 2019, and more than 60 percentof these,5.6 billion, will be for smartphone.

• According to the U.S. Digital Consumer Report,Americans now own four digital devices onaverage, and the average U.S. consumer spends 60hours a week consuming content across devices.

• According to Avendus Report 2013, there areover 2.4 billion Internet users in the world, of which1.5 billion access the Internet via their mobiledevices. An astounding growth can be witnessed inthe use of mobile devices across various continents,in academics as well as industry.

Universities have started accepting 'Mobile devices' as amedium of engagement with their stakeholders.Information that was earlier provided to students,teachers, parents, government bodies and other people via websites is now also delivered through mobile.

In this paper, we study the evolution of mobiletechnology in top universities of world, the mobiletechnology adopted by the universities and featurespresent in their mobile apps. The rest of the paper isorganized as follows: Section 2 describes need for theuniversities to have mobile presence. The optionsavailable to universities to establish themselves inmobile era are discussed in Section 3.Section 4 presentsdifferent forms in which mobile technology haspenetrated the top universities of world. Key featuresprovided by university apps are discussed in Section 5.Section 6 states the conclusion. Section 7 confers theacknowledgement.

II. NEED FOR UNIVERSITIES TO HAVE A 'MOBILE ENGAGEMENT STRATEGY'

Designing an effective mobile website has become anecessity for universities. With the increasing percentageof students using smart phones, many universitywebsites worldwide are moving towards addressing mobile needs.A number of renowned universitieshave already entered the mobile realm; those who havenot shifted to mobile so far have also started thinkingabout it. With mobile becoming so pervasive, everymajor educational institute is altering their 'stakeholderengagement strategy' keeping "mobile" on its mind.

III. THE NEW TWITTER GENERATION OF PARENTS: WHY SCHOOLS STRUGGLE TO COMMUNICATE

Communication isn't what it used to be. The average length of written communication is getting progressively shorter while the average length and format of school communications has remained relatively unchanged over the years. What has also gotten shorter is the attention span of parents, their ability to retain information and their preferences for clear, concise and actionable communication, devoid of fluff, color and designs (Twitter has 140 characters and no color, yet it has over a billion users).

But today's schools aren't connecting the dots between technology and the plethora of information transfer that occurs almost daily. So they continue to bombard parents with a constant barrage of schedules, notices, newsletters and forms. As a result, schools continue to push parents away, instead of pull them closer as they struggle to find the optimum balance and medium to engage the parents. On one hand, they are reluctant to change their old ways of doing things (paper, paper, more paper, beautiful websites, and 2-5 pages long newsletters which the parents hardly read) and yet are requiring today's mobile parent to stay engaged with their school at all costs. Parents often take the "Be Brief-Be Gone" approach with school communications (anything more than a few sentences, and they tune out).

Did you know that a school with 50-100 children sends out anywhere between 2,000-5,000 sheets of paper to the parents every year, including incident reports, conferences, permission slips, forms, calendars, newsletters etc.? Isn't it about time that schools start looking at school notification systems and other technology a little differently to keep the parents engaged and save the trees?

IV. THE 80-20 RULE FOR SCHOOLS TO ENGAGE PARENTS IN THE MOBILE GENERATION

Blogs, websites, Facebook pages, printed and digital newsletters (anything more than a page does not get read), calendars, twitter updates and personal reminders…the school's communication arsenal continues to increase …and school resources and front desks are stretched thin, … if they continue to keep doing what they have been doing, they will keep getting what they have been getting…. the disengaged parent and an increasing cost overhead to maintain an inefficient communications infrastructure.

While parental expectations are growing by the day, small schools are challenged with keeping up with the pace of technology growth to reach out to parents. Enrollment, engagement and loyalty are the three metrics that are critical for a school's success. However, at what cost? It would behoove small schools to consider measuring the true cost of what they spend on communications using all the above mentioned mediums including the cost of paper, resources, website updates, sending newsletters and the time it takes to do all of this.

If every parent had their way, there would be not one solution but an infinite number of solutions that would still fail to meet the needs of all parents. It is important for schools to use the 80/20 rule to engage the parent… What 20 % of engagement methods will solve 80% of the parental needs? There will always the 12-20% of parents in every school who will either choose not to be engaged with their school simply because they are too busy or they come up with excuses on why their school's communication methods are not working.

Addressing the needs of these 12-20% ers is prohibitively more expensive than addressing the needs of the remaining 80%. Because its these 80%ers who play a vital role in genuinely engaging with their school to make it a better place for their child.

Did you know that …today's parent audiences are predominantly mobile – tech savvy – on the go, and expect clear, concise, compelling, timely, relevant and actionable communication at their fingertips and not on paper or websites? Does your school have the 20% of parents who make it more challenging for you to engage with than the remaining 80%?

V. PARENT TEACHER CONFERENCES: WHY SIGN UP SHEETS AND EMAILED REMINDERS LOSE PARENTS

Now that school has been in session for about a month, many schools are in the process of organizing their first round of parent/teacher conferences. Scheduling parent conferences can be a cumbersome process. Many schools continue to use low tech methods, such as newsletters, sign-up sheets or paper notices sent home in student folders. Even sending emails can be hit or miss,relying upon parents to spot the email, open it and navigate through a list of available times. Some of the biggest complaints from parents are:

Never receiving notice of upcoming conferences, due to lost papers, or missed emails.
Lack of flexibility in scheduling; you get assigned a time and that's it.
No parent reminder or alert system that is integrated with their cell phones.
No way of changing an existing meeting or alerting a teacher if they are running late.

Parents, very much like their children, are a hand's reach away from their smart phones all day long. Why isn't mobile technology being used to inform, alert, remind and communicate with parents? It's no wonder that so many parents are "no shows" at teacher meetings. Administrators and Principles need to create mobile pre-meeting and post-meeting touch points which will keep parents involved and eager to communicate, allowing schools to engage and build parent relationships on more than a single level. The old argument that these applications are expensive and hard to deploy no longer holds water. A competitive marketplace has produced highly affordable apps that are easy for teachers and administrators to set up; and even easier for parents to download.

The goal for school parent/teacher conferences should be to have the parents involved in the conferences long before they occur and keep them engaged long after the conference has ended. In today's world, nothing is more effective to achieve this than using mobile technology to establish a two way conversation with parents where you know you can reach them: on their smart phones! Relying upon forms, emails and other 'old school' methods of communicating will systematically exclude a large percentage of new millennial parents who are ready and willing to engage their way.

VI. SMALL AND PRIVATE SCHOOLS: THINK YOU CAN'T AFFORD TO OFFER PARENTS A MOBILE APP?

If your private or small school is still holding off providing a mobile app for parents to access information via their smart phones, you may be losing both the mind share and revenue of an increasing segment of your parent population.

According to the latest 2014 study by Nielsen, U.S. adults now officially spend more time connecting to the internet via their smart phones than their PCs. A typical U.S. adult spends 34 hours and 17 minutes a month on the Internet on a smart phone compared to 27 hours and 3 minutes on a PC, according to Nielsen. That translates to 1 hour and 8 minutes per day on smart phones and 54 minutes per day on PCs.

Administrators, Managing Directors, Principals and Teachers: You don't have the luxury of time any more. Parents are now demanding mobile school notification systems that are robust enough to offer single point access to all critical student data as well as providing school announcements , calendars, and homework information.

The days of multiple sheets of paper being sent home (and usually misplaced) are gone. Competitive schools know this, and a growing number are using mobile solutions to eliminate paper as well as those hard-to-navigate portals. The good news is that price competition has made school mobile apps a buyer's market, with many high quality road tested products. It's time for schools to get smart and begin offering truly unified mobile platforms that reach out and engage parents on their turf — their smart phones.

VII. HOW MOBILE SOLUTIONS IMPACT SCHOOL ENROLLMENT NUMBERS

Competitive edge has become more critical than ever in the ongoing battle for students. Private schools, especially small schools, are ever on the search for new ways to ignite enrollment and gain an edge against the growing number of options parents have to school their children.

Mobile technology can be a positive contributing factor when used strategically. Here is how:

Marketing your brand. Yes, mobile technology has a place in marketing. Differentiation is key to identifying the correct target student and parent communities. Marketing your school through online advertising, blogs and targeted mobile school announcements, email and text campaigns can keep the school uppermost in the minds of parents who may be in the process of evaluating and comparing schools.

Parent communications. Schools which are not equipped to communicate with a younger, mobile phone equipped generation of parents simply will not be able to compete. Mobile apps are available that virtually replace the now outmoded 'portals' of the last 10 years with highly interactive, easily accessible school alerts, parent messaging, notifications and information on programs, schedules and student academic information.

The classroom. This is the area where most of the focus on technology has been traditionally and it needs to continue. Schools need to stay ahead of the curve and incorporate technology into their strategy to foster more collaborative, interactive in class participation.

Schools must not only accept the fact that technology is a necessity and embrace technology in new and exciting ways. Parents and students are not standing still waiting. There are too many alternative choices.

VIII. SCHOOL PARENT NOTIFICATION SYSTEMS

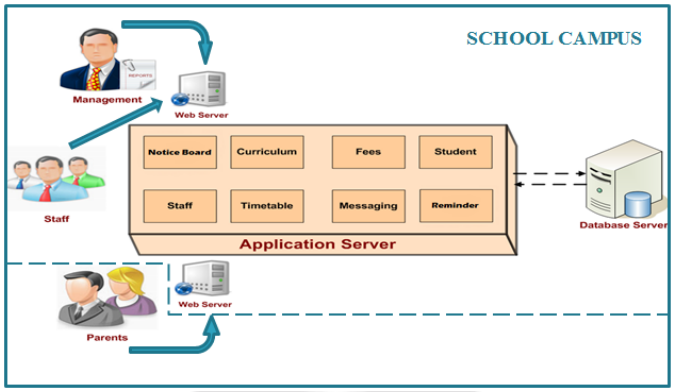
There is no question that all schools, public and private, have to watch their budgets these days. As school administrators brace for a challenging new year, many have spent the summer patching up old websites, working out the bugs in their intranet portals, and overhauling old printed materials and forms.

Because schools are so often financially strapped, there is an ingrained tendency to do as much themselves as possible. We've all heard the stories of teachers purchasing their own supplies, often including books and other expensive resources needed to do their jobs. But there is one area that really should be left to third party experts: school communications systems. And today's schools are realizing that they need more than paper and a website to keep parents in touch and tuned in!

Here are three reasons why, tempting though it may be, it makes more sense to leave communications technology to the experts (app and platform developers, third party applications, etc.)

Save Time to Waste Time: When you try to "do it yourself" to save money, you usually end up spending more; more time, more resources and, yes, even more money. Using existing technologies that have been developed and tested means putting some cash up front. But taking up the valuable time of internal resources will cost you more in the long run.
Rapidly Advancing Mobile Technology: Mobility is here and it's about much more than texting! It's moved way beyond those hastily put together parent-to-teacher texts about upcoming events and progress reports. Today's technology means proactive alerts, fingertip access to key information, such as parent reminders and notifications, a scrolling review of summary information, drill down to more data; all with a tap of a simple icon on a mobile phone. The simplicity and elegance of these new applications can be deceiving; in reality it takes a lot of expertise and best practices to do right.
Competitive Edge: Especially for charter and private schools, technology is often the deciding factor for parents who want their children in schools with the latest school notification systems to keep them informed as to what's happening in and outside the classroom. They want to communicate with teachers and administrators their way, when they have time, not in old ways that require digging through papers, and endless clicking through landing pages.
Of course schools should and will continue to use internal resources when possible. They are ingenious when it comes to harnessing the talents of parents, grandparents and others within their communities. But when it comes to mission critical elements like their communications technology, it may be time to find an app to handle the heavy lifting.

IX. SOFTWARE ARCHITECTURE



Modules:-

Notification:
This module focuses on notifying parents about schools recent or upcoming events and even include reminding parents about their child's homework.
This module will include schools NoticeBoard, Curriculum Calendar, Fees Notification and Homework reminder.

Timetable:-
This section will include class wise time tables for students as well as teachers.
Here, only teachers and parents are given access to view the time table and management is authorized to edit this time table if required.

Staff:-
This section will include details about staff according to their particular depts. or classes. This will include teaching as well as non-teaching staff for the convenience of management and other internal activities.

Students:-
This section will include the details of students.
Their academic details, details about their curricular activities, sports record, library details and overall growth statistics.
This section is developed keeping in mind that the parents are not aware about each and every detail of the students which could be very useful in child's growth.

Messaging:-
This module will allow parents as well as teachers to keep in touch about the child's growth and other progress throughout academics and other activities.
This module is not limited with the single recipient but we can even broadcast as and when required.

X. ALGORITHMS IMPLEMENTED

Distance Calculation based on gps location:-
In calculating areas, the simplifying assumptionsdiscussed above are used. In our example you will needto: (i) use the spread sheet developed above; (ii) know theDGPS coordinates of the corners of the field in question;and (iii) use the triangle area equation, which is:
Area = .5*|x1*y2 - x2*y1 + x2*y3 - x3*y2 + x3*y1 - x1*y3|
Note that the | | lines are absolute value operators.
This means that the calculation inside of the | | willbe positive or converted to positive.where xi and yi are the coordinates of the three pointsmaking the triangle.
To calculate acres:
Step 1: Use a DGPS to measure the corners of your testfield. The latitude and longitude values of SouthDakota State University football field are given instep 2

Step 2: Separate the field into two triangles (or as manytriangles as are necessary to cover the entire field. Irregular fields can be approximated by a number oftriangles). This is accomplished by identifying pointsi, ii, and iii as the corners for triangle 1 and the pointsii, iii, and iv as the corners for triangle 2.
Select the smallest value in F1 through 4 (F2=44.3210783) and G 1 through 4 (G1= -96.7779358) and put these values in B2 and C2. These values will be defined as the origin on the X/Y coordinate system and the points are located in the southwest corner of the area being worked on. The area in triangle 1 will be calculated in steps 3 through 6.
Step 3: Copy F1 and G1 to B1 and C1, respectively. The X and Y coordinates for point 1 are in B12 and B13. Copy these points to B17 and B18. When copying these values you must copy the values, not the equation. This can be accomplished by using {paste special} and {values} commands.
Step 4: Copy F2 and G2 to B1 and C1, respectively. The X and Y coordinates for point 2 are in B12 and B13; copy these values to C17 and C18. When copying these values you again must copy the value, not the equation.
Step 5: Copy F3 and G3 to B1 and C1, respectively. The X and Y coordinates for point 3 are in B12 and B13. Copy these values to D17 and D18. When copying these values you must copy the value, not the equation. When you are done the values in the spreadsheet should be: BC D 17 49.55035245 0 48.45022 18 0 0.207419129 91.6629606
Step 6: calculate the area for triangle 1 using the formula given above. This is accomplished by setting cell: B20 = 0.5*ABS(B17*C18-C17*B18+C17*D18- D17*C18+D17*B18-B17*D18) The value (2270.852m2) in cell B20 represents the area of triangle 1. This value is converted to ft2 by multiplying it by 10.76391ft2 /m2 . The 24,443.25 ft2 is then converted to acres by dividing it by 43,560 ft2 /acre. Following these calculations the area of triangle 1 is 0.56114 acres.
Step 7: Repeat steps 2 through 5 for triangle 2. As defined under step 2, your new corner points are located at points ii(F2,G2), iii(F3,G3), and iv(F4,G4).
Step 8. Determine total acres by adding the acres in 6 and 7 together. The total acres in the football field were 1.10576. ■

The Advanced Encryption Standard (AES):-

All of the cryptographic algorithms we have looked at so far have some problem. The earlier ciphers can be broken with ease on modern computation systems. The DES algorithm was broken in 1998 using a system that cost about $250,000. It was also far too slow in software as it was developed for mid-1970's hardware and does not produce efficient software code. Triple DES on the other hand, has three times as many rounds as DES and is correspondingly slower. As well as this, the 64 bit block size of triple DES and DES is not very efficient and is questionable when it comes to security. What was required was a brand new encryption algorithm. One that would be resistant to all known attacks. The National Institute of Standards and Technology (NIST) wanted to help in the creation of a new standard. However, because of the controversy that went with the DES algorithm, and the years of some branches of the U.S. government trying everything they could to hinder deployment of secure cryptography this was likely to raise strong skepticism. The problem was that NIST did actually want to help create a new excellent encryption standard but they couldn't get involved directly. Unfortunately they were really the only ones with the technical reputation and resources to the lead the effort. Instead of designing or helping to design a cipher, what they did instead was to set up a contest in which anyone in the world could take part. The contest was announced on the 2nd of January 1997 and the idea was to develop a new encryption algorithm that would be used for protecting sensitive, non-classified, U.S. government information. The ciphers had to meet a lot of requirements and the whole design had to be fully documented (unlike the DES cipher). Once the candidate algorithms had been submitted, several years of scrutinisation in the form of cryptographic conferences took place. In the first round of the competition 15 algorithms were accepted and this was narrowed to 5 in the second round. The fifteen algorithms are shown in table 7 of which the 5 that were selected are shown in bold. The algorithms were tested for efficiency and security both by some of the worlds best publicly renowned cryptographers and NIST itself. After all this investigation NIST finally chose an algorithm known as Rijndael. Rijndael was named after the two Belgian cryptographers who developed and submitted it - Dr. Joan Daemen of Proton World International and Dr. Vincent Rijmen, a postdoctoral researcher in the Electrical Engineering Department of KatholiekeUniversisteit Leuven. On the 26 November 2001, AES (which is a standarised version of Rijndael)
The ***AES cipher*** Like DES, AES is a symmetric block cipher. This means that it uses the same key for both encryption and decryption. However, AES is quite different from DES in a number of ways. The algorithm Rijndael allows for a variety of block and key sizes and not just the 64 and 56 bits of DES' block and key size. The block and key can in fact be chosen independently from 128, 160, 192, 224, 256 bits and need not be the same. However, the AES standard states that the algorithm can only accept a block size of 128 bits and a choice of three keys - 128, 192, 256 bits. Depending on which version is used, the name of the standard is modified to AES-128, AES-192 or AES- 256 respectively. As well as these differences AES differs from DES in that it is

not a feistel structure. Recall that in a feistel structure, half of the data block is used to modify the other half of the data block and then the halves are swapped. In this case the entire data block is processed in parallel during each round using substitutions and permutations. A number of AES parameters depend on the key length. For example, if the key size used is 128 then the number of rounds is 10 whereas it is 12 and 14 for 192 and 256 bits respectively. At present the most common key size likely to be used is the 128 bit key. This description of the AES algorithm therefore describes this particular 59 Chapter 7 The AES Algorithm implementation. Rijndael was designed to have the following characteristics:

• Resistance against all known attacks

. • Speed and code compactness on a wide range of platforms. • Design Simplicity.

The overall structure of AES can be seen in 7.1. The input is a single 128 bit block both for decryption and encryption and is known as the in matrix. This block is copied into a state array which is modified at each stage of the algorithm and then copied to an output matrix (see figure 7.2). Both the plaintext and key are depicted as a 128 bit square matrix of bytes. This key is then expanded into an array of key schedule words (the w matrix). It must be noted that the ordering of bytes within the in matrix is by column. The same applies to the w matrix.

Equivalent Inverse Cipher As can be seen from figure 7.1 the decryption ciphers is not identical to the encryption ciphers. However the form of the key schedules is the same for both. This has the disadvantage that two separate software or firmware modules are needed for applications that require both encryption and decryption. As well as that, decryption is slightly less efficient to implement. However, encryption was deemed more important than decryption for two reasons:

1. For the CFB and OFB cipher mode (which we have seen before but will study in more detail next) only encryption is used. 2. As with any block cipher, AES can be used to construct a message authentication code (to be described later), and for this only encryption is used. However, if desired it is possible to create an equivalent inverse cipher. This means that decryption has the same structure as the encryption algorithms. However, to achieve this, a change of key schedule is needed. We will not be concerned with this alternate form but you should be aware that is exists. 7.7 Block Cipher Modes of Operation We have seen previously that five modes of operation are used when applying block ciphers in a variety of applications. This section will give a more detailed view of how these modes operate. 7.7.1 Electronic Codebook Mode (ECB) This first mode is the simplest of all five modes. Figure 7.10 shows the scheme where it can be seen that a block of plaintext (which is the same size in each case) is encrypted with the same key K. The term codebook is used because, for a given key, there is a unique ciphertext for every block of plaintext. Therefore we can imagine a gigantic codebook in which there is an entry for every possible plaintext pattern showing its corresponding ciphertext. If the message is longer than the block length then the procedure is to break the message into blocks of the required length padding the last block if necessary. As with encryption, decryption is performed one block at a time, always using the same key. The ECB method is ideal for small amounts of data such as an encryption key however for larger messages if the same plaintext block appears more than once then the same ciphertext is produced. This may assist an attacker. 7.7.2 Cipher Block Chaining (CBC) Mode We would like that same plaintext blocks produce different ciphertext blocks. Cipher Block Chaining (see figure 7.11) allows this by XORing each plaintext with the ciphertext from the previous round (the first round using an Initialisation Vector (IV)). As before, the same key is used for each block. Decryption works as shown in the figure because of the properties of the XOR operation, i.e. IV $\oplus$ IV $\oplus$ P = P where IV is the Initialisation Vector and P is the plaintext. Obviously the IV needs to be known by both sender and received and it should be kept secret along with the key for maximum security.Counter (CTR) This is a newer mode that was not listed initially with the above four. Interest in this mode has increased a good deal lately. A counter, equal to the plaintext block size is used. The only requirement stated in the standard is that the counter value must be different for each plaintext block that is encrypted. Typically, this counter is initialised to some value and then incremented by 1 for each subsequent block (modulo 2 b where b is the block size). For encryption, the counter is encrypted and then XORed with the plaintext to produce the ciphertext block; there is no chaining. For decryption, the same sequence of counter values is used, with each encrypted counter XORed with a ciphertext block to recover the corresponding plaintext block. This mode contains a number of advantages including hardware efficiency, software efficiency, provable security (in the sense that it is at least as secure as the other modes discussed) and simplicity.

CONCLUSION

In this paper we will focus on developing a medium of interaction between school and parents, we aim to focus on providing maximum security to parents regarding their student's extra-curricular activities as well as academic growth aiming towards overall growth of the children. This paper will provide the academic details of the student to their parents and even the regular Notice Board notification, so that parents are updated about each and every activities organized for the well fare their children.

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