

**Proceedings of the International
Conference on eBusiness,
eCommerce, eManagement,
eLearning and eGovernance
(IC5E 2014)**

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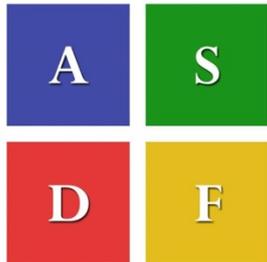
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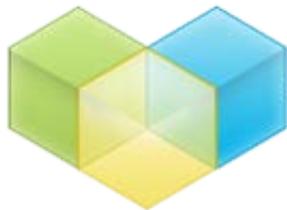
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International Conference on eBusiness, eCommerce, eManagement, eLearning and eGovernance (IC5E 2014)

FOREWORD

Welcome to Greenwich, London, UK.

We have the pleasure to arrange the first international conference on eBusiness, eCommerce, eManagement, eLearning and eGovernance, IC5E 2014 in London. This conference is hoped to be the first in many in its comprehensiveness, inclusivity and universality in its approach. We extend warm heartfelt thanks to our keynote speakers who have voluntarily given up their free time to share their many years of experience and knowledge with us, without whom this conference would not have been a success. Thanks are also to be given to all those who submitted their papers and to the team of reviewers for their due diligence and careful scrutiny of each paper submitted.



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The rather challenging task of organising this whole conference would not have been possible without the constant help of the editors, Mahdi H. Miraz and Kokula Krishna Hari and their dedicated organisations of CReATED and ASDF.

Special thanks must go to Mahdi for obtaining technical co-sponsorship by the British Computer Society and for preparing the conference proceedings amongst his many roles. Kokula Krishna Hari helped in obtaining the DOI, ISBN and the considerable logistical support from the ASDF and Techno Forum organisations including the financial sponsorship of the whole conference.

Special thanks must also go to Greenwich University for agreeing to host the conference and for their extreme patience in working with all of us. The chairs and technical programme committee members must also not be forgotten for their eagerness to make this conference a success.

The IC5E 2014 conference will also comprise of the First International Workshop on Mobile Usability, Learning and Application Development (MULAD). The workshop is organized under the partnership with the Centre for Research on Applied Technology, Entrepreneurship and Development (CReATED) and the Association of Scientists, Developers and Faculties (ASDF). This workshop is specifically focused on Mobile Usability, Learning and Application Development (MULAD) that improve existing mobile technologies and application. The workshop's primary aim is to bring together professionals, technologists, policy makers and academics to share and disseminate their innovations and research projects.

Finally, a special gratitude is due to the printers, Moxton Book Services Limited, for working to such a tight deadline.

To conclude, we would like to see this conference as a starting point in future international collaboration in the work of IC5E.

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KEYNOTE SPEAKERS

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Professor Peter S. Excell

Glyndŵr University, Wrexham, Wales, UK.



Visions of the Future of Computing and Communications Technology

The presentation reviews, and raises questions about, the way in which personal computer and mobile communications technologies will be used in the near and medium-term future. The evolutionary paths of the relevant technologies are reviewed and it is argued that they are converging rapidly. Inasmuch as mobile communications have a clearer forward plan and a larger sales base, they appear set to become a dominant paradigm. However, the lack of vision regarding the way in which they might be used, and the slow rate of development of appropriate content, suggest that the industry needs to consider the wider implications and to think very radically and creatively about future applications. Work to develop new applications and the media content to display on phone-type screens will be reviewed.

Mobile phones already contain a large amount of computing power: they can display images and they can connect to the Internet. They have smaller storage capacity than desk-bound devices, but this is being overcome by Cloud storage. Their communications capacity is rapidly increasing, and ideas for making them more convenient for the user are steadily being pursued, although radical ideas seem necessary to facilitate desirable advances.

Given their larger numbers, their popularity in the developing world, and the problems of getting instant access to personal computers, there is a good chance that mobiles will replace PCs for many applications. However, the mobile phone will have to change substantially since its input and output interfaces to the human being are currently very limited (i.e. the keypad, the voice system and the screen). This, in turn, means that it could become more like the so-called wearable computer, with a high resolution screen display projected into the eye and various human output devices distributed around the body: the Google Glass device is an important development in this direction.

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Clearly, the tablet computer has become popular as a compromise between the mobile phone and the PC, but it has some significant deficiencies, lacking the full flexibility of a PC and also lacking the easy portability of a phone. It will be suggested that the tablet modality will not have a long life as it is likely to be supplanted by wearable devices, which are more portable and permit an even larger effective screen size. On the other hand, the mobile phone may also metamorphose into a device that is mainly a transceiver, with some of the screen functionality being taken over by the smart watch.

In parallel with this, however, it is essential that new 'content' is developed, i.e. material that is useful or entertaining, to be displayed on the screens of mobile devices, thus making people want and need them, and providing a business model that will fund the continuing evolution. Although recent years have seen a burgeoning of basic content, it is mainly a small version of content designed for the desktop screen, and more imaginative designs, linked to wearable-type hardware, are expected to yield more transformative results. In particular there is a need to break away from the "desktop" paradigm and wearable devices are much more likely to move towards augmented reality forms of display, simply because of the need to overlay on to the user's actual view of the world.

Current thinking on these technologies will be discussed and illustrated, with some discussion of forecasting for the future.

Biography

Peter Excell is Professor of Communications and Deputy Vice-Chancellor at Glyndwr University in Wrexham (Wales, UK). He obtained his BSc in Engineering Science from the University of Reading in 1970 and his PhD, for research in Electromagnetic Hazards, from the University of Bradford in 1980. From 1971 to 2007 he was with the University of Bradford (UK), rising to Associate Dean for Research in the School of Informatics. His classical academic interests cover wireless technologies, electromagnetics, engineering computing and antennas. However, he has also engaged with interdisciplinary initiatives, developing broader interests in mobile communications, their future content and applications. He has published over 400 papers and holds three patents. He is a Chartered Engineer and Chartered IT Professional, a Fellow of the British Computer Society, the Institution of Engineering and Technology and the Higher Education Academy, a Senior Member of the IEEE and a member of the ACM.

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Garfield Southall

University of Chester, Chester, UK.



When Learning Becomes Another Distraction

Our lives move at an ever-quicker pace and we rely on our communication devices to keep in touch, to plan our travel arrangements and to guide us quickly to our next meeting.

Mobile phones are phenomenally powerful computers and almost all desktop applications have been ported across to the major platforms, so we can work whilst we are away from our desk.

We can read books and stunningly-transferred digital versions of magazines and there is an increasing market for study materials to be similarly transferred.

My worry, and the subject of my talk, is that we run the danger of taking 'bite-size learning' to such extremes that the act of learning becomes a distraction and the time required to reflect effectively on our study disappears altogether.

In my talk I will look at ways in which we can address this problem, but also look at what might happen if we let this 'system' naturally evolve.

Biography

Garfield Southall is the Associate Dean for the Faculty of Science and Engineering at the Thornton Science Park, University of Chester - and institution he has served for over 30 years.

His main interests are mobile computing, programming languages and emergent behaviour. His main area of research is in the modelling of signalling systems involved in the natural processes of bone remodelling. Outside of work he enjoys trail running, road cycling and music.

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Analyzing App Inventor for Building Usable Touch Screen Courseware for Blind Users

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Abstract- This paper focuses on how to design and develop a usable Touch Screen Mobile Courseware Application (TMCA) by using usability features recommended in the literature. For our study, we consider usability features that are imperative for blind users such as widget usability, validation, feedback and navigation. We explain the usability features needed to address the relevant usability issues in design and development of TMCA for blind users. We also suggest the appropriate location for control items or widgets in a flat screen. Furthermore, we make recommendations for ways to satisfy usability features through existing features. The study shows that prospective educators cum developers can implement usability features as a base for addressing usability for blind users to a significant extent. Although the usability features are guided by the literature, said features are simply defined in the literature. There is no guide for designers and developers demonstrating how exactly to achieve such features. The proposed approach in this paper makes the TMCA more usable for blind users and it is more likely to achieve its objectives.

I. INTRODUCTION

With more than five billion mobile devices in service worldwide, and exponential growth of mobile applications in all domains of daily life, mobile phone accessibility and assistive applications for persons with disabilities are at the forefront of the agenda of all countries that have signed onto the United Nations Convention on the Rights of Persons with Disabilities. In the United States, 54 million people live with disabilities, while that number reaches more than 650 million worldwide [1].

App Inventor is a free, open source application that permits people with any level of programming background to create software applications for the Android operating system. App Inventor uses a graphical user interface that allows users to drag and drop blocks (puzzle-shaped objects) to build applications without ever having to write traditional code.

App Inventor is currently being used in a variety of educational settings, including classrooms ranging from elementary school to college and after-school programs. While many programs teach computer science using App Inventor, there are also a number of educators using it as a tool to engage students while teaching other subjects. Many after school programs are being developed around App Inventor. These programs often focus on encouraging groups that are typically underrepresented in the field of technology to feel empowered to be creators of technology.

W3C discusses creating accessible apps on websites and in mobiles. However, it does not focus on mobile application development in touch screen. The development of applications in smart phones (mobile) with physical buttons varies with application development through touch screen. Website design and mobile applications using physical buttons are similar in many aspects. Website accessibility suits mobile application development through the same principles as suggested by W3C. Thus the developer is only concerned with the layout size and content that fits into the smart phone layout.

In touch screen, it is difficult for visually impaired users to identify widget location on a flat surface. Therefore, WCAG principles cannot be implemented precisely for TMCA development. However, it is imperative to have a user centered and inclusive design from the beginning of TMCA development. As a result, our study primarily focuses on how to implement WCAG 2.0 guidelines on touch screen mobile apps. We note that we have avoided using MWBP 1.0 for implementing in touch screen mobile apps as it is currently in the infant stage.

II. RESEARCH METHODOLOGY

The Software Engineering and Human Computer Interaction (HCI) disciplines consider usability as a nonfunctional requirement. Usability literature has provided extensive guidelines to build usable applications for prospective educators cum developers. Despite agreement between various works as to the nature of usability, each author has named the respective guidelines differently. Additionally, the exact nature of the guidelines also differs between works. In order to categorize a list of usability features, usability features with relevant benefits and strong design implications were identified. Based on the literature, we identified *widget usability, validation, feedback* and *navigation* as usability features with the required characteristics.

For each usability feature, we explain what is meant for App Inventor code segment and which App Inventor code blocks are available for Android mobile application developers to address the relevant usability issues. We also recommend ways to satisfy the usability features through Scratch blocks. Certain usability features are not addressed due to page constraints. Our study is based on App Inventor classic version of 30-Jun-2009.

III. RESULT AND DISCUSSION

The overall level of usability features can be implemented by designing courseware through the App Inventor tool. We have summarized our findings based on techniques that are feasible for touch screen smart phone applications.

A. *Widget Accessibility*

VoiceOver is a gesture based screen reader on the Mac and it is available in iPhone 4S, iPhone 4 and iPhone 3GS. It enables speaking into a touch screen to perform commands such as sending text messages or emails, getting directions, and listening to music [2]. In Android phones, Google's voice action was built for voice to text to issue commands through voice. However, relevant literature is not available regarding the accuracy of commands when issued in different environments such as in busy places, in bad weather and so forth.

Voice-based commands are primarily suited for invoking applications. They cannot be applied to invoke controls such as radio buttons or check boxes. In such cases, almost all input controls are not accessible for blind users. Input control such as the button are accessible for blind users if they are able to identify the position of the button. Input through textbox using virtual keyboard is also not accessible for blind users.

An alternative method can be adopted to use input control as a replacement for traditional methods. For instance, the use of radio button and check box controls can be replaced by simple command buttons for different options. For every toggling, the audio can inform the user what option the user should select. Another alternative is simply through textbox using voice synthesizer enabled.

Assuming that the user has a lot of information from which to choose, the drop down item (list picker in App Inventor) is used in the traditional method. However, the list picker is not accessible for blind users in touch screen. It is difficult for a blind user to identify the location of the item. In order to overcome this, we adopted the flung technique to iterate through the items using canvas widget. The aforementioned technique has been implemented by the first author of this work for e-assessment tools for blind users in TMCA [3].

Another important interaction control is the textbox control where a blind user has to enter the text using a virtual keyboard. Since the button sizes are small with difficult to identify locations for each keyboard button, blind users are not able to use the virtual keyboard. We developed a keyboard interface that adopts the finger technique used by the first author in a phone dialer application [4]. Using this technique, it is easy for a blind user to identify the keyboard buttons.

Findings 1

1. Toggle buttons such as radio button and check box control can be replaced by a simple button.
2. List picker control is replaced by iterating items through flung event of the canvas control.
3. Keyboard interface can be developed using finger technique to replace virtual keyboards.

B. Validation

To check for plausibility of user input, a procedure with result code block is used which returns 'true' in the case that everything is correct or 'false' in the case that there is an error. The choose code block can be used in nested form to keep the source code as small as possible. Fig. 1 demonstrates the validation performed for registration page used in the courseware. It validates null entry in student name and grade entry when the submit button is clicked.

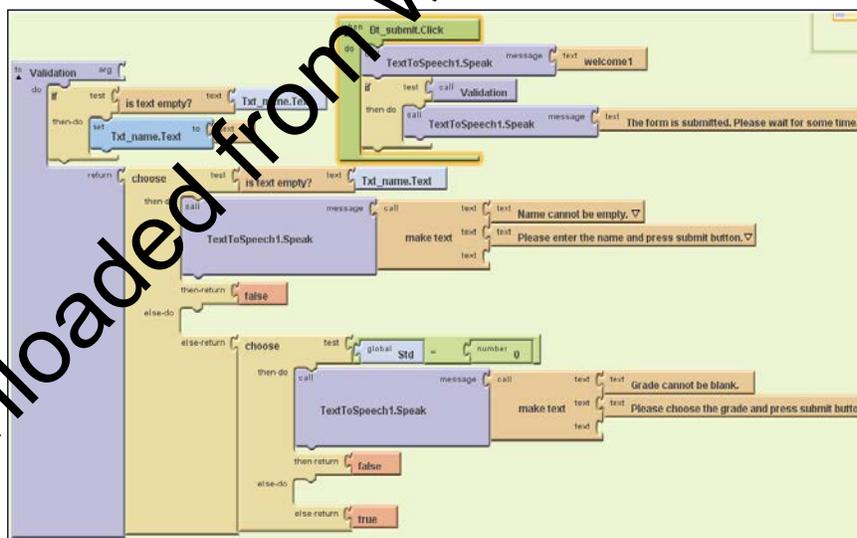


Figure 1. Code block for validation.

Findings 2

1. A procedure with result code block is used for calling validation procedure.
2. Choose code block is used to validate the item.
3. The appropriate message has to be delivered using text-to-speech to guide the blind user to correct mistakes.

C Feedback

Feedback is a technique used to inform the user about what is going on inside the system. The HCI literature proposes four types of feedback: 1) Interaction feedback – to inform the user that the system has heard their request; 2) Progress feedback – to inform the user about tasks that will take time to finish; 3) System Status – to inform the user about any changes in the system status; and 4) Warning – to warn the user about irreversible actions.

Using App Inventor, interaction feedback is provided by using a player component which vibrates to indicate to the user that an action has been performed. Other feedback is provided through a text-to-speech component that informs with verbal messages. To differentiate the warning message with other feedback, the warning message is provided both through vibration and aurally.

Feedback provokes the blind user to perform the next course of action. In a physical keyboard attached device such as a desktop computer or in a laptop, the blind user presses the tab key to navigate through different controls or links. Then the user presses the enter key or another key to open the link or application. In comparison to sighted users this matter is not of much significance because a sighted user is able to click the control or widget on the touch screen by using vision. However, it is difficult for the blind user to interact with widgets directly in keyboard attached devices. To address this issue, when a blind user touches the widget, it provides feedback about the purpose of the widget. Then, the blind user will decide whether to press using a long click to open the application or using a normal click to navigate through to the next item.

Findings 3

1. Feedback is provided verbally through text-to-speech component and physically through player component.
2. Audio feedback can be provided when a blind user presses the button providing information about the application.
3. After initial audio feedback, the blind user should double tap (as on iPhone) or long click (as on Android) to be able to open the application.

D Navigation

When a sighted user uses a mobile application, the page is quickly scanned and the user is able to read for the desired information. However, the blind user has to depend on assistive technologies to read information for them. The blind user requires extreme patience to reach the required page. It requires the blind user to navigate from page to page or section to section until the required information is identified. As a consequence, navigation is classified as page-to-page navigation and in-page navigation.

Page-to-page navigation

The keyboard is the point of interaction for performing any functions using assistive technology. With the advancement of touch screen, all the functionalities such as navigation, opening an app and invoking an event are performed through gestures. App Inventor supports gestures in canvas such as flung (quick swipe), touched, touch-down and touch-up events. While flung event is used to navigate through pages, touch events are generally used to open an app or to pause a process. However, the touch event of a button such as Click or Long Click can also be handled to open a new page.

The *open another screen* code block is used to open a new page without passing information to the new page (Fig.

2). To pass the information to the new page, *open another screen with value* code block is used.

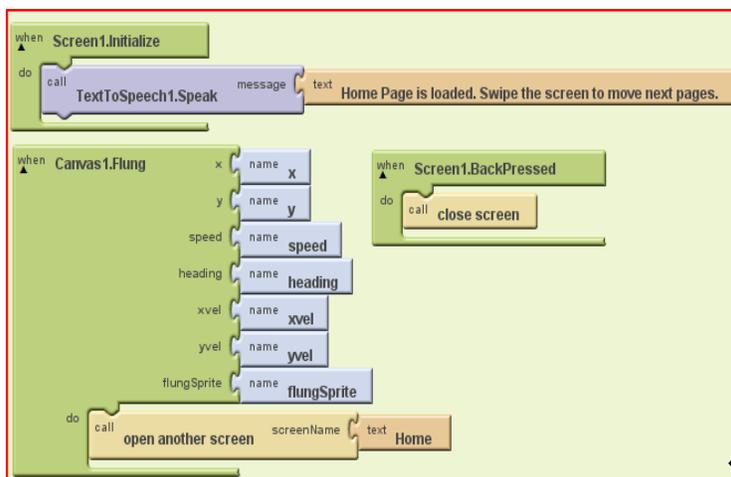


Figure 2. Code blocks for opening new page and closing the page.

When the page opens, the page title or page information can be recognized through TTS. The navigation in touch screen is linear on both sides (left or right) [5]. Hence, no trapping of event takes place during navigation. However, if the flung event is used for multiple simultaneous functionalities, such as navigating to the next page and navigating to the next control in the page, conflict occurs. The user can press the back button to exit the page or to go to the previous page.

Findings

1. *Open another screen* and *open another screen with values* code block are used to open a new page.
2. Flung event of the canvas or Button Click event is handled to navigate through the pages.
3. Back Pressed event of the screen is used to navigate to the previous page or home page.
4. When a page is open, a blind user has to be informed about the information on the page using TTS.

In-page Navigation

The blind user reads the information in pages through a screen reader. The screen reader will read the contents in a linear fashion sentence-by-sentence, automatically scrolling over the pages until it reaches the end. If the page is lengthy, the user has to spend a prolonged duration listening to the audio until it is complete. If the audio reading the content is programmatically controlled, it will read the whole page irrespective of scrolling of the page. It is tricky for the blind user to go to a desired section. In our courseware, we adopted a technique to demonstrate in-page navigation by reading the information sentence-by-sentence (see Fig. 3).

Findings

1. Navigating section-by-section or sentence-by-sentence in a page will make it easier for a blind user to grasp the information easily.

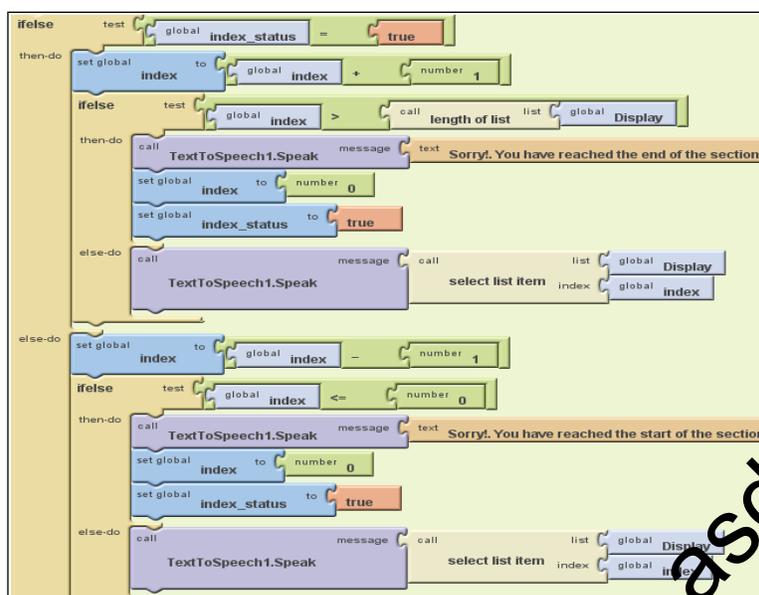


Figure 3. Code Blocks for In-page navigation.

IV. CONCLUSION

Although touch screen has many accessibility issues to address, this paper demonstrates how to adopt WCAG 2.0 as a basis for addressing accessibility to a significant extent for TMCA. Careful planning and designing is needed to achieve accessibility. Currently, touch screen accessibility largely depends on voice recognition. The researchers found that voice recognition failed in two main aspects: 1) Presence of background noise when using voice recognition and 2) Exact word or command not being extracted from the voice. Therefore, our paper suggests techniques that can be used to satisfy various success criteria of the WCAG.

Although W3C's Web accessibility guidelines provide an excellent framework for establishing the objectives of accessibility for blind users, more work needs to be done toward demonstrating methods for actualizing those objectives for educators who wish to further pursue the development of practical applications. TMCA accessibility can be realized by way of the methods proposed in this work. Additionally, our methods make the objectives established in the W3C guidelines a tangible reality while taking into account the rapid changes in technology and their deployment, as well as advancements in users' knowledge and expectations.

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IPv6-protocol the logical characteristic properties used to increase the security level of national information technology infrastructures

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Abstract - This paper suggests a method of IPv6-protocol the logical characteristic use to increase the security level of the national information technology infrastructures (e-governments) and global information community.

I. INTRODUCTION

A constant growth of cybercrime in the Internet is annually observed, in 2012 alone the cost of cybercrime [1] is estimated at \$ 2 bln in Russia and \$ 110 bln worldwide.

“The figures speak for themselves”. Given that, to identify cybercriminals still remains a difficult task whose solution cannot be found in most cases. This paper develops the concepts [2,3] and offers a method to reduce the complexity of the issue on the basis of IPv6-protocol the logical characteristic (RFC 2460 and RFC 4291 [4,5]) and standard ISO 3166 [6]. When the principle of inevitable punishment for cybercrime is strictly implemented, then the problem of managing any state and the entire world community information security (IS) would be solved. However, the political will of the leading powers and adoption of relevant international acts and standards is the main requirement to achieve victory over cybercrime.

II. BACKGROUNDS

Statement 1. The shortage of version 4 IP addresses (IPv4) whose length is 32 bits is felt as most urgent in the Internet community. In the 90s the version 6 IP addressing (IPv6) system which defined the 128-bit length addresses was proposed [2,3]. The total capacity of the IPv6 addresses space is $2^{128} \approx 10^{39}$. Such number of IPv6 addresses is much greater than the Earth's population.

The standards [4,5] presented in Fig. 1 define the global unicast IPv6 addresses encoding format.

The global routing prefix is (typically hierarchically-structured) a value assigned to a site (a cluster of subnets/links) and the subnet identifier (ID) is an identifier of a link within the site.

All global unicast addresses have a 64-bit interface ID field (i.e., $n + m = 64$), formatted.

n bits	m bits	$128-n-m$ bits
Global routing prefix	Subnet identifier	Interface identifier

Figure 1. The global unicast IPv6 addresses encoding format

Statement 2. In 1974 International Organization for Standardization (ISO) adopted the first version of the International standard ISO 3166 [6] which defines the code names of States and dependent territories as well as the main administrative units within the States. In accordance with the International standard the three digits designation was bound to each country, for example, 643 to Russia, 840 to USA, 826 to Great Britain, 250 to France.

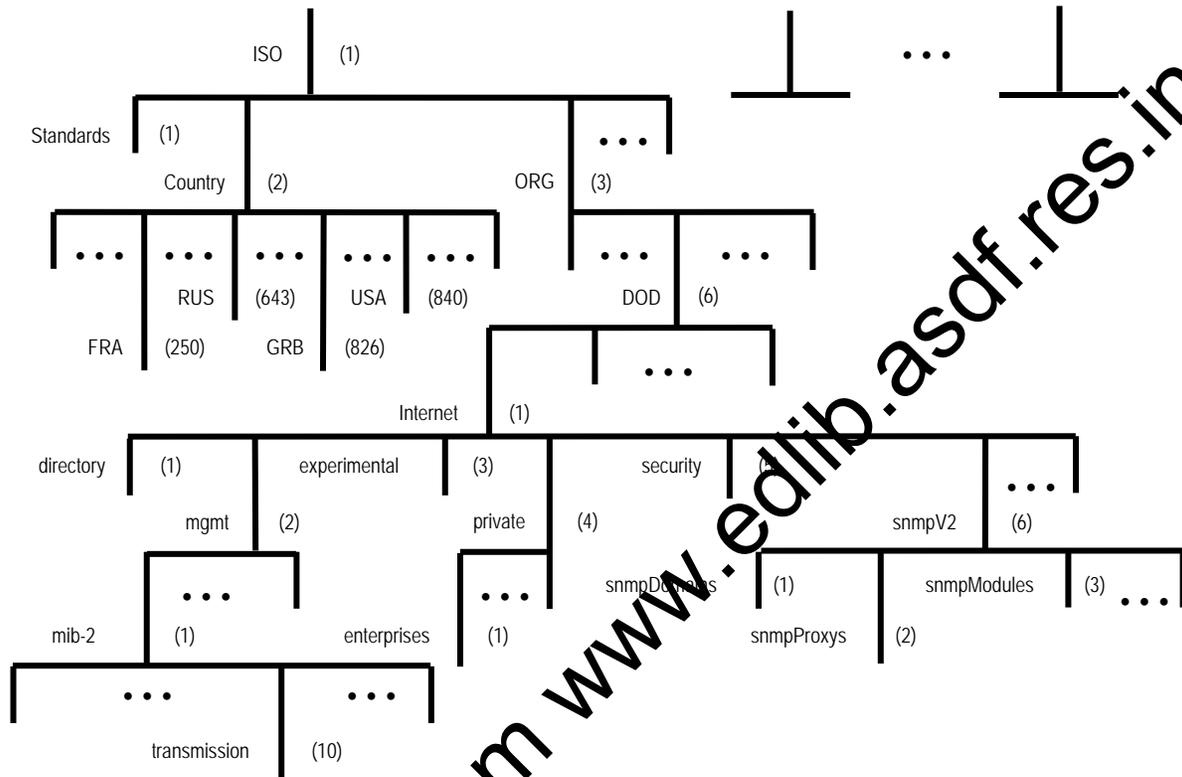


Figure 2. Root NMI hierarchy tree, including country object identifiers

Statement 3. In the Internet to develop a unified approach to the management of network hardware and software facilities Simple Network Management Protocol has been developed (SNMP). Later SNMP improved. Now a third version of SNMP (SNMPv3) is in practice.

SNMPv3 specifications are based on a modular architecture consisting of:

- 1) a data definition language;
- 2) definition of management information (the Management Information Base, or MIB and MIB-II);
- 3) a protocol definition;
- 4) security and administration.

Within the SNMPv3 architecture Structure of Management Information second version (SMIv2) is applied. SMIv2 determines the hierarchy structure for the network management information (NMI) presented as a network management objects collection. Each object is bound to its own identifier (*object identifier* — OID). OIDs are sequences of digital labels separated by dots stored in MIB(-II).

For NMI ISO is in the highest hierarchy level (Fig. 2), “iso” = 1. In particular, coding of the path to the root (in NMI hierarchy tree) follows as:

```

org          OBJECT IDENTIFIER ::= { iso 3 } -- «iso» = 1
dod          OBJECT IDENTIFIER ::= { org 6 }
internet     OBJECT IDENTIFIER ::= { dod 1 }
directory    OBJECT IDENTIFIER ::= { internet 1 }
mgmt         OBJECT IDENTIFIER ::= { internet 2 }
mib-2        OBJECT IDENTIFIER ::= { mgmt 1 }
transmission OBJECT IDENTIFIER ::= { mib-2 10 }
experimental OBJECT IDENTIFIER ::= { internet 3 }
private      OBJECT IDENTIFIER ::= { internet 4 }
enterprises  OBJECT IDENTIFIER ::= { private 1 }
security     OBJECT IDENTIFIER ::= { internet 5 }
snmpV2       OBJECT IDENTIFIER ::= { internet 6 } .
    
```

The country OIDs form one branch of the NMI hierarchy tree (one path to the root). Fig. 2 shows such a branch:

```

Country      OBJECT IDENTIFIER ::= { iso 2 } -- "iso" = 1
RUS          OBJECT IDENTIFIER ::= { country 643 }
USA          OBJECT IDENTIFIER ::= { country 840 }
GRB          OBJECT IDENTIFIER ::= { country 826 }
FRA          OBJECT IDENTIFIER ::= { country 250 }
    
```

Thus, every country is bound to its own OID coded as a digital label sequence, for example, 1 (ISO). 2 (countries). 643 (Russian Federation). ... ; 1 (ISO). 2 (countries). 840 (USA). ... ; 1 (ISO). 2 (countries). 826 (Great Britain). ... ; 1 (ISO). 2 (countries). 250 (France). In other words, the state of management object discussed and stored in MIB(-II) (including control, use etc.), is specified by any three labels sequence of type "1.2. ...".

III. TECHNIQUES

Based on the above analysis, the paper offers to use countries OIDs (example, 1.2.643 — Russia) as the global routing prefixes in IPv6 addresses. Thus, the IPv6 addresses space need be split in three big clusters of:

- 1) national IPv6 addresses subranges of countries;
- 2) special IPv6 addresses subrange, including local, multicast and any technological IPv6 addresses;
- 3) forbidden IPv6 addresses (an international organization should take a decision to use IPv6 addresses not included in the above first and second subranges). These IPv6 addresses must not be used until a decision to use them is made.

The countries' codes used in the fixed and mobile telephony systems could be an example of such a global splitting up, i.e., each country is bound to its own international telephony code (identifier). Examples: "+7" to Russian Federation; "+1" to USA; "+44" to Great Britain; "+33" to France etc.

Hexadecimal coding of IPv6 addresses subranges for some countries might look as follows:

- 1) Russia — 1264:3000::/20.
- 2) USA — 1284:0::/20.
- 3) Great Britain — 1282:6000::/20.
- 4) France — 1225:0::/20 .

IV. MOTIVES AND EFFECTS

The motives behind the method offered and its effects may be the following.

1) The Internet globalization which resulted in building national information communities (e-governments), practically in all the countries of the world. National e-governments will be transformed to new social economic environments (SEE) [7]. In each country, such an SEE becomes a sphere of special economic interests which requires protection, both from external and internal interventions.

2) The method offered actually delimits virtual national information communities and SEEs. By analogy with the Schengen countries, virtual borders remain open and transparent. However, there are the state and administrative borders between the countries of the Schengen zone. Such borders determine the zones of economic, financial, legal, environmental and other state responsibilities, meaning a boundary slip between them, which splits up the spheres of state interests. Similarly, the virtual borders of the national information communities actually become boundary slips in the worldwide virtual space. Thus, the offered method splits up the spheres of state interests in the worldwide virtual space.

3) By analogy with the national radio frequency bands, each national IPv6 addresses subrange will be public national property of a state and maintaining and servicing such subranges could be a source of the state budget replenishment. For example, Russians (or other country citizens) could get individual IPv6 addresses free throughout their life. Commercial organizations could rent the national IPv6 addresses subrange fragments (unique, not duplicate and in various amounts) on a paid basis. Now mobile and cellular communications providers replenish national incomes by payments of radio frequency band rent.

4) Maintaining national IPv6 addresses subrange data base (IPv6-NDB) and strict registration and control of used and unused IPv6 addresses will provide an exact identification of cyber criminals and any intruders who conduct illegal activities in Russian or other country domain of global information society. In particular, national information technology infrastructure (ITI), which is the basis of the information society (e-government), will pluck potential internal violators' attempts to use forbidden IPv6 addresses by a block of malicious IPv6 datagrams. The strict implementation of inevitable punishment is the base of the assertion above.

5) When cybercriminals make attempts of virtual penetration into Russian or other country' SEE by using forbidden IPv6 addresses, their actions will be intercepted at the boundary of the national information society, i.e. at the boundary of the national ITI. Moreover, when the potential violators use legitimate IPv6 address, the fact of passing IPv6 packet with this address will be recorded on the virtual border. If the information security violation does occur, the cybercrime investigation materials will be transferred to that country whose IPv6 address was used (i.e. from the national IPv6 addresses subrange of that country);

6) By analogy with the existing practice, the Internet service providers will rent unique (non-overlapping) parts of the national IPv6 addresses subrange for the appropriate payment. Internet service providers will assign IPv6 addresses to the clients on the basis of a particular permanent or temporary agreement.

This will uniquely identify that an Internet service provider's client performed a wrongful act in cyberspace. This can be also applied to organizations and individuals, creating Web sites of extremist, terrorist, pornographic and other malicious information on the base of the Internet-providers services.

7) For law-abiding citizens and organizations as Internet users, nothing will change impact. As they provide their personal data when signing agreements with Internet providers, they will go on doing so later during the transition to

IPv6 addressing with only one exception: they will have the right to use their individual IPv6 addresses or provided by Internet providers.

8) The Internet users in the zones of free access to the Internet provided by private or charitable organizations (for example, a network of fast food restaurants “McDonald's”) could also use their individual IPv6 addresses or provided by private organizations depending on their information security policies. In this case, it is expected that private or charitable organizations will use some unique non-overlapping parts of the national IPv6 addresses subrange.

V. IMPLEMENTATION ASPECTS

International aspect. First, for the implementation of the offered method, an official transfer of IPv6 address space authority must be established by a generally accepted international organization (e.g. International Telecommunication Union, International Organization for Standardization and other). To this end a decision of UN or only US authorities can be accepted.

Second, adoption of some international acts and standards will determine the strategy, policy, principles and rules of the IPv6 address space use as well as official selection of unique IPv6 addresses subranges for each country.

Third, a transient period for national ITIs should follow while adapting the worldwide system (the time transition interval) to a full-scale use of their IPv6 addresses subranges.

Fourth, an organization of “cyber police” within, for example, the Interpol (International Criminal Police Organization) can be established to investigate international cybercrime, provide national cyber police services interaction and detect unauthorized prohibited IPv6 addresses use.

National aspect. Each country should establish or assign a federal authority to create and implement national IPv6 addresses subrange use strategy, policy, principles and rules. In particular, in the Russian Federation such an authority can be subordinate directly to the President of the Russian Federation or to the Prime Minister of the Russian Federation (or his First Deputy) and be a part of the Administration of the President of the Russian Federation or the Executive Office of the Government of the Russian Federation. The federal authority shall form the Public Commission, in which representatives of all interested agencies and organizations, including the public ones will work. One of the objectives of such a Commission would be to resolve all the conflicts that related to the distribution and operation of the national IPv6-address space subrange, and to frame the necessary decisions and recommendations.

Technological aspect. IPv6-NDB must be created and maintained to control used for forbidden IPv6 addresses. The IPv6-NDB maintenance should include an appropriate DB complex protection system and a control access system operation should be regulated by federal legal acts.

IPv6-DB as information technology system (ITS) may be created on a state-private partnership base.

Infrastructure aspect. Any state ITI serving as a national information community base should include malicious and criminal traffic controls using the principle of skipping IPv6 packets with permitted IPv6 addresses only such as:

- 1) national IPv6 addresses subrange of states,
- 2) and special IPv6 addresses subrange, including local, multicast and any technological IPv6 addresses.

In addition, all state and private organizations maintaining and developing national ITI should configure their software and hardware network devices (routers, switchers, etc.) in order to prohibit processing IPv6-packets with forbidden IPv6-addresses.

The procedures and rules of local IPv6 addresses use by organizations and agencies should provide a personal assignment of local IPv6 addresses, i.e. a unique local IPv6 address should be bound to its employee. Local IPv6 addresses must include state and organization/agency OIDs [8], otherwise, organizations and agencies must use their unique (non-overlapping) local IPv6 addresses subranges. Local IPv6-addresses distribution and maintenance in the countries will be part of the activities of the federal authority responsible for creating and implementing strategy, policy, principles and rules of national IPv6 addresses subrange use.

The procedures and rules of translators IPv6 addresses [7] use must include a conversion of local addresses to global ones and vice versa via corporate (agency-level) IT systems only.

VI. SUMMARY

A method and a system of IPv6 addresses use in the global information community can significantly reduce the cybercrime level and protect national ITI of states without any limitations on their rights and freedom of citizens to get true and independent information.

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Adopting “The International Society for Technology in Education” Standards on AOU e-Learning Environment

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Abstract: The new technology has a huge revolution on almost all areas on our life including learning and education. Furthermore, it raised the need to have sets of standards and regulations to guide the best practice of such technology in many eras in general and in education in specific. These standards are supposed to employ the use of technology in teaching, face to face learning, and e-learning. One of the most pioneer standards in education is the International Society for Technology in Education; ISTE for short. ISTE standards were set to improve the learning skills which consist of many skills such as thinking skills, problem solving, critical thinking, and creativity. One aim of ISTE standards is to prepare students for the new era of using technology in education, using the Learning Management Systems (LMS) as a student-centered learning environments, using the digital technologies in learning, and encouraging the use of digital professional models for planning, designing, and creating an e-learning environment. Arab Open University; AOU for short; is considered as the first and leading educational institutes in the Arab world of utilizing e-learning and blended learning as the main core of teaching. This paper investigates adopting the ISTE standards in the learning environment at AOU in general. Also, it focuses on the advantages and the need for these standards to deliver optimal learning process.

I. INTRODUCTION

Nowadays, technology became the core of all phases of our daily practices at home, at work, and in our social lives. We have to utilize the technology to be a part of our educational system. Utilizing the technology can create a powerful e-learning environment by enhancing the content presentation and also enhance the learning process with the available variety of tools and digital skills such as the assessment tools, communication skills, and security issues. Using the technology in the learning process will improve student learning and enhance the learning process. Digital assessments are very essential to use information that can be used to continuously improve the learning and education systems [1, 9].

The International Society for Technology in Education; ISTE; is an association for education leaders and educators dedicated to empower member learners and educators all over the world. One of the most contributions of ISTE is the developing of a set of Standards with the contribution of pioneered educators to enrich the new era of education by using the digital technology. There is a wide international acknowledgment of ISTE Standards by implementing their standards in teaching, learning, and the use of digital technology in education. The ISTE characterized their standards into many specialization including: “ISTE Standards for Students, ISTE Standards for Teachers, ISTE Standards for Administrators, ISTE Standards for Coaches, and ISTE Standards for Computer Science Teachers” [2, 7, 8]. Educational institutes must implement these standards as a complete package to enhance their educational system.

Arab Open University; AOU for short; is the first university to adopt e-learning as a core of its teaching process in the Middle East area. It offers online material for all touted classes through the learning management system used since it was founded in 2002. Until now, AOU has branches eight different countries in the Middle East area,

Also it has an affiliation agreement with the United Kingdom Open University; UKOU; and based on this agreement we run the UKOU courses and programs to guarantee the good quality of its educational programs [3, 6].

The first e-learning system used by AOU was FirstClass offered by UKOU in 2002, and then we adopt Moodle to be the official Learning Management System of AOU. Moodle is an open source learning management system which is broadly used by thousands of educational institutes all over the world. Moodle has many templates to present any course content in a proper way. Also Moodle is very rich with many tools and activities that might be needed while delivering the course such as Forums, Chat Rooms, Instant Messages, Workshops, Grade Book, Online exams, assignments, etc. [4].

In this paper we will investigate the adopting of ISTE standards in the Arab Open university e-learning environment. We will focus on the adaptation of such standards from the technological point of view. The technological infrastructure and the readiness of instructors and students to use such technology in the learning process will be also presented. Furthermore, the essential requirements to build a successful model are discussed in details.

Section two introduces ISTE Standards, section three presents AOU e-learning environment, we present a case study in section four, and final section five concludes this paper.

II. ISTE STANDARDS.

This section introduces the ISTE Standards for students and teachers in brief; full details of these standards can be obtained from ISTE official website <http://www.iste.org/standards>. The goal of bring in these standards is to be familiar on them and then to investigate the adopting of them within the AOU e-learning environment in the subsequent sections of the paper [2].

A. ISTE Standards for Students Resources:

As stated about ISTE standards has many categories, one of these categories is focused on students since they are the center of and learning process. The main factors are [2]:

1. Creativity and Innovation: It measures the ability of the students to use the digital technology and employ their knowledge to think creatively and show innovative outcomes.
2. Communication and Collaboration: It measures the ability of the students to use the digital technology and communication tools and digital media to collaborate and communicate with other students and teachers, considering that there are a set of synchronous and asynchronous communication tools.
3. Research and Information Confidence: It measures the ability of the students to use the digital technology to collect data, produce information, and evaluate results.
4. Decision Making and Problem Solving: It measures the student capabilities of critical thinking aspects, management, research, and problem solving.
5. Digital Citizenship: It measures the ability of the students on the proper behavior while using of the digital technology, students must be aware of all ethical and legal issues of using the technology.
6. Technology Concepts: It measures the ability of the students to understand concepts, operations, and structures of the digital technology

B. ISTE Standards for Teachers Resources:

The second category is focused on teachers since they are the leaders of any learning process. The main factors are [2]:

1. Motivate Student's Learning and Creativity: It measures the teacher capabilities of teaching, technology, and knowledge to employ and facilitate them to direct and support student's knowledge and creativity, and also the produce an innovated outcomes.
2. Design and Enhance Digital Learning Experiences: It measures teacher capabilities of producing a complete cycle of learning content, this will require skills and knowledge of designing, developing, using proper tools, and evaluating the needed outcomes.
3. Model Digital Work and E-learning: It measures the ability of the teacher to use the digital technology, communication tools, skills, and digital processes in a professional level.
4. Encourage Digital Citizenship and Responsibility: It measures the capability of the teacher of using proper behavior while they are using the digital technology, teachers must be aware of the new digital culture and all ethical, social, and legal responsibilities of using the technology.
5. Engage in Professional Development: It measures the professional improvement of teachers. A teacher must maintain a continuous improvement of his skills of digital technology and how to employ it in the learning process.

I think that all teachers nowadays must be active in using the digital technology in order to maintain professional capabilities. They should keep learning how to use the digital technology socially and also in their professional learning system [5].

III. AOU E-LEARNING ENVIRONMENT

The official learning management system used by AOU is Moodle, which is an open source learning management system which is broadly used by thousands of educational institutes all over the world. AOU made a lot of enhancement over Moodle to fulfill the regulations and instructions used in the university. Moodle has many templates to present course content based on the specification and the nature of the course. Also Moodle is very rich with many attractive tools and activities that might be needed while delivering the course such as Forums, Chat Rooms, Instant Messages, Workshops, Grade Book, Online exams, assignments, etc. These activities can be performed on different levels such as section, course, department, or college level. [4].

ISTE standards for student's resources are applied and adopted in the AOU e-learning environment. Creativity and Innovation is the first element of the standards. Concerning AOU students, we can state the following:

1. Students create their own work either by sole activities or by team work using the technology through forums and sharing thoughts and ideas.
2. Express the learned knowledge by presenting some related ideas.
3. Do related projects and some new programs and models.

The second element is about communication and collaboration, we case state the following:

1. Students use Moodle to communicate and interact with each other and also to communication with their teachers. They use forums, messages, voice mail, and direct chat rooms.

2. They exchange ideas and help each other through these technological communication tools.
3. They create dedicated communication environments to do a team work on assigned projects

The third element is referring research and information fluency. AOU students are practicing the following activities:

- 1- They plan strategies to guide inquiry specially in their final year project.
- 2- They organize, analyze, evaluate, search and use information from a variety of sources and media. AOU has a huge digital library which has a variety of e-learning resources where student can access it via the internet from anywhere any time.
- 3- They write a report for every course they take. There is always new information that they need to present in this report and also they need to state the resources of these information.

The fourth element is about decision making and problem solving. AOU Students practice the following:

- 1- Many assignments are set to measure student capabilities of identify, define, and analysis a specific task.
- 2- Projects are designed to let students plan and manage activities to develop their projects.
- 3- They are asked to select the proper solution for assigned problems based on the collect and analyze data. At the end, it is their decision to make from a variety of alternative solutions.

The fifth element is about digital citizenship. Students need to show that they are belonging to the digital society:

- 1- They practice the digital technology and information in an adequate, responsible, and legal way.
- 2- Their ethical, thoughts, and behavior of using digital technology which supports learning and creativity.
- 3- They must present their capabilities and leadership for digital citizenship.

Finally, the sixth element is about technology operations and concepts. AOU student cannot process within the university unless they are fully operational in the technological system used in general and Moodle in specific including:

- 1- Understand and use technology systems including Moodle and online Student Information System
- 2- Use applications effectively. All student activities are required to be online via Moodle.
- 3- They need to test and fix faults of assigned online activities and systems.
- 4- ITC students are transforming some system to be adopted on mobile web technology.

The second important standard to adopt is ISTE standards for teacher's resources. The first element of the standards is to motivate Student learning and creativity, according to teacher of AOU, we can declare the following:

- 1- Teachers support students' creativity and encourage them to practice critical thinking.
- 2- Teachers must be engaged with students via many digital tools to train them how to solve problems and obtain more resources.
- 3- Teachers train students to use activity tools to expose and explain students' understanding, critical thinking, and developing.
- 4- Moodle is equipped with tools where teachers and students are participants in the learning process within the learning management system environment.

The second element is about design and enhances digital learning experiences. AOU teachers are practicing the following:

- 1- They develop many e-learning activities and assignments within the LMS by creating adequate digital tools to encourage the students to be more involved and more experienced in the digital learning.
- 2- They use the official learning management system Moodle that contains many individual activities and tools. These activities and tools encourage students to be more active and also to manage their own e-learning procedures.
- 3- Moodle allows teachers to customize and personalize e-learning activities for their students.
- 4- Moodle support teachers with multiple types of assessments to assist their students formative and informative.

The third element is about model digital work and e-learning. AOU teachers have the proper knowledge and skills to:

- 1-Demonstrate confidence in technology systems
- 2-Work together with students and colleagues using digital tools and resources to support students.
- 3- Communicate effectively with students and colleagues using a variety of digital age media, specifically via Moodle.
- 4-Teachers are using many electronic tools within Moodle to support students with the needed information and feedback on the course content and also on the submitted assignments.

The fourth element is to encourage digital citizenship and responsibility. AOU teachers understand their responsibilities in evolving digital culture in their professional practices:

- 1-They are aware of ethical and legal use of digital information and technology
- 2- Moodle is designed in a way where learners are learner-centered. AOU teachers are aware of such strategies.
- 3- They are trained professionally on how to use the technology in all aspects, the net-etiquette and behavior skills of using the net and digital media are vital.

The fifth element is referring to Engaging in Professional Growth and Leadership; AOU teachers continuously improve their professional skills and they are considered pioneers in the e-technology professional practice in the Arab world:

- 1-They have been practicing the use of technology to interact with the students and deliver learning material since e-learning platform is the core of AOU learning process.
- 2-They contribute to support better professional behavior in local communities and institutes that are new in this area.

IV- CASE STUDY

In this section, we present some activities and experiences which are being used by our students while practicing the digital technology in their first year here at AOU. Each activity represents an example of one or more elements of ISTE student standards, these elements are numbered at the end of each activity within parentheses:

1. Design and create an online journal via a journal tool in Moodle in details to show the understanding of a related course material and content. (1, 2, 3)
2. Think, Design, Write, and Test a digital program or report to show the understanding of knowledge and skills related to course learning outcomes. (1, 4)
3. Use electronic tools within Moodle that can be adjusted and timed based on the student's progress on the course materials to measure the student understanding effectively. (3, 6)
4. Perform online experiments and trainings related to course materials and measure the student's critical thinking progress. (1, 4)
5. Study and come to a decision on how we can employ the new technology to present better e-learning environment and determine the limitations. (4, 5, 6)
6. Measure student's capabilities of finding solutions to course related problems and plan and perform related projects. (1, 2, 3, 4)
7. Consider the Web Accessibility Initiative; WAI; requirements and rules while designing a website. (1, 5)
8. Measure the capability of setting all hardware and software requirements to install and operate the learning management system Moodle and debug and error while configuring the system. (4, 6)
9. Consider all legal and ethical issues while using the technology on the web; this includes the copy rights and referencing issues. (3, 5)

V. CONCLUSION

In this paper, we introduced ISTE standards which aim to guarantee an optimal use of digital technology in e-learning and teaching. The main goal of using the ISTE Standards is to improve the quality of teaching and enhance the thinking skills and creativity for both students and teacher, also preparing students for the new era of digital learning. The paper discussed adopting and implementing ISTE Standards for both teachers and students in the Arab Open University e-learning environment. A case study of AOU adaptation of ISTE standards is also presented.

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A Framework for Android Based Shopping Mall Applications

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Abstract-Android is Google's latest open source software platform for mobile devices which has already attained enormous popularity. The purpose of this paper is to describe the development of a mobile application for shopping mall using Android platform. A prototype was developed for the shoppers of Bashundhara Shopping Mall of Bangladesh. This prototype will serve as a framework for any such applications (apps). The paper presents a practical demonstration of how to integrate shops' information, such as names, categories, locations, descriptions, floor layout and so forth, with map module via an android application. A summary of survey results of the related literature and projects have also been included. Critical Evaluation of the prototype along with future research and development plan has been revealed. The paper will serve as a guideline for the researchers and developers to introduce and develop similar apps.

I. INTRODUCTION

Mobile Phone users are no longer restricted to the basic predefined functionalities provided by the manufacturer and/or Mobile Operating Systems. Manufacturers now provide various development platforms and tools to support the third-party application developers. Not only that, some manufacturers even provide software markets such as Play Store by Google, where developers can sell and distribute their applications. Since the beginning of offering such opportunities, many different types of applications have been developed to cater the wide range of user demands. The concept of the Internet of Everything (IoE) has further geared up this phenomenon. Android has been playing a vital role in this regard. Our project is a part of such exertions of mobile application development using Android platform. We have developed the first iteration of the prototype to be used by shopping mall customers. Various Metadata of the participating shops of the Bashundhara Shopping Mall of Bangladesh were incorporated with an Indoor map of the Mall. This paper reports the finding of the initial evaluation of the prototype and will serve as a guideline for early developers and researchers interested into developing such apps.

II. BACKGROUND AND METHODOLOGY

Mobile and cellular phone has gained huge popularity for its diverse use starting from making phone calls to sending SMS as well as act as a platform of running converged application and third party software. Due to such enormous diffusion of mobile devices and applications, mobile technologies have become a part of great and immense research. Android, introduced by Google, is a platform which is projected to be a complete software pack including operating system, middleware as well as core applications. In addition, it has an SDK (Software Development Kit) which provides the necessary tools for developing various applications in java platform [1,2].

Application markets such as Apple’s App Store and Google’s Play Store provide point and click access to hundreds of thousands of both paid and free applications. Such stores streamline software marketing, installation, and update therein creating low barriers to bring applications to market, and even lower barriers for users to obtain and use them. Design is very encouraging for developers and users of new applications as witnessed by the growing Android market. Android's application communication model further promotes the development of rich applications. Android developers can leverage existing data and services provided by other applications while still giving the impression of a single, seamless application [3]. For example, a restaurant review application can ask other applications to display the restaurant's website, provide a map with the restaurant's location and call the restaurant. This communication model reduces developers’ burden and promotes functionality reuse. Android achieves this by dividing applications into components and providing a message passing system so that components can communicate within and across application boundaries [4]. Research has found that android apps are heavily being used to find out shopping mall locations, ongoing promotions and offers at different stores, map module etc. In developed country 44% [5] android users use shopping mall apps for their comfort. Developing countries are far legged behind in this regards but they have already started the journey to join the others.



Figure 1. Percentage of global Android users for shopping purposes in 2013 [5]

For our project, we have opted for Android platform to develop the targeted app for shopping mall. Firstly, we conducted an extensive literature and project search to find out details of related works already done by other researchers and developers. We adopted the User Center Design (UCD) method to design and develop our first prototype. Participatory Design method, where representative(s) from the user groups take(s) part in the design process, was also used. The evaluation of the initial prototype has been presented here.

II. RELATED WORKS

The “Park Tower Shopping Mall” [6] App is one of the pioneer projects of this field. This was developed to be used by the customers of The Park Tower Shopping Mall which is located on main Shahrah-e-Ferdousi, Clifton in Karachi, Pakistan. This mobile application has the following functions:

1. The directory link function is to locate the address or the location of the shops.
2. Limited search functionality

3. The pop-up floor plans

The ShopZY [7] shopping Mall Mobile Application is developed for the shopping malls located in Bangalore and Ahmedabad. The Directory link function is to locate the address and location for the shops. The shops are divided into categories automatically. Consumers can use the search function on top of the screen to fasten the search process. The Layout link function is use to show the entire floor plans of the shopping mall. Other than these two main functions, there are other interactive links such as Favorites, Events, Promotions, Entertainment etc.

The official Simon Malls [8] App is developed for the Simon Property Group in USA. This is a must have shopping mall app for every savvy shoppers so that when they visit one of the Simon shopping malls out of 300+ malls nationwide, they can maximize their shopping experience. This app includes the visualization of the shopping mall map, checking out the latest promo offers as well as finding the desired shops etc.

The Dubai Shopping Mall [9] app is developed by Emaar Technologies. This is an app for the customers of Dubai Shopping mall to maximize their shopping experience. This app includes various features such as use interactive maps to help user pin point the location, showing detailed direction of desired place, real time update, latest events and promo etc.

The UAE Malls Combined [10] is an app developed my Mahmoud Khalil for UAE shopping malls. This app is an easy way to search and review of everything what an user/customer need to know about his/her favorite shopping mall. This app has some unique features like completely designed smart search, navigating systems through the interactive maps, filter mall controller etc.

III. PROPOSED MODELING ALGORITHM DESIGN

In this section, the technical model and development's algorithms have been discussed. A brief overview of the app, both technical and theoretical has also been presented here. For clarity of understanding, the section has been divided into the following sub-sections:

A. Design Criteria

This section reports the analysis of the system requirements for the app based on the user need. This has further helped us to identify the steps and procedures needed for the algorithm. Providing the floor layout has been identified as the primary requirement. In addition to that, displaying the layout of the selected floor has been pinpointed as to be a vital procedure while developing the algorithm for the app. Not only that, providing users with all the stores' information in the building comes as another prime fact due to its importance to the users. Besides, periodically data update service will be available to make user connected with the recent activity of the shopping mall. Moreover, category based search system will play a vital role for the popularity of this app. To add a new dimension to usability of the app, selected stores' interface could be added. Adding and letting the stores to update the promotion and offers will serve as a motivating factor for using the app as this will help: 1) the users to decide which shop to visit and 2) the stores to attract more customers. A use case diagram, as shown in fig. 2 has been presented to better the overall designing criteria.

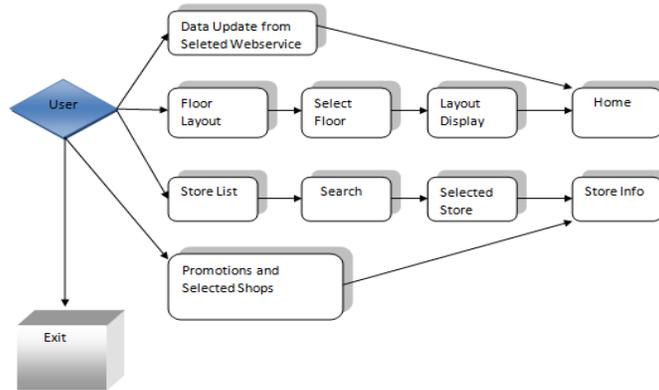


Figure 2. Use case diagram of the proposed App

Table-1 lists the findings of the requirement analysis and associates them with appropriate events to be triggers.

TABLE 1
DESIGN CRITERIA TABLE

No	Requisite	Apply event
1.	Providing Floor plans of the building	Layout of the Floor/Floor Layout
2.	Providing selected floor layout	Select floor
3.	Providing all the information about stores	Store list
4.	Providing list of stores based on category	Category based search/search
5.	Providing promotion offers and selected stores update	Promotion
6.	Displaying the primary interface	Home
7.	Terminating interface	Exit

B. Algorithm and Development of the app

Considering those designing criteria, an efficient algorithm, as shown in fig. 3, has been developed for the system. At the beginning stage, data collection should be done and a total view of the shopping mall (Map view) should be generated. Next, all data will be categorized according to the floor plan and layout of the desired stores will be depicted. After that, category based search system should be developed and promotion features will be created.

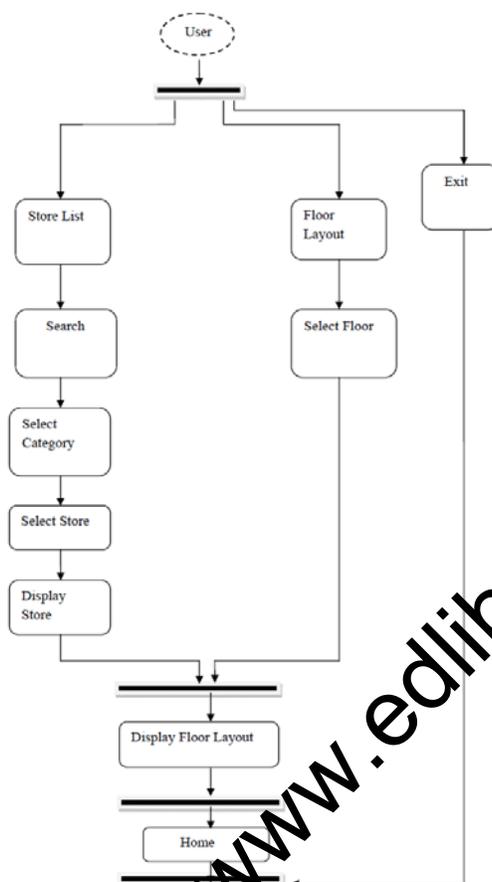


Figure 3. Algorithm development phase of proposed app

Fig. 4 presents some selected screen shots from the first iteration of the app. The initial user evaluation of the app provides positive feedback in terms of usability and usefulness. The results indicate that the app will be adopted and used by most of the customers having a smart phone or other compatible handheld devices. Once the final iteration is reached based on further detailed user evaluation, the app will be marketed for free for the users. However, for the shops to participate has to pay a monthly subscription to contribute to the development and maintenance process.

Testing and Evaluation:

The app was informally used, by a small number of users, for testing purposes only. The participants were mainly the shop owners and employees of the shopping mall. They are having previous experience of using smartphones. As they did not come across any such app before, they could not compare it with other similar apps as described in the Literature Review section of this paper. However, most of the participants were satisfied with the functionality of the app. The ability to navigate through the interactive maps was found to be the most prevalent feature. The participants were also pleased with other features as such search, filter, promotion and so forth. The app will be further enhanced based on the suggestions received and then a detailed usability test will be carried out. It will be subject to regular maintenance and updates.



Figure 4. An overview of the proposed Android App

IV. CONCLUSION

This Paper presents an overview of how to develop an Android based shopping mall app from the scratch. Processes of doing requirement analysis using UCD and participatory design methods as well as generating development phase algorithm have been discussed. The initial prototype was developed and evaluated based on the requirement analysis. The initial evaluation of the prototype provided very encouraging results. However, to develop a marketable version of the app, the prototype has to undergo numerous further iterations until high user satisfaction is achieved. A detailed usability evaluation has to be carried out. The prototype developed is expected to serve as a framework for any such applications.

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P-Governance Technology: Using Big Data for Political Party Management

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Abstract- Information and Communication Technology (ICT) has been playing a pivotal role since the last decade in developing countries that brings citizen services to the doorsteps and connecting people. With this aspiration ICT has introduced several technologies of citizen services towards all categories of people. The purpose of this study is to examine the Governance technology perspectives for political party, emphasizing on the basic critical steps through which it could be operationalized. We call it P-Governance. P-Governance shows technologies to ensure governance, management, interaction communication in a political party by improving decision making processes using big data. P-Governance challenges the competence perspective to apply itself more assiduously to operationalization, including the need to choose and give definition to one or more units of analysis (of which the routine is a promising candidate). This paper is to focus on research challenges posed by competence to which P-Governance could respond include different strategy issues faced by particular sections. Both the qualitative as well as quantitative research approaches were conducted. The standard of citizen services, choice & consultation, courtesy & consultation, entrance & information, and value for money have found the positive relation with citizen's satisfaction. This study results how can be technology make important roles on political movements in developing countries using big data.

1. INTRODUCTION

An ancient Greek word "kebernon" that means to steer, has been followed for the term governance. Still in current world, governance means to the power that steering our political system, social system as well as all processes those have been used to control, to direct and to held an organization to their society. P-Governance is a new pattern and new processes to ensure the transparency, accountability, responsiveness, efficiency, supervision for all directions of any political party. Debating to decide policy and investment, to organize and to deliver information and services to the citizens P-Governance has opened new opportunities for citizens, supporters, party members, stakeholders etc.

Because of the increasing of world population from 1.65 billion to 6.79 billion within 20 years in 2010 [1], there are a lot of odd progresses have been increased also, such as primary need, those are causing poverty and increase of desperation among the nations. Governance for political parties comprises with effectiveness, equity and inclusiveness, participation and responsiveness, transparency and accountability, [1] among these population. So, while the population is larger, then there are more data around a political party to governance and empower them in proper management processes. Information and Communication Technology (ICT) can provide more opportunities towards the political parties to guide them in critical as well as general strategies and decision making which belongs to them. In Bangladesh, there are 85 million people out of 164.4 million involved with different political

parties, where this population is more than British total population [18, 19]. There are more than 110 million mobile phone users, but ICT are not actively introduced in the process.

To represent and deliver social services with decentralization and to make policy framework [2] by proactive societal actors [3] in various public administrations, P-Governance technology is a better solution performing these functions and connecting citizens with political parties. Efficiency and effectiveness, stability of a political party, rule of law, citizen participations, corruption controlling and accountability [4], these six perspectives for P-Governance are key factors to improve governance processes using ICT. The Interrelationship between citizens and formal political parties influences on this critical process to use ICT key factors, such as social media data, mobile applications, web services etc. Hence, the collected big amount of data needs to be processed through ICT tools or services to achieve more efficient information for the governance processes of a political party.

Moreover, a citizen centric p-governance, supported by ICT, enjoys increasing trust of citizens and ensures accountability of organizational transactions [23]. It also provides enhanced collaboration among departments and stakeholders, thereby enabling fast decision making and consensus [24]. Now-a-days Internet plays a vital role on the governance processes to take feedback from citizens, party member supporters, stakeholders, etc. Thus it involves rethinking the entire redistribution of services across all agencies from a citizen perspective. So, through a holistic approach of a true citizen, the opportunity of interaction between political party and citizens could bring us to the doorstep of a new model of governance technology.

II. WHAT IS P-GOVERNANCE

P-Governance (P-Gov) is not made on particular decisions of some specific people. That is a management system based on ICT. Rather, P-Gov is about to identify someone, whereas a input right belongs to him for different types of decision and to make people accountable on these rule of law [5]. The achievement on a performance goal, also comes from a governance principle, implanted on a corporate environment to manage it using ICT. So, P-Gov represents a framework of decision making and accountabilities to enlarge the domain of political activities using of ICT for big data [5]. Through this technology, as shown in Fig. 1, political parties can deliver public and social services to the nation with a responsive, efficient, transparent, accountable and effective organization using big data.



Figure 1. Concept of P-Governance for a political organization

The term “IT based governance” was introduced in 1970s [6] [7]. Then, in the late 1990s, e-government (e-Gov) was emerged. Because of the revolution of the Internet, the opportunity on business, governance, monitoring and tracking systems, effectiveness, participation, accountability etc has enlarged exponentially. The trend of a political personnel is to serve more efficient services to citizens, supporters, stakeholders etc as his customers by manipulating big data of each scope [8]. In this perspective, P-Governance has been started also for political personnel to fulfill the challenges as well as to practice their profession with root level people more promptly, smartly, deligatively and effectively for a nation.

III. Background

In the 2008 presidential election, the Democratic National Committee (DNC) of USA uses their mobilization programs among supporters, to cover up the participation among citizens, stakeholders, etc. and to pre-determine the statistics of election status. Obama uses Web based platforms, sharing through social media, and smart phones for his supporters to make them participate in the political processes of his election campaign for each voters [13].

P-Gov refers to governance technology for political parties, in the extension of e-Governance for political party management as well as the strategic use of political activities, which can be operate through web services, social media, or mobile services (using SMS or mobile app). It is about to use mobile applications and services, where an organization and political party can serve little more disciplined, transparent and accountable social infrastructure. Adapting to this infrastructure is almost not dispensable to fulfill the citizen’s demand fully for all public sectors. It actually emerges as a huge opportunity in the using of ICT processes for public services, even if any additional thing added to the activities of political parties. These hopeful changes of technological and social sections are primary concern of our study. Through social media, a political organization can exchange their information with their citizens more interactively and vastly. So the way, through which a community or an individual can communicate, is now improved to a new horizon. Social media is more visible to our citizens directly through a popular platform on the Web. To register, mobilize, or persuade any supporter during campaign of a party, using a mobile application could be a better solution for them. Obama uses this technology for volunteer activity of most active supporters, canvassers, citizens, stakeholders to make them notice about his approach, to make them hear his speech and taking back a statistical report in return, such as rating, from them as suggestions without ringing the doorbell for their home during the campaigning period [13].

Critical Analysis regarding on P-Governance can be reported into four dimensions. Firstly, the strengths of this technology are Internet (as pull factor), combination with democratization reforms, willingness of that party, and modern image for that party. Secondly, the weakness of P-Governance could be lack of cyber laws in developing countries, hierarchy in organization, lack of expertise on technology, budget, lack of motivation, slow decision making process, integration to reform, short term approaches for election campaign. Thirdly, the opportunities, that could be our positive factors, are raising public sector fund through this technology, showing more competitive and transparency edge on natural change of processes towards the supporters, citizens and stakeholders. And fourthly, threats could be bureaucracy, piracy, misuse, corruption, maintain disorder, political disorder, resistance etc. for applying P-Governance technology.

IV. METHODOLOGY

The term big data refers to huge amount of datasets and analyzing big data refers to the steps of manipulating and testing these datasets to seek insight them. The idea of big data analyzing is a formal process of using open data around everywhere. It is not a new process in this world, but leading some habitudes related to amplify these datasets such as voting, rating, sharing, feeding activities of a political party through individual citizens. Big data sizes could be starting from a few terabytes and ending to a lot petabytes of datasets in a single field.

The six most critical and also focusable stages of operating a political organization through Information and Communication Technology (ICT) are as follows-

1. Participation and Responsiveness:

Political participation in any activity means, facilitating greater citizen participation in policy decision-making processes using web technologies as well as to provide information and to support infrastructure for empowering citizens to gain their achievement. In this case, it is needed a qualitative responsive service among the citizens and the policy influencers and deplorers, stakeholders, supporters etc.

2. Transparency and Accountability:

Through ICT a political party can be transparent in its infrastructure and activities towards the citizens, supporters, policy makers, stakeholders etc. This transparency makes more clear about the concept and ideal of that party to everyone. This increases the accountability and acceptance regarding any activity or performance of that political party to a society or a region or a nation.

3. Effectiveness and efficiency:

Exploring new channels of services, activities through ICT such as mobile service and social media for proactive two way communications ensures better effectiveness and efficiency for that political organization. Improving activity effectiveness for seeking better ways to interact with citizens and stakeholders using ICT, these political parties are aiming to become more efficient.

4. Equity and inclusiveness:

By counseling and introducing ICT facilities such as web technologies, mobile services, social media in rural, remote and indigenous communities as well as creating more interest and inclusiveness on using ICT to these communities, may bring the equity to the citizens, supporters, party members, stakeholders etc. and will also help to focus the aim on political activities and their importance to everyone.

5. Rule of Law:

Violation of the rule of law is not unusual in a democratic organization. The rule of law, that remains our guiding principles, violations for any political party such as corruption, illegal favors, etc. can be protected, monitored and/or preserved, and corrected using mobile services, social media, web technologies. Thus, using ICT any permanent structured or temporary unstructured groups or society can protest any violation of the rule of law of any political party over years.

6. Interrelation among citizens, political party, supporters, and the stakeholders:

For adopting ICTs to modernize and for the reliability on political parties' a better interrelationship with citizens, supporters, and stakeholders offers considerable potential for the sustainable p-Governance. For

the improvements of political activities, policy decision-making, initiatives on broader perspectives by using of multiple channels (web technologies, social media, mobile services, etc.) to participate in local community life or online discussion forum, interrelationships play a vital role to for p-Governance.

The method of this technology is to extract relevant and interesting knowledge from big amount of data using data mining. Among several tasks of data mining classification [21] is one of the most useful techniques to build any model for decision making process from input data set. Then this model can be used to predict future data trends [22]. Hence, an application is developed for Android operating system as well as a web platform is also open for all citizens, supporters, stakeholders, party members etc. Two screen shots, as shown in Fig. 2, are presented here for the example of this development.



Figure 2. Web platform and mobile based application for a political party

The life cycle the processes executed to the following steps:

Step-1: A process could be started from a post in web platforms or in mobile based application. An authentic user can only login the application. A social media can also be included

Step-2: All users can view the post from web platforms or from mobile application. To suggest the post to another user, anyone can direct SMS the post through the mobile application or can suggest through social media.

Step-3: All users can comment on posts, share the post, or like the post as user review.

Step-4: A large amount of data can be collected for a single data set through prompt responses from huge users in the web based database.

Step-5: This data need to be classified for policy making processes, for identifying user experience, and for quick decision finalize. This process can be done through decision tree of "WEKA" tool from data sets.

Step-6: The already collected of data sets will be used as training data for identifying the future trend and possibility of user behaviors.

Step-7: A simplified result can be calculated through Bayesian belief networks, where attributes are conditionally independent not only to reduce the cost calculation, but also to count the class in many distributions.

$$P(C_j|V) \propto P(C_j) \prod_{i=1}^n P(v_i|C_j)$$

Relational model I: Naïve Bayes model classifier; where, C_j is the j-th class, V is the data sample and v_i is the value of i attributes from 1 to n th samples.

V. SOLUTIONS

Regarding the critical analysis of P-Governance, there could be 4 phases to operate it between party to citizens (P2C), party to stakeholders (P2S), party to party (P2P). In the earliest phase, named information phase, all data will be collected accordingly in a common structure. In the next phase, named interaction phase, the communication with the citizen, stakeholders, party members will be operated through participating in discussion groups or forum, newsletter, etc. and notifying them using mail or service (mobile based or web based services) notifications or any other interactive processes. Hence, a huge collection of data is analyzed to take a quick decision on any activity. Data was collected from administered questions through many type of activities, those are performed, monitored, and guided by the supporters, members, stakeholders of different political organizations. The 4 phases, Information, Interaction, Transaction and Transformation could provide an acceptable solution to organize and manage the P-Governance technology for any political organization. The flow of processes of these phases, as shown in Fig. 3, is internally dependent with each other, which can be fully controlled through web based platforms, social media, mobile applications or services.

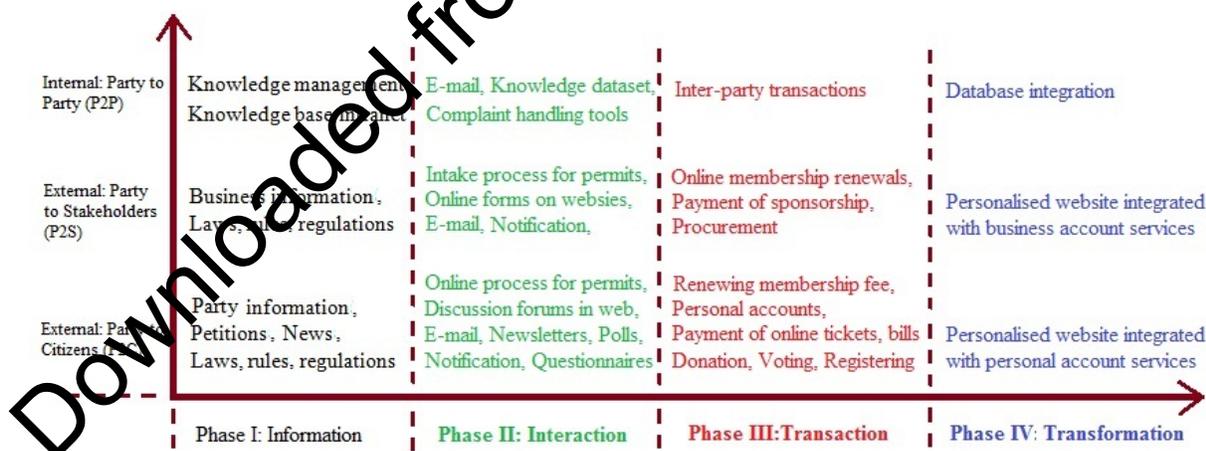


Figure 3. 4 Phases of the solution of P-Governance Technologies

VI. Conceptual Framework

Reliability of P-Governance is widely understood as the use of the information and communication technology (ICT) to achieve:

- Providing information and delivering services,

- Participation and responsiveness for a citizen in the process of decision preparing,
- Transparent and accountable organization to members, citizens, supporters, stakeholders,
- More effective and efficient management.

The concept also seeks to improve the service delivery between Party-to-Citizens (P2C), Party-to-Stakeholders (P2S), Party-to-Party (P2P) as well as back office processes and interactions within the entire political framework to make it more effective and efficient management system. Parties all over the world are faced with the common challenge of improving their quality of services and gaining the confidence of their citizens. Citizen-centric service delivery has been identified as a key method to establish greater connections with the citizenry and build trust with them. This is to enable governments deliver better services to citizens more cost effectively.

The framework refers to 5 dimensions of P-Governance, as shown in Table-I, party, technology, society, supporters and interaction. For each of these dimensions, we may define a list of elements which are the part of the design of the framework for that dimension, e.g. target, value, operation, enforcement, role, service and institution within the dimension of party. These 5, as shown in Table 1, dimensions are the boundary spaces of the whole P-Governance framework, but the elements of these dimensions, which are the core part of the design/framework, are open in all axes.

TABLE I
ELEMENTS OF 5 DIMENSIONS OF P- GOVERNANCE FRAMEWORK

PARTY	TECHNOLOGY	SOCIETY	SUPPORTERS	INTERACTION
Target	Applications	Social inspection	Accessibility	Channel links
Value	Infrastructure	Public value	Delivery of services	Goals
Operation	Services	Globalization	Information sharing	Partnership
Enforcement	Data	Demography	Trust	Strategy
Role	Social Media	Transactions	Roles on changing	Governance
Service	Equipment	Digital inclusiveness	Responsiveness	
Institution			Participation	

The framework also needs a common interface to communicate, participate, and responsiveness. The participation emphasizes on e-participation. In this case, governance could go through web technologies (already available), social media (partially implemented), and mobile apps services (rarely implemented). To input big data for a single data set and analyzing them for quick decision making as well as operating any activity, we need to merge them in one common platform.

VII. CONCLUSION

At the end of this study, this technology shows an immature research field which needs to be developed in multidisciplinary and a large practice. Though the definition of scope and core is still unclear and also a novelty, it brings a new analytical dimensions and new variables for governance technology research. This research needs more integration of ideas from political science, social science and psychological activities. So, P-Governance is a potentially fruitful research area. For any substantial change in this technology, it is important to recognize the research attention.

To make improve on this research, the state of this technology and its adjacent surroundings elements of different dimensions need to assess for building a good understanding to the citizens, supporters, stakeholders and members of any political party. To implement this research assessment framework, a political party need to focus on research methodology of 6 most critical stages, relational model for big data formulation, conceptual framework in 5 dimensions, solution in 4 phases for this technology, to collect and analyze data. This framework also needs to maintain disciplines to practice it for any political organization.

In conclusion, we can say that P-Governance is a key technology for any political party to minimize political disorders such as corruption, illegal favors etc. and to provide efficient and effective services to any society or nation.

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A Comparison of UI/UX and Process for Major E-Commerce Platforms

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Abstract- E-commerce is one of the important fields of the Web services, with the rapid developments of web service technology and the prevalence of new marketing concepts (e.g. O2O), a lot of companies begin to invest money and human resources in this area. Some traditional industries also seek for transformations through adopting E-commerce. E-commerce takes advantage of the fast-delivery on Internet, conveniently online experience, A successful E-commerce platform can attracts many online users, and not only enables users to have more convenient shopping modes and more promotional products and services, but also offers companies a low-cost and effective way of advertising. Big data are generated by the information of E-commerce mode and can further be used to conduct strategic applications and researches. Capacity and flexibility is the core of E-commerce. Therefore, this paper reviews several E-commerce platforms that have undergone successful enterprise transformation through analysis of UI, UX and Process, and summarizes some key functions in E-commerce platforms.

I. INTRODUCTION

O2O(Online To Offline, also called Offline to Online) is a new business mode integrating the online shopping and the entity transactions. O2O through discount, providing information, services, reservations, etc. to push the offline stores' messages to the web user. Thereby convert them to their offline customers. This is suitable for the services and products they must shop at physical stores, such as food, fitness, watching movies and performances. With the rapid development of Internet, e-business models in addition to the existing B2B, B2C, C2C business model. O2O has recently developed rapidly in the market. This consumption pattern has developed very mature, and has also been widely accepted [1, 2]. But some analysts pointed out that the e-commerce in the United States, the proportion of online consumer transactions accounted for only 8%. But the offline consumption ratio reached 92%. To attract the consumer online to offline store for consumption has vast space for development.

O2O and e-commerce supplement and complement each other. Different user can view E-commerce from different perspectives. Therefore, E-commerce platform plays a very important role in this. E-commerce has allowed enterprise to create market presence, and to enhance an existing market position, by providing their products or services [3, 4]. For instance, Target has used E-commerce successfully. This retailer not only has physical stores, but also has an online store where the customer can buy everything.

II. THE E-COMMERCE PLATFORM OF FORMATION

In this study, surveying a number of well-known e-commerce platforms. There has eBay, Taobao, Tmall, Magento, Yahoo and PChome [5-10]. We analyze these successful stories that help us find some key formations of the e-commerce platform, and we thereby come to understand some essential functions of EC platforms as well as their applications and forms of display. With the basis of a complete purchase process, we derive 10 key functions from an EC platform, as the block diagram below shows. This paragraph will then analyze the functions listed in the upper-mediate level of the diagram (blue bottom color) and explain these key functions.

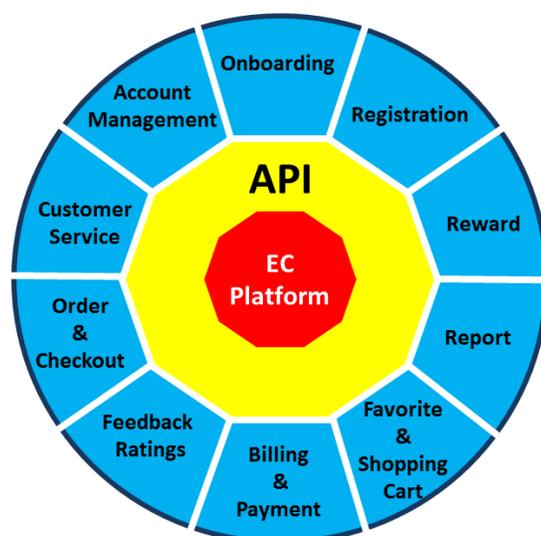


Figure 1. Architecture of E-commerce platform

A. *Registration*

Registration is the way to accessing a platform and is one of the requisite functions on every major EC website. With the aid of the authentication system, registration management becomes more effective (less liable to the disturbance of random registration). Current way of registration do not merely comprise the conventional method of allowing members to customize their accounts and passwords; moreover, many platforms start to employ OAuth to integrate and allow the admission of the accounts of other platforms such as Facebook and Google. In this latter method, the interface is designed to be user-friendly so as to increase registration and purchase. Product search will be made in the description of the third chapter

B. *Onboarding*

This is one of the core functions of E-commerce platforms. Shelving refers to all the functional processes and page display of putting merchandises on shelves on the website. It has several sub-functions: adding product information, giving detailed introduction of the product, uploading images or audio/video, setting price (including suggested price and discounts), managing the numbers of the merchandise, providing different choices of payment, setting the specification and size of the merchandise, and offering FAQs of the merchandises. Even include the product search. These functions have the corresponding UIs or processes of their own to operate.

C. *Account Management*

The management of members' accounts is of great importance on any Internet platform. Issues regarding members' personal info, such as the proper managements of account numbers and passwords are highly substantial. For instance, in the member management of Yahoo Mall, the following functions are included for the members' uses: personal information maintenance (account number, password, address, and telephone), order and shipping information, order tracking, shopping cart, my favorites, bonus management, and customer service. Since these functions appear in elsewhere on the whole platform, I will explain them further in another chapter.

D. Favorite & Shopping Cart

The shopping cart displays in a similar way as I envision. The shopping cart is used to let buyers temporarily save the items they want to buy and check out altogether after they finish shopping. The shopping cart usually includes the name of the item, image of the product, quantity of purchase, unit price of the product, shipping fee, and a function to remove the product from the shopping cart. As for the function of “My Favorites,” there are mostly divided into two types: the favorite shop and the favorite product item. The customers can add their favorite shop(s) to “My Favorites” so that it is convenient for them to shop again next time. Also, they can put products they still hesitate about buying in the ‘favorite product’ area; that way, they can both keep an eye on the fluctuation of the price and make a quick purchase when they decide to buy. The displays of the functions in My Favorites and the Shopping Cart are quite similar.

E. Order & Check Out

Two ways of order payment are offered on the EC platform of many shops. One is to pay separately to each different shop, and the other is to check out altogether all the orders from different shops. The differences of these two ways of payments will be discussed in later chapter. The display of function in the payment of an order mainly includes the name of the item purchased, quantity, unit price of the item, total price, and the information about the receiver (name, cell phone number, address, mode of shipping). As for the order, many EC platforms nowadays will provide an axis of time displayed on the website, so that the buyers can clearly track the current statuses of their order and delivery.

F. Billing & Payment

Most of billing & payment are the cooperation of E-Commerce platform with external cash flow. Such as credit card companies, third-party payment, cash on delivery, remittance, etc. These methods typically use API or otherwise connected in series, and the most are using the API. Because the API is more unified and convenience in series.

Another part of the refund. It must be combined with the above of the Orders & Checkout section. Refund usually involves many parallel problems. And it needs to go through many steps before they can confirm the refund. This is a big issue across many functions.

G. Feedback Ratings

Feedback Ratings is extremely important in an E-Commerce platform. It is because that it involves the buying behavior. Many buyers reach the stores or buy some products at the first time. They are reference the feedback ratings of product or stores as a basis for credibility. Typically the higher feedback ratings can promote confidence rose and Increased willingness to buy. On the other hand, ascribed the feedback ratings can build the awareness of brand or business. And make the transition more successful about the enterprise.

H. Reward

Reward is the many shopping’s inducement, and it also the method that let the buyer increases repo rate. In addition to credit cards acquired through the company’s own credit card reward. There has the other mechanism about the E-commerce platform’s reward. Usually they have a formula to calculate the amount of consumption translated or get the reward points. For example, buying \$100 can get one reward points or

obtained from a number of activities. And in use have their own way of exchange, such as full offsetting or partial offsetting. Also in the issuance and redemption of reward point has some corresponding security mechanisms that prevent those people with bad intention to steal or destroy data.

I. Report

Nowadays it's importance of intellectual property rights and increasing fraud incidents. Internet shopping is more vulnerable to encounter this type of problem. It is because that we can't see the items entity. If we encounter fraudulent product, we will return the product. In addition, we can also set a report mechanism that alert the platform to make appropriate treatment. On the other hand, an intellectual property right is also a very important issue. When the commodity infringes the intellectual property of others, we can directly to report online. And report by the platform's company or as impartial third party to assist unit. Therefore, the mechanism of prosecution process becomes very important. This part will be explained in later chapters.

J. Customer Service

Customer Service has the most associated between the E-commerce platform and customers. From product Inquiry to the whole platform all need a proper customer service system. It is responsible the dialogue pipeline with customer. Solve the purchase, member account, returns and other issues. The traditional methods have E-mail and online form. There has the instant online customer service that is similar the plug-in instant messaging software embedded in the site. It lets customer service staff can be more immediate service for users. In this part, some platform will add the feedback mechanism in to the customer service. It will be able to reach a certain level of customer service.

III. DISCUSSION AND CONCLUSION

A. Discussion

The main structure of the consolidated chapter described only for basic functions and concepts. In fact, these are quite extensive in this area. Some of these features are listed in the discussion for the development and application of its direction in this chapter.

The first come the onboarding. Onboarding as a general platform for the product was added to the network. There are many web platforms to start uploading some different items, such as Taobao and Yahoo already onboarding lot of service on their platform. For example, we want to find a plumber to repair the toilet; we do not have to search the plumbing slowly as the traditional way. Just enter the location and it will show the most suitable plumbing base on location. This service not only save time, it also helps plumbing advertise. This is the best application about onboarding the service. Further courses are also able to upload. Multiple onboarding's concept speculated will become a trend. E-commerce driven by other industries and it becomes another business model.

Furthermore is the part of member management. This part is not only a member information management, it also combination of orders, billing, payment, feedback ratings, customer service, report, reward and other mechanisms. We can maintain these information easier at the same when maintaining the member account. Using account as the interface to connect all function and it can effectively improve the whole management efficiency. Most of the platforms have gradually taken this approach.

The third issue is report. How to plan a proper report process is also a major problem. It's very important to prevent those people with bad intention to disorderly when the platform opens to accept report. Some platforms will set a minimum threshold for the number of report. If it does not reach this threshold, then the report will be ignored. It also set up a complaints pipeline to avoid misjudgment of the situation. The following figure is a simple schematic flow.

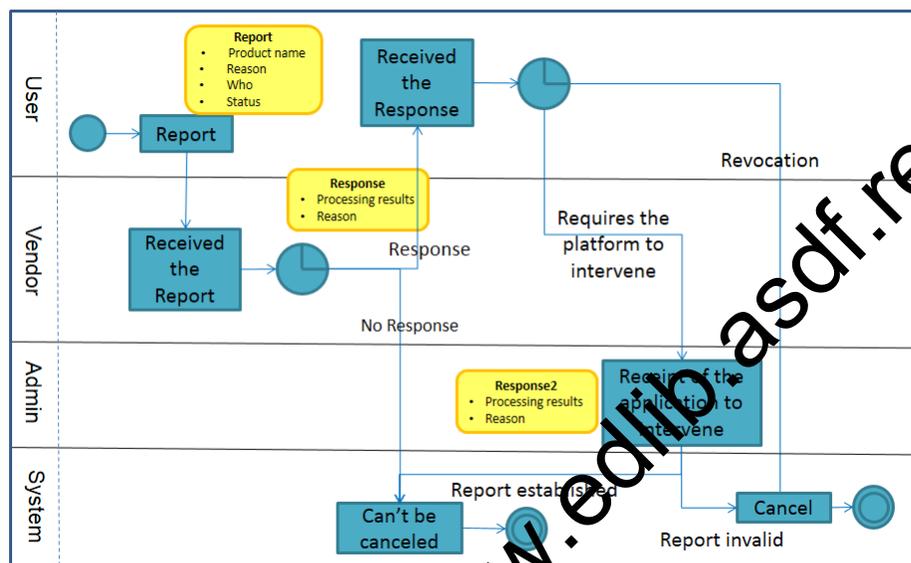


Figure 2. Example of report process

The other one is the topic of product search. It has a lot of knowledge and the need to spend a lot of effort to study. Search accuracy is often the focus of everyone, and the followed by the search speed. Currently the based approach is the use of word segmentation system first. Then it uses the key word detection technique to determine, and comparison the product name with database. Finally display the correct results and sort them. But usually the accuracy of word segmentation is very important and it needs good thesaurus to support. So sometime it will rely on big data technology. Combine big data and machine learning or artificial intelligence techniques to improve search accuracy.

The last one is about the whole E-commerce platform. In order to adapts the environment that changing rapidly. Most of stores seek corporate restructuring that base on web service. Therefore E-commerce platform needs to be more flexible and quickly applied to different areas [11]. We recommend made use of the concept of Smart Systems Service (S3) [12]. Use S3 method can quickly build a suitable service platform. And it can quickly reuse the features that have high homogeneity. Finally it races the efficiency and speed about system builder.

B. Conclusion

This study analyzes the essential function of the E-commerce platform, and lists the key features and to expand. Explain the basic concepts of each function and some process operations. Finally, the discussion section presents some of the key technical issues about the platform. This study also analysis of these issues in the future trend or direction as a reference.

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An Investigation of Factors Affecting Instructors' Usage of E-Learning Systems at the University of the West Indies

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Abstract- This study seeks to explore the factors that determine the level of instructors' acceptance of the e-learning platform at the University of the West Indies (UWI), St. Augustine Campus. The Unified Theory of Acceptance and Use of Technology (UTAUT) model was used to evaluate responses from over 600 instructors. Four important factors, i.e. subjective norms, facilitating conditions, perceived usefulness and perceived ease of use were core to the UTAUT model. After using exploratory factor analysis and structural equation modelling three of the four factors emerged as significant; facilitating conditions, perceived ease of use and perceived usefulness.

I. INTRODUCTION

The University of the West Indies (UWI) was founded in Jamaica in 1948 as a division of The University of London. Over the last six decades UWI has grown to three physical campuses in Jamaica (Mona), Barbados (Cave Hill) and Trinidad (St. Augustine) as well as a virtual Open Campus. Together these four campuses serve the English speaking Caribbean with an enrolment of 47,000 as of the 2011/2012 academic year [1].

Over the last decade, UWI St. Augustine has adopted information and communication technologies to support various blended eLearning initiatives. The first system was based on Web CT and this was upgraded in 2005/2006 [2] to myeLearning based on the Moodle content management system. As of January 1st, 2014, Campus IT Services, listed 662 active myeLearning courses [2], up from 393 in 2005 [3]. Despite this growth, the number of active myeLearning courses accounts for a relatively small proportion of the over 2,000 courses offered by the campus each year.

This paper examines the instructors' acceptance of the myeLearning system and is, as far as we know, one of the few studies focusing on technology acceptance amongst instructors in the region.

The objectives of this study are:

- a) To clearly identify critical factors affecting UWI instructors' acceptance to e-learning in context of higher education.
- b) To examine the viability the Unified Theory of Acceptance and Use of Technology model (UTAUT) to measure instructors' technology acceptance at the UWI, St Augustine Campus.
- c) To identify gaps that may inhibit the full utilization of the present e-learning system at the UWI and to propose possible recommendations that may help diminish these gaps.

The sections that follow include the literature review, methodology, findings and recommendations.

II. LITERATURE REVIEW

E-learning refers to “the use of internet technologies to deliver a broad array of solutions that enhances knowledge and performance” [4]. It relies on ICT based tools (e.g. internet, computers, telephones, radio, video, and others) and content created with technology (e.g. animations) to support teaching and learning activities [5].

One of most popular types of e-learning is blended learning. Blended learning is defined as “face-to-face oral communication and online written communication optimally integrated such that the strengths of each are blended into a unique learning experience congruent with the context and intended educational purpose” [6].

According to [7] over 90% of universities and colleges in United States and about “95% of the same institutions in United Kingdom have adopted E-learning systems for students and faculties” [8].

Despite the rapid uptake, many instructors lack the knowledge and ability to integrate the technologies into their teaching practices [9] [10]. According [11] many universities’ problem lie with instructors, who over the years have become accustomed to the teacher-centered approach of face to face tutorials, lectures and mentoring. As a result, “Classroom users of potentially powerful information technologies are seen too often to take the reduced form of mindless activities that do little to alter the expectations, assumptions, and practices of higher education teaching” [12].

This has often led to a learning transfer misalignment which creates a gap in the outcome of e-learning systems at many universities because “ICT implementation often takes place without a theory and many institutions do not spread any resources on trying to understand what kind of change ICT and computers bring to their systems; they just follow the new trend, casting doubts on the success and effectiveness of such initiatives” [13].

III. THE PROPOSED MODEL AND ASSOCIATED HYPOTHESES

In order to study instructors’ use of the myE-learning system at the St. Augustine campus we used a model based on a combination of e-learning acceptance model (ELAM) [5], the Unified Theory of Acceptance and Use of Technology [14] and the venerable Technology Acceptance Model [15].

The proposed model contains four (4) core constructs which are performance expectancy (PE), effort expectancy (EE), subjective influence (SI) and facilitating conditions (FC).

PE is defined as the “degree to which an individual believes that using a system will help him or her to attain gains in job performance” [14]. Under PE, Perceived Usefulness (PU) is defined as “the extent to which a user believes that utilizing a certain system would influence his/her job performance and productivity positively” [15]. As such we propose that;

H₁: Perceived usefulness affects instructors’ attitude towards using e-learning systems at the UWI.

EE is the “degree of ease associated with the use of the system” [14]. Under EE, Perceived Ease of Use (PEOU) is defined as “the extent to which people believe that using certain systems would be effortless” [15]. It is assumed that if the instructors’ perceptions about using a system are perceived to be relatively unproblematic to operate then there is a great likelihood that the instructor will use the system. Consequently;

H₂: Perceived ease of use affects instructors’ attitude towards using e-learning systems at the UWI

In TAM [15], PEOU is often observed as directly influencing PU. Thus

H₃: Perceived ease of use affects perceived usefulness of e-learning systems at the UWI.

SI and is defined as “the degree to which an individual perceives that important others believe he/she should use the new system”. Under SI, Subjective Norms (SN) are defined as “a person’s perspective that most people who are important to him think he should or should not perform the behaviour in question” [15]

H₄. *The influence of Subjective Norms affects instructors’ attitude towards using e-learning systems at the UWI.*

Attitude (ATT) is centered on the belief that a person will only perform a behaviour if it is believed to have a positive outcome. Therefore;

H₅. *Attitude will positively affect instructors’ intention to use e-learning systems at the UWI.*

Behavioural intention is users’ decision, willingness or expectation to perform certain actions. ITU_BI is “an indication of how hard people are willing to try and of how much an effort they are planning to exert, in order to perform the behaviour” [16]. It is assumed that PE, EE and SI will have a significant effect on instructors’ behavioural intentions to use e-learning systems.

H₆. *Behavioural intention to use will affect instructors’ actual use of an e-learning system at UWI.*

Facilitating conditions are conditions that an individual cannot influence or change immediately and it is defines as “the degree to which an individual believes that an organization and technical support/ infrastructure exist to support use of the system” [14]. FC consists of ICT infrastructure, institutional policies, training and support, and leadership [5]

H₇. *Facilitating conditions will affect instructors’ actual use of e-learning systems at UWI*

The actual usage is the end result that follows behavioural intention to use and can only occur when the individual’s intention is enforced and internalized, resulting in the performance of a desired action.

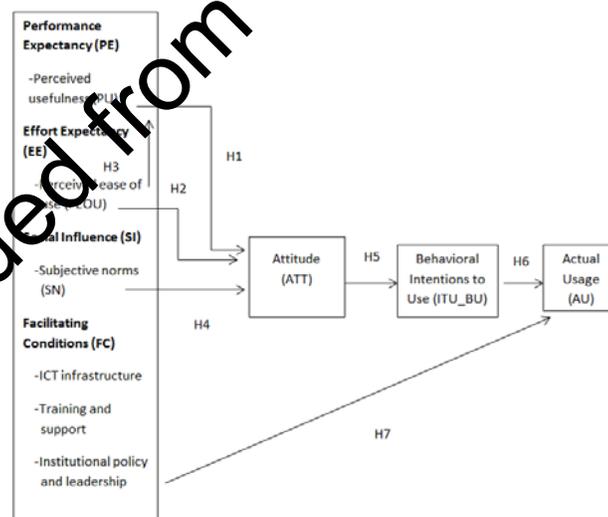


Figure 1: Proposed Model

IV. METHODOLOGY

The sample elements in this study targeted 635 full time and part time senior lecturers, lecturers, assistant lecturers and professors across all five faculties of the St. Augustine campus. Invitations were emailed to all instructors in the above categories. Each email contained a unique hyperlink to an online questionnaire hosted at Survey Monkey.

The instrument consisted of 36 Likert questions and one open ended question soliciting general feedback and perceptions. This method of data collection was cost effective given the instructors' geographic dispersion across the campus and diverse teaching schedules. Of the 635 instructors contacted, 126 completed the questionnaire giving a response rate of 20%.

V. DATA ANALYSIS

The data collected was imported into SPSS version 15 and factors that contained at least 5 to 8 factor loadings per construct were subsequently reduced, through the use of Exploratory Factor Analysis to 4 of the highest factor loadings per construct. Structural Equation Modelling (SEM) was then used to assess the path diagram and convert it into a graphical and structural path diagram.

VI. RESULTS

Normality testing was conducted to ensure that the variables contained in the data set were fairly normally distributed. In all cases, the mean in the data set ranged between 3 and 5 with majority of responses favouring the mid-section while the standard deviation was 1 and lower in most cases indicating that there is a low deviation from the norm and consistent with a normal distribution

The cronbach alpha for the data set was computed at .931 well above the 0.7 threshold and suggests there is very high internal consistency [17].

TABLE 1
RELIABILITY STATISTICS

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.931	.936	35

The measurement model was examined using exploratory factor analysis followed by an assessment of scale reliability and convergent validity using SPSS.

Table 2 shows the summarized table of questions and total variance for each variable. All variables are tested with the use of questions that are designed to collect specific information about the tested variable.

TABLE 2
QUESTIONS DROPPED AFTER FACTOR ANALYSIS

Item	Item name	Total Variance Explained
Perceived usefulness		69.58%
PU1	Kept	
PU2	Kept	
PU3	Kept	
PU4	Kept	
PU5	Kept	
PU6	Kept	
PU7	Kept	
PU8	Dropped	

TABLE 2
 QUESTIONS DROPPED AFTER FACTOR ANALYSIS (CONTINUED)

Perceived Ease of Use		
PEOU1	Kept	68.86%
PEOU2	Kept	
PEOU3	Kept	
PEOU4	Kept	
PEOU5	Dropped	
PEOU6	Kept	
Attitude		
ATT1	Kept	65.14%
ATT2	Kept	
ATT3	Kept	
Subjective Norm		
SN1	Kept	65.86%
SN2	Dropped	
SN3	Kept	
SN4	Dropped	
SN5	Kept	
Intention to Use		
ITU1	Kept	88.94%
ITU2	Kept	
ITU3	Kept	
Facilitating Condition		
FC1	Kept	60.68%
FC2	Dropped	
FC3	Dropped	
FC4	Kept	
FC5	Kept	
FC6	Kept	
FC7	Dropped	
FC8	Dropped	
Actual Use		
AU1	Kept	96.33%
AU2	Kept	
AU3	Kept	

Structural equation modelling was used to refine the proposed model and test the model fit. After several iterations the following model yielded the best fit.

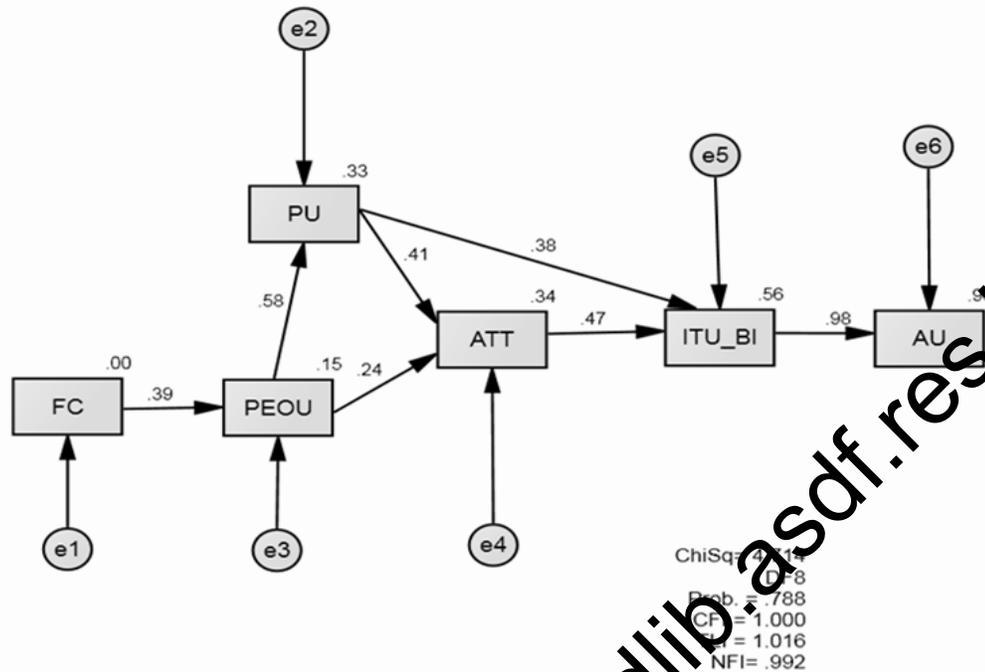


Figure 2. Revised Model

The revised model showed relationship patterns similar to the Technology Acceptance Model [15]. This technology acceptance model has been a mainstream model for many years after being thoroughly examined and continually validated through numerous studies, the converse is said to be true for the novel UTAUT model.

Generally, the revised model fulfilled all the criteria when examined and all fit indices (CFI 1.000, TLI 1.016, and NFI .992) were at the acceptable level of 0.90 or above. All factors except SN were statistically relevant and retained for the revised model. The probability was approximately 0.8, significantly above the acceptable level of 0.5 or above.

Table 3 depicts the hypothesis change for both the a priori expectation of the proposed model and the a posteriori results of the revised model.

TABLE 3
REVISED HYPOTHESES

A Priori Expectations: The Proposed Model		A Posterior Results: The Revised Model	
Proposed Hypotheses	Status	Revised Hypotheses	Status
<i>H1: Perceived usefulness</i> positively affects instructors' attitude towards using e-learning systems at the UWI	Transferred: path relationship merged into the revised model	<i>H1: Facilitating conditions</i> positively affect Perceived ease of use of e-learning systems at UWI	New path relationship found: supported: good fit
<i>H2: Perceived ease of use</i> positively affects instructors' attitude towards using e-learning systems at the UWI	Transferred: path relationship merged into the revised model	<i>H2: Perceived ease of use</i> positively affects perceived usefulness of e-learning systems at UWI	Accepted from old proposed model: supported (H2)
<i>H3: Perceived ease of use</i> positively affects perceived usefulness of e-learning systems at the UWI	Transferred: path relationship merged into the revised model	<i>H3: Perceived ease of use</i> positively affects instructors' attitude towards the use of e-learning systems at the UWI	Accepted from old proposed model: supported (H2)
<i>H4: The influence of Subjective Norms</i> positively affects instructors' attitude towards using e-learning systems at the UWI.	Rejected- no path relationship found, dropped from the proposed model	<i>H4: Perceived usefulness</i> positively affects instructors' attitude towards the use of e-learning systems at the UWI	Accepted from old proposed model: supported (H1)
<i>H5: Attitude</i> will positively affect instructors' behavioural intention to use e-learning systems at the UWI.	Transferred: path relationship merged into the revised model	<i>H5: Perceived usefulness</i> positively affects instructors' behavioural intention to use an e-learning system	New path relationship found: supported: good fit
<i>H6: Behavioural intention to use</i> will positively affect instructors' actual use of an e-learning system at UWI.	Transferred: path relationship merged into the revised model	<i>H6: Attitude</i> will positively affect instructors' behavioural intention to use e-learning systems at the UWI.	Accepted from old proposed model: supported (H5)
<i>H7: Facilitating conditions</i> will positively affect instructors' actual use of eLearning systems at UWI	Rejected- no path relationship found, dropped from the proposed model	<i>H7: Behavioural intentions to use</i> will positively affect instructors' actual use of e-learning systems	Accepted from old proposed model: supported(H6)
		* Subjective Norms	Dropped

VII. RECOMMENDATIONS

While the model exhibits a reasonably good fit and most of the hypotheses are supported, many lecturers still do not use myeLearning, and many that do, use it only for posting course outlines and class schedules. In the open ended question, many complained about a poor user interface, lack of support, slow networks and the difficulty of integrating multimedia.

In order to make the best use of the technology and to increase usage and effectiveness, UWI St. Augustine should consider adopting the following recommendations.

1. Consider implementing a dedicated e-learning department in each faculty to can help instructors integrate all the components of e-learning.
2. Create incentive schemes that encourage instructors to incorporate eLearning technologies where appropriate as well as to reward innovations and best practices.
3. Encourage early adopters and experienced to share their experiences as well as to mentor new or reluctant staff members.
4. Introduce a system of continuous monitoring and benchmarking vis-à-vis acknowledged leaders so as to benefit from advances in best practice and to avoid unnecessary mistakes.

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Yes, Governments Can! - Concept and Experiences with Guaranteed Blindness in a Central Exchange Service

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Abstract- With April 1st, 2012 the implementation of Directive 2006/24/EC on the retention of data generated or processed in connection with the provision of publicly available electronic communications services, or of public communications networks came into effect in Austria. With this implementation, not only the obligations of the providers of telecommunications services are controlled with respect to the retention of communications data, but also the powers of the security and law enforcement authorities with respect to request both retention data as well as traditional connection data (e.g., security police in the course of fulfilment of affairs). To make the retrieval of such data as transparent as possible, legally secure and traceable, all requests (with only few exceptions) must be carried out only via the so-called DLS, a central exchange service. This allows preventing unauthorized or hidden inquiries, practically and not just legally. Both requests and replies must be transmitted only over HTTPS connections to the DLS and must further be secured using end-2-end encryption, enforcing a blind central service.

I. INTRODUCTION

In her book on publicity rights, Gillian Black proposes that privacy is the desire of an individual to be free of intrusion [1]. The European Convention on Human Rights states, "that everyone has the right to respect for his private and family life, his home and his correspondence". This right may be restricted to a person of public interest or for the purpose of prosecution, though this might have to be seen very controversial [2].

Austria was faced exactly with this problem over the course of the implementation of the European Data Retention Directive. Here two controversial subjects have to be dealt with at the same time. First, the infringements of the right of every Austrian citizen for his privacy by the data collection itself, as well as a safe handling during processing and especially transfer of such data between authorities and providers. The aim pursued was accordingly to install a system that conforms to the requirements of the directive and to protect the privacy of Austrian citizens.

The approach the authors designed and partly implemented for Austria, deliberately does not use the handover interface defined by ETSI² and tries to prevent the concerns that largely rely on the judgment of the German Federal Constitutional Court [3], as well as various other considerations [4][5][6].

II. STATE OF THE ART FOR PRIVACY IN GOVERNMENTS IT-INFRASTRUCTURES

Vrakas *et al.* [7] states, "that it has been proved that privacy concerns are a main antecedent of trust in e-government systems intention of use. Therefore, information systems that are not privacy aware are not trusted and thus not accepted by citizens". They argue that conventional ways for preventing attacks on the data's' privacy by mainly employing Privacy Enhancing Technologies (PETs) must involve an organizational context for selecting the appropriate technical, organizational and procedural countermeasures for building privacy aware systems.

¹ <http://human-rights-convention.org/>

² <http://www.etsi.org/>

A short overview of privacy in the context of digital government is given by Vaidya [8], by examining potential concerns and causes of privacy breaches. This work was based on existing laws regarding privacy, as well as some of the technological solutions and potential challenges. It therefore stresses the importance and responsibility of preventing data misuse coming along with the increase in data being collected, stored, and analyzed.

Haryadi and Malik [9] give recommendations for governments on how to setup a Data Retention System in his paper. It describes points of recommendation to National Telecommunication Regulatory Bodies in establishing data retention regulations and deals with fundamental questions, as e.g., functionalities, logging and site of storage. Moreover, it takes into account the matter of data exchange by taking the example of the European Telecom Standards Institute (ETSI) handover interface.

III. GOVERNMENTAL DATA RETENTION

Government triggered data retention in common has the objective of surveillance, as they, especially their law enforcement, realized the importance of communication data concerning the fight against crime and terrorism. Therefore, a growing number of countries enacted legal backgrounds for the interception of communication data in case of serious suspicions. In addition, e.g., the European Union (EU) enforced “The Directive on the retention of data generated or processed in connection with the provision of publicly available electronic communication services or of public communications networks (2006/24/EC)”, known as the Data Retention Directive (DRD) [10]. According to this Directive, every EU member state must retain specific communication parameters of their users for the period of six months up to two years for the purpose of the investigation, detection and prosecution of serious crime. This paper will later on refer especially to this directive.

A. *Data Retention Principles of the European Data Retention Directive*

In their paper, Haryadi and Malik [9] present recommendations to establish data retention regulations for countries. When it comes to technical aspects they state that the most advanced technical guidelines in Lawful Interception (LI) Data Retention is the collection of ETSI technical specifications and technical reports³. Presumably most of the member states implemented the DRD according to these specifications.

One of the standards, the ETSI TS 102 657, deals with the aspect on how to handover retention data from a provider to an authority. It gives a reference model showing a principle setup. This reference model is depicted in Fig. 1. An entitled authority requests data from a communications provider using a defined handover interface. As the figure shows, the Receiving Authority in some cases might not be the same as the Issuing Authority. The Issuing Authority sets the request to an Administrative function in the provider’s data retention system. According to the request, the provider fetches the data from its database using the Data Store Management Function and transmits it to the defined Receiving Authority. The provider internally feeds his Data Storage from different sources, as e.g., email, Internet access, Internet telephony, mobile telephony, fixed network telephony and so on, using a Data Collection Function. The standard also defines a Log Functionality for event logging of the activities in the Data Retention system.

³ <http://www.etsi.org/standards>

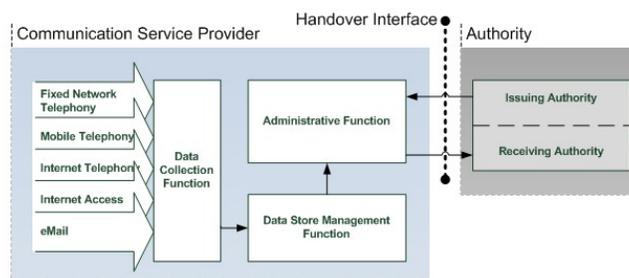


Figure 1. Data Retention System Reference Model

B. Regulations by the Directive to Guarantee Retained Data's Privacy and Security

Concerning processed retention data's privacy and security the directive enacts several regulations to guarantee their confidentiality, integrity, unlawful access and alteration as well as accidental loss. Moreover, it clarifies that the regulations of the Data Privacy Directive (DPD, 95/46/EC) and of the Directive on Privacy and Electronic Communications (DPEC, 2002/58/EC) are furthermore applicable as far as no specific regulations are stated. Basically, from a data security point of view, retention data are to be treated and protected equally to operational data processed in the provider's system providing the corresponding communication service, as far as specific regulations do not require the implementation of stricter measurements. So pursuant to this the provider has to implement organizational and technical measurements and procedures that only authorized staff are able to access retention data and that retention data are deleted after their compulsory period of storage. Moreover, each Member State is engaged to designate one or more national supervisory authorities, which is responsible for monitoring and ensuring an appropriate level of data security [10].

C. Reservations Concerning the ETSI Handover Interface

As part of the implementation of the DRD in Austria some concerns about the ETSI standard for a handover interface have been raised. Due to data protection reasons, access via a direct interface to the database systems of providers was a controversial subject, since it may potentiate the infringement of European privacy law. The concept of the ETSI interface allows a so-called grid investigation within all covered communications data of the DRD. This circumstance corresponds to a kind of data mining. The associated possibilities of linking data goes far beyond the competence of the DRD and therefore was seen as a not acceptable method [11].

In addition, the evolutionary history of the ETSI standards and the contribution of experts from different intelligence organizations give enough reasons for certain suspicion concerning the underlying background intentions⁴.

IV. THE AUSTRIAN DLS - A CENTRAL EXCHANGE SERVICE FOR RETENTION DATA

For the data exchange the directive states that, "Member States shall adopt measures to ensure that data retained in accordance with this Directive are provided only to the competent national authorities in specific cases and in accordance with national law" [12]. By following this and due to the aspects mentioned in chapter III-C, we developed a construct not following the ETSI standards for Austria. Amendments in the Austrian Telecommunications Act regulate exactly which data may be requested by authorities under what conditions. An

⁴ <https://moechel.com/lectures/>

associated technical Data Security Decree gives a holistic legal as well as technical solution for the mandatory system to exchange this data between authorities and provider, on the basis of official request letters (in PDF format) and defined response files (in CSV format) [13]. The fundamental challenge was to develop this system with appropriate level of privacy while allowing secure communication and data transfer between providers and entitled authorities. In addition, the superior requirements of the DRD had to be met.

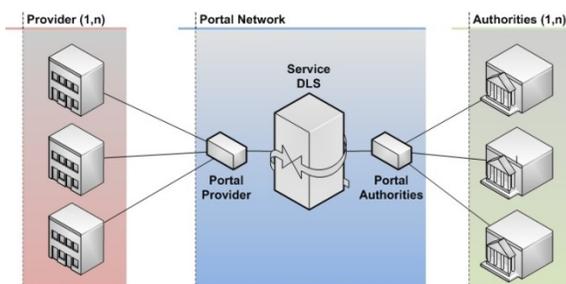


Figure 2. The Principle Concept of the Central Exchange System (DLS)

For this, we introduced an oriented hub-and-spoke architecture with a central trusted third party (the so called DLS), allowing data transmission only between provider and authorities. The basic construct is shown in Fig. 2. The framework builds on a central exchange service, embedded as a service in the so-called Federal Portal Network (short PV). Access to this service is made possible only by one portal each for providers and authorities. This setup enables a transparent, legally as well as technical, secure data exchange service with the possibility to trace every event for requesting data.

A. Guaranteed Blindness of the Central Exchange Service

As already mentioned, the DLS represents a kind of hub for information on communication and retention data. To ensure data security and privacy, data should only be exchanged in a confidential way. Therefore, the DLS is designed in a way that the content transmitted in requests and responses cannot be inspected by the DLS, even with the content not being accessible to system administrators. The system as a whole can only be compromised if a client itself is compromised and the design should not provide possibilities to intercept information, neither by active MitM attacks, nor by passive eavesdropper. This requires strong cryptographic measures with encryption of both, the request and the response, already in the infrastructure of each actor, and consequently before being sent to the DLS. Additionally, the data transmission between clients must be secured at the transport level.

The transmission is secured with a transport encryption based on HTTP Secure (HTTPS), using proven technologies enforcing HTTPS/TLS⁵ 1.2. As stated in the corresponding RFC 5246, "the protocol allows client/server applications to communicate in a way that is designed to prevent eavesdropping, tampering, or message forgery".

Additionally to the transport encryption, the actual content of a request and the corresponding answers must be encrypted as well. For this, a hybrid encryption method based on a Public Key Infrastructure with symmetric session keys is used. Therefore, it is achieved that the data can be decrypted only by the dedicated receiver. This also ensures the appropriation of the data to its objectives according to the Directive. Thus, the demand of the blindness of the DLS for the exchanged data is fulfilled.

⁵ <http://tools.ietf.org/html/rfc5246>

The public and private key are specified to use RSA-2048 bits for client certificates, and RSA-4096 bits for the Root certificate, while the used symmetric session key has to follow the specifications of AES-256 in CBC mode, using PKCS5 padding (also known as Standard Block Padding). This is conforming to the recommendations of the BSI⁶ for secure key material [14].

B. *The Rollout-Concept of the DLS*

The DLS presents its users specialized clients in form of a web application, depending if they are an authority or provider. The clients are implemented based on *HTML* and *Java Script* in order to run entirely in a web browser, while including all designated use-cases and functionalities stipulated to authenticate, set and get requests, encrypt and decrypt data, digital sign data and check digital signatures, as well as to provide required statistics. These clients satisfy all legislative as well as technical requirements of the Data Security Decree (DSL). These clients must authenticate using the corresponding Access Portal to log on to the DLS.

The unusual approach to perform all cryptography in the browser instead of using external software also revealed the need to generate the symmetric AES key inside the browser. At the time of implementation, there was no possibility to utilize a key generator or random number generator provided by the operating system. Therefore, a concept for the creation of the required symmetric session keys inside the browser was required. In order to accomplish this for the web application provided by the DLS, different sources for filling entropy pools had to be used. The mentioned sources gather information which are collected in entropy pools, which will be utilized by the Fortuna pseudo-random number generation algorithm [15] developed by Neils Ferguson and Bruce Schneier [16]. By using this cryptographic secure pseudo number generator a symmetric AES-key will be generated [16]. This key will then be used for data encryption according to the encryption concept.

C. *Challenges Coming Along with the DLS*

The main issue by taking this approach is that it relies on implementing a system to generate the CSV-response files by the data providers, which prevents them from buying or using already in place software, e.g. according to the ETSI standards.

Furthermore, the client-side code is provided to the participants by the DLS. This effectively means the DLS must be completely trusted. The DLS could selectively send down java script with encryption functionality completely disabled, or the DLS could provide the wrong public keys. While the client is audited, the public keys are certified, and a website exists with certificate fingerprints, it takes expertise to ascertain given and used certificates, as well as the client. Therefore, we advise to additionally use methods to ensure the integrity of the client and the certificates, as presented by Popa *et al.* [17].

VI. CONCLUSION

The Austrian legislator obviously has managed to implement the directive under conditions as little invasive as possible in respect of data privacy and legal protection aspects, by introducing technical, organizational and procedural countermeasures. For the implemented encryption scheme the data sovereignty stays with the communicating partners, as third-parties capturing the encrypted data are not able to have insight to any content. By

⁶ <https://www.bsi.bund.de/>

using strong cryptography, coping government satisfying authentication and security regulations, all communications are subject to certain general principles. For all Internet connections, a transport encryption is in any case provided. In addition, inquiries from authorities and the answers by providers must be encrypted (content encryption). Requests and responses can only be received and decrypted and thus viewed individually by each designated recipient. The DLS (or its administrators) cannot have insight to exchanged data and therefore confirm the blind concept, as the encryption and signing of data is done prior to the submission to the DLS. The Provider shall ensure that it provides the necessary data by business case. The DLS itself cannot take substantive control function here. The log data do not require data encryption. However, they are transferred to the DLS by means of transport encryption. The DLS can read log data and store it accordingly in its database. The system as a whole practically prevents setting unauthorized inquiries, by establishing transparency on the data exchanged and proves accountability of taken actions. Although, the European Court of Justice declared the Data Retention Directive invalid, we believe that the DLS system will be able to easily adapt to upcoming legal and political changes. The concept of the DLS has been time-proven with similar systems emerging^{7, 8}, and can easily be customized to be used for any sensitive data exchange between government authorities, as well as the economy. Future improvement should focus on implementing facilitative integrity controls and advanced cryptography in order to enhance the level of security and performance.

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⁷ <https://lavaboom.com>

⁸ <https://protonmail.ch>

E-Government Perspectives: Evolution, Strategies and Practices

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Abstract- The United States is one of the leading global leaders in e-Government and has consistently emerged as one of the top 10 countries from 2003 to 2012 on E-Government Development Index (EGDI). The paper focuses on theoretical insight and perspectives on different aspects of e-Government from the days of its evolution. The paper provides an insight of e-Government perspectives and discusses evolution of e-Governance, policy frameworks and strategies, dimensions of e-Government dominance at federal, state and local level, critical success and failure factors in the United States.

I. INTRODUCTION

The role of Information Technology (IT) has played a pivotal role in municipal sector to bring functional, managerial and service oriented reforms at various governance levels [1]. The use of IT in public administration and municipal reforms is broadly recognized and intermittently referred as e-Government or e-Governance. “E-Government development very often aims to improve public service delivery capability, as well as public administration, governance, transparency, and accountability through the development of e-Government service delivery capability” [2]. E-Government involves multiple of approaches as a framework for good governance. According to [3], good governance include: “E-organization- internal government efficiency and effectiveness; E-services - external efficiency and effectiveness in providing services; E-partnering: external efficiency and effectiveness in working with public and private organizations; E-democracy: citizen participation in government decision-making”.

At a local level, the municipal service delivery is largely dependent and defined by the level of urban governance. The governance issues are closely associated with each other in terms of simple governance to improved governance like good governance and the use of appropriate technology like ICT. “The e-Governance programmes in municipalities have traditionally evolved from an urge to make municipalities perform better for delivery of services to citizens and achieving overall performance in its functions” [4]. In spite of several measures, the adoption level or the desired outcomes through several ICT reforms, is still at minimal level as compared to the needs/ gaps in delivery of municipal services. The technological interventions through e-government in all spheres of municipal government and touching areas of citizen centric services would highly impact given that appropriate measures are adopted at various levels to bridges the gaps of service delivery.

II. EVOLUTION OF E-GOVERNMENT

The finalization of standards in IT sector and advent of internet World Wide Web (WWW) shaped the evolution of e-government from early 1990s to 1996 [5,6,7,8]. The state level earliest e-Government applications in public administration is seen by Central Post Office during 1995 by the State of Florida. The 1998 Government Paperwork

Elimination Act, was one of the key drivers which enabled transition of processes more inclined towards web centric services. Several initiatives in e-Governance witnessed it's emergence across U.S and Europe during 2000-01, which included: Red Tape Cut, government programmes on internet, regulation of e-Government works, and development of e-Government economic growth indicators [9]. Previous research on e-Governance highlights the focus on use of IT for office automation and public administration within various levels of government. The trends in the recent literature discusses larger dimensions of e-Government like: internal and external municipal/governance domain environment, citizen services, and change management [10].

The scholars have characterized e-government evolution in several stages. According to [11], the evolution of e-government can be considered in various functional and technological dynamics which include: simple web interface to sophisticated integrated service provision across different spheres of government. These dynamics can further be understood in terms of functional stages like: static/ basic informational presence, detailed informational/ extended presence, communicative/ dynamic interactive sophisticated level, and functional transaction sophisticated level with seamless interoperability in internal and external environment. The trends in e-government show a higher level of sophistication in lesser time for national government, and are lesser sophistication for state, and followed by local government. The evolution of e-government sophistication takes more time for local government due to the fact that national governments have better financial and technical resources. The ability to move rapidly towards the sophistication level is more with national governments as compared to local governments. This brings a larger disparity among the federal, state and local governments in United States.

“There were several views and perspectives of institutions, experts and researchers on concept of electronic government, as the concept of e-Government or e-Governance is relatively new in the field of ICT knowledge, being discussed since last one decade. The different perspectives on e-government and e-governance are reflective of the numerous functions and possibilities as adopted by institutions and cities worldwide. Both the concepts of e-government and e-governance refer to 'government' as a superstructure that deals with decisions, rules, implementation and outputs of its policies; whereas 'governance' refers to functioning based on processes, goals, performance, coordination and outcomes. The governance is seen as the larger facet of government. E-government is the most frequently cited term in comparison to e-governance, online government, one-stop government and digital government” [12]. The 'government' is referred “as a superstructure that deals with decisions, rules, implementation and outputs of its policies; whereas 'governance' refers to functioning based on processes, goals, performance, coordination and outcomes” [13]. The functional processes sets the distinction between e-governance and e-government. The e-governance broadly largely covers aspects of e-consultation, and e-controllership, e-engagement. While the e-government is broadly associated with e-service delivery, e-workflows, e-voting and e-productivity [14]. The e-government is largely seen as a public administration domain which fits as a sub-set of e-governance efforts [15].

IV. E-GOVERNMENT STRATEGIES AND PRACTICES

A. *E-Government Strategies*

The tasks force's initiatives launched in 2001 by United States focused on improving the effectiveness and efficiency of the federal structure. The efforts aimed at improving citizen service delivery, government

administration and business centric environment. This resulted in the e-Government Strategy for reforming government and emphasized through its vision that “government needs to reform its operations – how it goes about its business and how it treats the people it serves” [16]. The three guided principles of the vision were centered on: citizen centered approach, result and market oriented approach, and innovation oriented approach. The citizen centric transformation approach enabled the strategy to work in key focus areas namely: Individuals/ Citizens, Business, and Inter-Intra Governmental relations. These focus areas broadly covered the domains of Government to Citizens (G2C), Government to Business (G2B), Government to Government (G2G), and Internal Efficiency and Effectiveness (IEE) [16]. The transformation of service delivery intended to bring high quality one-stop-point of government services, elimination of redundant collection of data, enable better performance measurement, improve administrative savings, better use of modern technology for improved administration, effectiveness, efficiency and satisfaction. The four major reasons identified by the federal government which impact the improvements in productivity, quality and customer service includes: program performance value, technology leverage, islands of automation, resistance to change.

B. E-Government Practices: Federal, State and Local

The existing literature on e-Government best practices discusses much of the practices adopted at Federal and State level. There is little discussion about the practices adopted at local level. However, many cities have very well aligned on similar lines of State and Federal e-Governance systems. The perspectives by various international agencies / survey findings reveal more details at Federal and State level. At the federal level, the top five federal agencies having high visibility through websites include: White House Portal, Department of the State, Department of the Treasury, Department of Agriculture, and Environment Protection Agency. The distinct feature of the White House Portal is about the large quantity of online services, live videos of press briefings, updates on national issues, question and answer forum with different White House officials, radio address and speeches, multilingual translations (Spanish), tool bar for navigation for every page throughout the site, and a clear privacy policy at the end of the webpage (www.whitehouse.gov). The Department of State provides options and services like: easy navigation, organized format, index of services, recent news releases, audio and video news releases, tool bar for retreating back to the portal pages, live chat, free subscription of State magazine, multilingual options (Spanish), and copyright information (www.state.gov). The Department of Treasury provides number of online service, the popular being the online tax filing. The site makes online information and services easily accessible, besides translation features in Spanish, press releases and databases, subscription services for treasury newsletter and webcast link (www.usfesa.gov).

According to [17], the top five states which excelled in websites for different functionality were: Utah, Maine, New Jersey, North Carolina, and Michigan. The website of these states provides interesting features which make them top ranking websites. In the case of Utah, some of the notable features are: easy navigation, online services, tool bars, links to executive, judicial, and legislative pages, and privacy policy (www.utah.gov). In the case of Maine, besides these similar features, the site appears to be uncluttered, informative and easy to use (www.state.me.us). The New Jerseys site allows citizens to scroll list of links for every online service. The other facilities includes: billboards, content personalization, and other transit related information to citizens

(www.state.nj.us). The North Carolina provides distinct color coded featured tabs for citizens, business and government employees. The other useful features include multilingual site in Spanish, jobs section, and email alert options. The Michigan site provides features like eStore, internship links and becomes unique among other state portals. The citizen feels a democratic involvement with concise depth and breadth of services while being useful and coherent (www.michigan.gov).

In 2003, the FirstGov (<http://www.firstgov.org>) was one of the earliest initiatives from United States towards citizen centric e-Government system. The previous sites were lacking in citizen participation, and a comprehensive, well thought out e-strategy made a significant presence in structuring e-government programme implementation. A well regulated and administrative reforms for the integration of e-networking taking the aspects of government and citizen functionalities improved the cost effectiveness and efficiency. A dedicated portal was launched “regulations.gov” for citizen participation and commenting on federal regulations. The FirstGov consisted of 180 million pages and acted as one stop for employment, government and channeled users for accessing various functions available for citizens, business, government and other stakeholders. The FirstGov became an e-Government trend, and through this single gateway one could have access to national, state, regional and local government information and services [18] [19].

By 2005, the strength of United States online presence gained in two aspects: web portal for information at one place and dependence on integrated portal which facilitated consolidated information for the citizens/ users. Some of the examples in these directions include web federal web portals for forms, payments, and regulations through the portals namely: <http://www.forms.gov>, <http://www.pay.gov> and <http://www.regulations.gov>. By 2008, additional features included in the USA.gov included: RSS (Really Simple Syndication), comprehensive mobile government page, e-rulemaking (consultation), blogs, wikis, etc. By 2010, administration in the social security emerged as one of the top governmental portal with highest user satisfaction evaluated in terms of: service functions, ease of navigation, information content and portal performance. The portal led to increased customers and emerged as one stop portal for essential primary resource information on social services in the country. The well-developed portals provided multitude range of e-services for their citizens and favoured high level of interactivity and decision making process. The portal provided links to more multitude of government services and transaction functionalities for various stakeholders like: citizens, government/ public sector departments, institutions, other private sector/ business entities. The portal offered services in various languages, and also catering to international users for information related to conducting business, employment/work, studies, travel and tourism. Besides these initiatives, several tools were introduced to provide citizens an opportunity to comment and share their own experience, such as: Facebook, Twitter, YouTube etc. [18], [19].

The 2012, witnessed the shift of e-Government strategic approaches and focused on user-centric solutions, to synergize public administration processes and systems across various spheres of governance. This spanned across various multitude of domains to synergize user experience in a seamless environment. The web 2.0 technology was used to enable cross-government collaboration, facilitate discussion, disseminate information and solve government’s most pressing problems. The IT dashboard system tracked the IT spending and became one of the most successful web-based transparency and accountability tools. The system enabled citizens to understand

government's public money spending with performance, multiple performance measures about how public money is spent effectively by government and provides comprehensive visualization tools which enable citizens to hold government accountable for its spending and performance.

C. *Factors Affecting Success and Failures*

The policy environment in U.S is considered to be one of the factors for success of e-governance. Several policies in areas of: privacy, electronic freedom, security, infrastructure and among others fostered effective e-government implementation. The Federal Spending in IT transformed the government into citizen centered e-government with much focus on internet initiatives [20]. The other success factor for e-Governance is infrastructure investments. The U.S being the largest developed country has one of the largest National e-Government Infrastructures (NeIs) among other developed countries. The orientation of strategy is also considered the factor for driving e-Governance successfully at various levels. The e-government implementation strategy of the U.S is market oriented aimed at supporting citizens specific requirements accessed by clear and specific results. [21] highlights that "in the USA, the Standish Group has been at the forefront in analyzing and classifying technology failures: its 1995 report of 8400 IT projects in the public and private sectors in the United States found that 31 per cent were cancelled before completion; 53 per cent were completed, but over budget and with less than full functionality. Only 16 per cent of the projects were completed on time and within. Problems such as late delivery, budget overruns and limited functionality have an impact on costs and therefore reduce net benefits."

According to [22], the e-government failures have five principal modes: "financial/ economic sustainability failure, cultural/ social sustainability failure, technological sustainability failure, political / institutional sustainability failure, environmental sustainability failure". The e-government failures because of uncertain environmental factors at various stages of the e-government implementation cycle is also discussed by [23] [24] [25]. The [26] states, a number of aspects contribute to successful functional implementation of e-government programs at state level. The e-government formulation and implementation process include some of the critical factors like: strategies; outsourcing; funding; political will; administration, leadership, technology, and among other critical aspects relation to performance and capacity building. The diverse approaches in e-governance indicate different approaches to the success formula to achieve e-government goals. Outsourcing is often associated with number is dimensions like: capacity to develop, implement and manage services in-house, financial factors, political interventions, and cost savings.

According to study by [1], "the lack of technical, personnel, financial capacities are perceived to be major barriers to the development of e-government in many municipalities". The personnel, technical and financial capacity includes multitude of issues like lack of: technical human resources; technical knowledge and expertise, infrastructure upgrade and maintenance, security issues, financial resources and legal issues. There are various impediments in areas of successful design, development and deployment of e-government services. The successful strategy must include provisions for "overcoming the critical barriers such as: legislative, administrative, technological, cultural and social barriers" [27].

V. CONCLUSION

Looking at the perspectives of e-government in United States, it is observed that multitude of programmes in a staged process are initiated across federal, state and municipal level. The initiatives in different areas of service delivery show the convergence of citizen centric services, business and other sectors for provisioning of efficient governance systems at local, sub-national and national level. The primary initiative being provision of online information through the national level portals, and later providing multitude of services through multi-delivery citizen centric channels. The isolated standalone approach gets replaced by the integrated approach of connected governance. The adoption of technological means from enhancing the user base in several areas of delivery channel subscriptions like mobile, internet, kiosks among others has diffused e-government at a very rapid pace. More emphasis is laid on the transactional presence of services, with enhanced interoperability among various entities of different spheres of governance. The evolutionary concept of e-government and e-governance touches upon strategic dimensions of public administration and governance which cuts across socio-economic, political, functional, and technical dimensions of public management.

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An Overview of Mobile Assisted Language Learning (MALL)

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Abstract- A literature survey of Mobile Assisted Language Learning (MALL) has been undertaken. Specific academic examples are given. Various types of MALL software are covered including their advantages and limitations. The research results show that use of MALL software gives the learner convenience to study at their own pace and consequently improve their language retention and learning.

I. INTRODUCTION

“Mobile-assisted language learning (MALL)” is regarded as one of the most pertinent application areas [1,2]. Numerous papers may be found on second and foreign language mobile learning [1,2,3,4,5,6,7]. The papers highlight different facets of language learning and their corresponding efficacy based on explorative studies. Mobile learning can accommodate people with different learning styles due to the devices' ability to be used anytime, in any place, at any pace. Thus the overall conclusive hypotheses show that the use of mobile technology does indeed enhance the acquisition of the second language [8].

II. LITERATURE REVIEW

Contemporaneous studies and practical mobile technology based projects using mobile devices such as iPhones have concentrated on informal and formal language learning [9, 10, 11, 12]. These studies found that their use clusters around learning vocabulary and grammar, story reading and practising pronunciation. This is achieved by programs requiring repetition and drills. However, no formal pedagogic theory of mobile language learning exists to date [13] (2006). The trend in advances in mobile technology does show the mobile language learning environment being highly ubiquitous, interactive and convenient. Most of the literature has concentrated on improving the proficiency of the language learners of varying linguistic abilities without stipulating a model to be adopted in the “design [of] authentic audio/visual or print materials to be used for language learning based on mobile phone technology” [9].

Mobile phones being relatively a recent addition in the field of communication technology have opened up new avenues for language learning. Expanding the academic vocabulary for university undergraduates was one recent initiative undertaken by an Iranian university [14]. This study investigated the use of using SMS for vocabulary learning and its retention using 45 freshman students with upper intermediate proficiency level, lasting 16 weeks. “The participants of the experimental group (N = 28) were taught 320 head words from the Academic Word List (Coxhead, 2000) via SMS. During the same period of time the participants of the control group (N = 17) were taught the same words by using dictionary.” Testing both groups employing an independent t-test did show both groups had improved in the post test. No significance difference could be seen between both groups in the post-test. However, “the result of the delayed post-test showed that SMS had more significant effect on vocabulary retention compared to using dictionary, and the experimental group

outperformed the control group” [14]. The study showed that using SMS helped in the retention of the vocabulary in long-term memory. Mobile learning also has a great potential for use in less industrialized nations [15], due to its versatility, low cost and ubiquity and thus appears to be the most practical way of currently delivering m-learning. The study found that using educational games, especially in a non-formal setting effectively motivates language learners, even mature Iranian government employees for lifelong learning [15].

The TOEIC MALL project [16] looked at utilizing MALL with existing compulsory language skills for listening and reading tests in order to improve the scores of Kyoto University Foreign Studies freshmen by the development of a new module. This module was to be used outside the classroom by the students themselves independently of the teacher, thus transferring the responsibility of learning fully onto the shoulders of the students. Graded steps to full autonomous self-learning were achieved by having the learner utilize a five step learning module. The learning platform utilized was the Nintendo DS mobile device and its software, DS More Training for the TOEIC Listening and Reading Tests. It was envisioned that the popularity of the device would also be an additional motivating factor.

It appears rather strange that voice interaction does not play a part in MALL research [17]. The exceptions to this, however, are in the learning and teaching of the Celtic language, Irish as a Second Language (ISL), as reported by Clooney & Keogh [18] (2007), at the secondary level for a five week pilot study. The system used mobile phones and ipods to log onto a system to respond to a set of questions. The responses were saved in the “.wav” file format. These could be then marked either in real time or downloaded as a podcast to be marked offline by the teacher. Laptops were provided to download model responses as well as engage in monitored chat sessions. In this case, mobile phones used voice rather than text input to support formal learner assessment. [17]

Another exception reported was in a research conducted by Stanford University, where native speakers of the target language (L2) coached learners via mobile phone. Problems with scheduling led to its abandonment. A second activity requiring automatic voice-controlled grammar and vocabulary quizzes to overcome the scheduling problem had to also be abandoned due to software voice recognition problems. The mobile device was used to primarily deliver materials to which the learner could respond “rather than receive passively”.

The Praxis learning podcast line [19] is a platform providing a context-driven, social-based and software-enhanced website for learning foreign languages. It has recently been developing mobile phone applications to teach phonetics using multimedia functionality. A study in 2009 by Comas-Quinn, Mardomingo and Valentine [20] in Spain looked at how students “construct meaning through informal interaction with [the] target culture via mobile blogging”. The study concluded that the students’ sharing of their blogs, helped mutual interactivity and engender an informal learning community. A recent study [21] (2010) of the experiences of Chinese students to Britain found that mobile group blogs could help in understanding the target language and culture more effectively. These mobile blogs could also help future potential students in China in the preparation for language learning and understanding the idiosyncrasies of the British culture. Wishart [22] (2009) concluded that blogging could also be effective in “teacher trainees’ reflections on teaching”.

Many language applications now exist for both the iPhone and Android operating system platforms [23]. Some of these software offer traditional features like “flashcard programs, dual language dictionaries, and phrase books”. Their sophistication and quality does vary, however. Newer hardware and software does offer added features for language learning, such as hyperlinked, multimedia phrase books, drag-and-drop trip planners

(‘Lonely Planet’ application). More advanced systems even offer augmented reality where pointing with the phone’s camera can have the image or video overlaid with additional local site information, such as background history. Vocabulary programs continue to develop in their sophistication. One such program, eStroke, devised to help learn the strokes that make up the Chinese characters also has full multimedia features such as animation, dual language libraries and extensive quizzes. An alternative software for learning Chinese known as Pleco, starts off as a free software but adds extra paid-for features such as optical character recognition. ChinesePod is another application that offers a variety of tools to work with podcast [23].

III. LIMITATIONS AND DISADVANTAGES

Mobile technologies provide numerous advantages: small size, user-friendliness flexibility and low cost - researchers continue to explore how to exploit mobile technology in language learning [24]. However, there also exist disadvantages, such as small screen size (leading to reading difficulties), storage capacity limitations, full multimedia limitations, limited presentation of graphics [25] (Albers & Kim, 2007) and dependence on networks that may not always provide very high transmission capacity and which may be subject to noise and outages. The design of the phone may also make it difficult for educational usage. Those phones with feature rich functionalities may be too expensive for most students also. Despite these pitfalls, Thornton and Houser [26] (2005) show that mobile devices can indeed be effective tools for delivering language learning materials to the students. Thus, teachers should be aware of what kinds of tools teachers actually possess and then adaptively deliver the learning resources to the mobiles [27]. Stockwell [28] demonstrated that students who found tasks taking longer to perform on their mobile devices indicated quite early on that they would be doing their tasks on their PCs because of the cost of Internet access, the screen size, and the keypad [28].

IV. CONCLUSION

Mobile Assisted Language Learning (MALL) continues to show promising results in academic research studies in the literature. MALL software continues to grow in its sophistication taking advantages of the added functionalities afforded by the advances in mobile platform hardware. Newer software is now offering multimedia features including augmented reality and voice recognition software. Studies have also shown that use of MALL helps better retention of vocabulary into longer term memory retention. The use of MALL continues to spread in academia. The overall conclusion is that the use of MALL does indeed help in the acquisition of language learning.

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Feasibility of Online Video Lectures via Touch-Screen Mobile for Blind Users for Academic Purposes

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Abstract- The recent development of touch-screen based devices has given rise to unique and unstudied opportunities in the field of academics. This research was conducted to understand blind students' attitude towards the use of YouTube videos in an academic environment using a touch-screen mobile device. A prototype was developed for a course offered at the sixth grade level of primary school in Hail, Saudi Arabia. Ten blind students participated in the case study. Survey and focus group interviews were conducted: (a) to analyze blind students' perception of substitution of Braille course materials with YouTube video lessons and (b) to understand usability features of the prototype. The results show that the majority of blind students perceived YouTube course materials on a touch-screen based device (using an android app) to be equal to or better than Braille course materials.

I. INTRODUCTION

While it would be advantageous to identify academic uses of YouTube technology for blind users, very little is understood about the accessibility of YouTube videos using touch-screen (TS) mobile devices for blind students. Most modern educational programs that use YouTube videos have provided anecdotal feedback instead of rigorous academic research about the influence such use could have on education. Additionally, the adoption of touch-screen based devices for blind students in academic environments has not been thoroughly explored in research.

A better understanding of the functionality of mobile learning (m-learning) in an academic environment will improve future efforts in the replacement of print materials with digital materials. The purpose of this study was to explore what could be learned from pilot program participant perceptions in regard to YouTube lectures presented on an Android touch-screen device. To investigate this phenomenon, the researchers conducted a qualitative case study with the 10 blind student participants in a pilot study using a prototype. This research informs faculty, institutions, and mobile app developers on how to improve TS devices for future adaptation in academic environments. To shed light on the potential of TS devices and YouTube lectures, the following research questions were addressed:

1. How do blind students perceive video lectures on a touch-screen mobile device?
2. How do blind students perceive the usability of YouTube lectures using touch-screen mobile?

II. RESEARCH METHODOLOGY

This research explored what can be learned from a pilot program about the usability of video lectures via touch-screen mobile. This study was specifically interested in the pilot program's blind participants' perceptions. These perceptions are derived from their experiences using video lectures on a touch-screen device with a specific application within the social context of the pilot program. The details of participant responses describing their

unique experiences in the pilot program are significant in informing the proposed research questions. As a result, qualitative research methods were the most appropriate in approaching the questions involved in this study.

Multiple methods of data collection were utilized in this study in order to research the use of the Samsung Galaxy Touch-screen at the Public high School, Hail. The focus group included 10 blind participants. Data collection for this study occurred from April 8, 2014 thru May 3, 2014. We divided our research into three sections. First, a pilot test was conducted using the prototype (Figure 1). Secondly, questions were asked to blind students using questionnaires to satisfy the first research question. Thirdly, feedback was collected regarding the usability of our prototype.

The quantitative data collected through the survey are presented and analyzed utilizing descriptive statistics in order to inform the qualitative study. The student survey instrument was developed directly from the primary research questions and their supporting propositions. Each survey question was tied directly to one or more proposition.

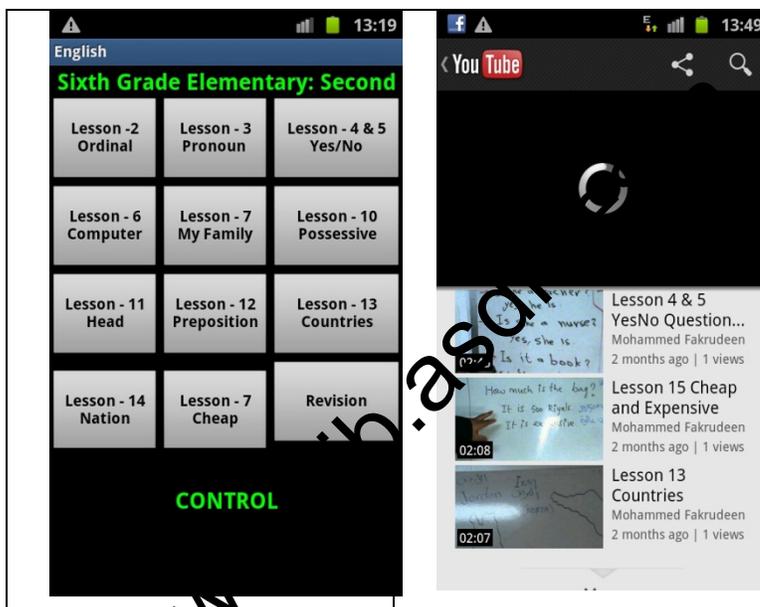


Figure 1: Prototype Design

III. RESULTS

Following is a presentation of the findings.

A. Research Question 1

Research question 1: How do blind students perceive video lectures on a touch-screen mobile? The first research question is supported by eight research propositions. These propositions act as a guide to inform the research questions and identify relevant data from across the research tools. The propositions were derived from the literature review and they have been referenced appropriately. Each proposition will be followed by relevant preliminary findings, all of which will be subsequently incorporated into a comprehensive finding for the first research question.

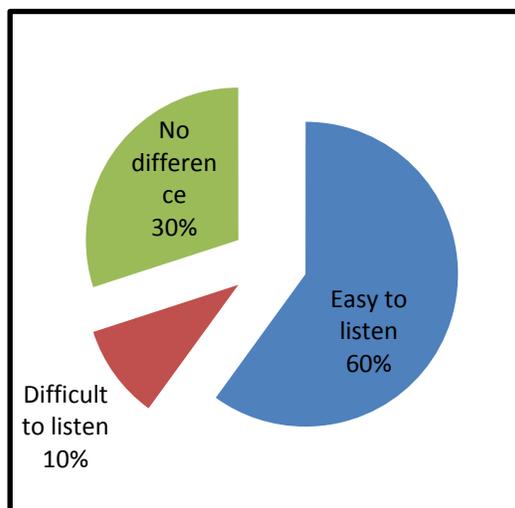


Figure 2: Frequency of listening

Proposition 1.1. How do students perceive the replacement of YouTube video lectures with Braille course materials with regard to their frequency of listening? [1]

The research asked respondents if they listen more or less often when using the prototype than Braille course materials and why they believed that they were listening more or less often. Four out of ten participants felt that they were listening more often than using the Braille materials (see Fig. 2). The reasons they gave indicated that they are more enthusiastic in exploring new ways of reading and it was easier to learn due to mobility in comparison to using Braille materials. A few of the respondents (3 of 10) felt that they listened less often, with two giving the reason that they worked in a secure facility in which they were not allowed to take the TS. The other respondents (3 of 10) felt that they were not very interested in exploring the device and they needed time to get used to TS to adapt to the culture of technology for academic purposes.

Finding 1.1. A clear majority of students (40%) perceived their frequency of listening to YouTube videos to be about the same or more often due to portability.

Proposition 1.2. How do students perceive the replacement of Braille course materials with YouTube lecture videos with regard to their duration of listening? [2]

The research asked respondents if they listen for longer or shorter periods of time when using the TS. Most of respondents (7 of 10) felt that their duration of listening to YouTube videos on TS is much shorter than actual lectures in the classroom (see Fig. 3). Some (2 of 10) felt that it took more time to listen to YouTube video lectures than classroom lectures. These two participants indicated that this was because in the actual classroom they can clarify doubts instantly whereas YouTube video lectures do not offer such a facility. In instances of needing clarity regarding a point in a YouTube video lecture, they would have to rewind and replay repeatedly until they understood the point. Only a minority of participants felt that there was no difference between the two modes.

Finding 1.2. A majority (70%) of the students felt that their duration of listening to course materials was shorter when listening using a TS device and YouTube.

Proposition 1.3. How do students perceive the replacement of Braille course materials with YouTube lectures with regard to their

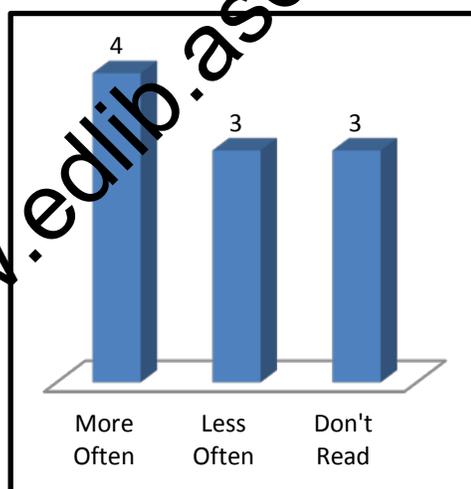


Figure 3 : Duration of listening

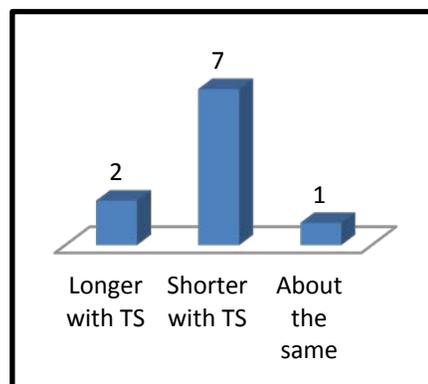


Figure 4 : Speed of reading

speed of reading? [3]. The research asked participants if they read or listened more quickly or less quickly when using the TS (YouTube lectures). Sixty percent (6 of 10) of the respondents listened more easily with TS while 20% listened with more difficulty and 20% felt that they didn't experience any significant difference (see Fig. 4).

Finding 1.3. 60% of the participants feel more comfortable listening to YouTube lectures than reading Braille materials.

Proposition 1.4. How do students perceive the replacement of Braille course materials with YouTube lectures with regard to understanding of course materials? [4]. The research asked participants if they find that they understand more or less of what they are reading when using YouTube video lectures in comparison to using Braille materials. Of the respondents, a clear majority (6 of 10) understood more, 20% felt that they understood less and the remaining 20% felt that did not

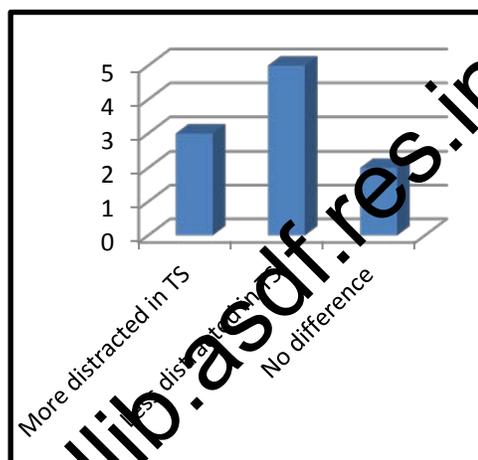


Figure 5: Comprehension

experience any difference between the two (see Fig. 5).

Finding 1.4. A majority (60%) of the students stated understanding is greater with YouTube lectures than with Braille because they can repeat the YouTube lectures more often than the Braille course materials. They also indicated that repeating Braille materials tends to be time consuming.

Proposition 1.5. How do students perceive the replacement of the replacement of Braille course materials with YouTube video lectures with regard to their class participation?[5]

The research asked respondents if they found themselves participating more or less in class after having listened to YouTube lecture videos with a TS. A majority (6 of 10) of the respondents found themselves participating more in class subsequent to listening to TS video lectures (see Fig. 6). However, 20% of participants felt that they participated less while the remaining 20% felt that their participation was the same.

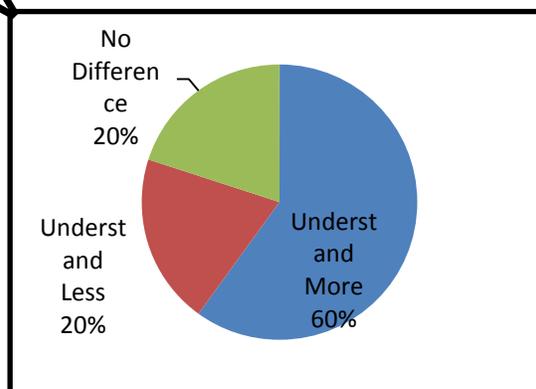


Figure 6: Class participation

Finding 1.5. The overwhelming majority (80%) of students participated the same amount or more after having YouTube lecture videos on TS.

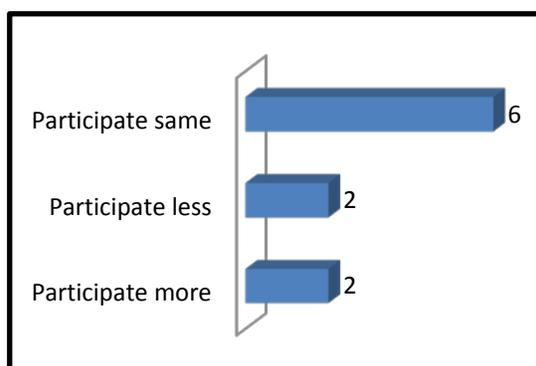


Figure 7: Class participation Page | 74

Proposition 1.6. How do students perceive the potential for distraction with a multi-modal device? [6]

The research asked participants if they found themselves more or less distracted with listening with the TS device when compared to Braille. Over half of the respondents (5 of 10) found that they were no more or less distracted when listening on the TS (see Fig. 7). The remaining respondents were almost evenly split between being more distracted (3 of 10) and less distracted (2 of 10). The research found that the ‘more distracted’ participants felt distracted due pressing the wrong target on the TS which resulted in additional time in order to return to normal operation.

Finding 1.6. A clear majority (50%) of students did not find themselves more distracted when reading on the YouTube lectures in TS. Some found themselves more distracted primarily by incorrect selection of target in TS.
Figure 6: Distraction

B. Research Question 2

Research question 2. How do blind students perceive the usability of YouTube lectures using touch-screen mobile? The second research question is supported by feedback on usability features with a Likert-scale (1-Strongly Disagree, 5- Strongly Agree) questionnaire. Each of the usability features will be presented with supporting findings from the research followed by an overall finding for the research question.

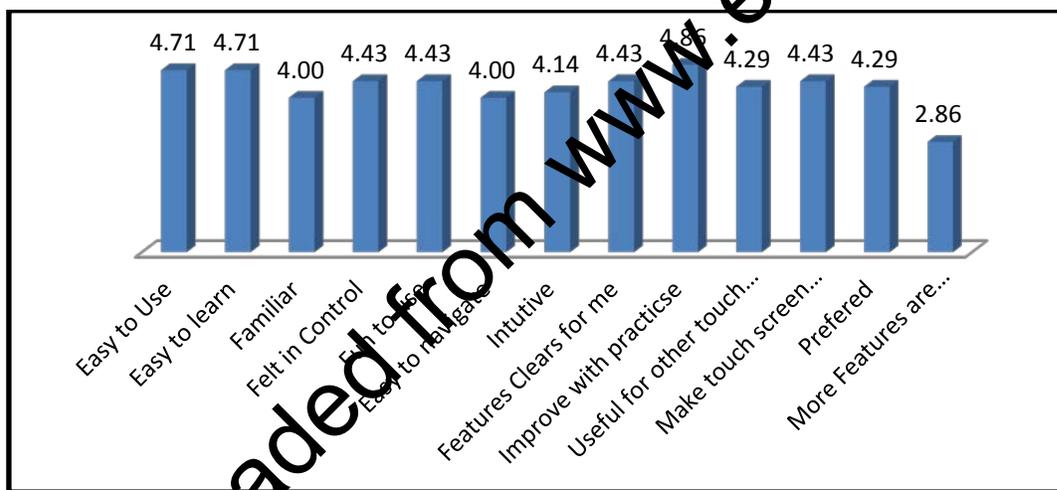


Figure 8 : Usability feature analysis for YouTube prototype

The research reveals that almost all blind users were satisfied with the accessibility features we applied to the YouTube lecture videos. Fig. 8 shows the average of the Likert-scale results for usability features. Most of the usability features were above 4. The last usability feature item asked the group if they need any more accessibility features for the prototype. Most of the blind participants felt that the prototype’s present accessibility features were sufficient and that there was no need for further improvement. The overall rating shows that they are very satisfied with the prototype.

V. CONCLUSIONS

The purpose of this study was to explore what could be learned from pilot program participant perceptions in regard to YouTube lectures and course related materials presented via touch-screen based mobile device as an 30th – 31st July, 2014, University of Greenwich, London, UK.
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alternative to Braille course materials. The conclusions of this study in accordance to the research questions, findings and analyses specifically address the following areas: (a) touch-screen based mobile devices enhance learning experience and, (b) the usability of the touch-screen based mobile device for academic purposes.

A. *Touch-screen based mobile enhances learning*

The first major finding of this research is that the majority of students found that listening to course materials on a touch-screen based mobile device did affect their duration of listening, speed of reading, materials comprehension, and class participation. The majority of student participants in this study have an issue with a lack of variety in regard to Braille materials. In addition, a clear majority of students did not find themselves more distracted when listening to course materials on the touch-screen based mobile device. Also, most participants perceived their frequency of listening was more often due to portability and less reading difficulty when compared to Braille materials. Overall, this study concludes that the majority of students in the study perceived YouTube lectures in touch-screen based mobile devices to be as good as or better than Braille course materials.

B. *Usability of the touch-screen based mobile device*

The second and third major findings of this study are manifested in the multi-functionality of the touch-screen based mobile device accessibility for blind students. The majority of students perceived that the touch-screen based mobile device was easy to use, easy to navigate, controllable, intuitive and easy to learn. However, for academic purposes, the touch-screen based mobile device was primarily used as a content consumption device in conjunction with a personal computer. The third finding demonstrated that a clear majority of students found the touch-screen based mobile device personally useful, carried it with them more often, and found themselves using it more academically due to its convenience and portability. Therefore, this study also concludes in regard to blind students in this study, the portability and accessibility of the touch-screen based mobile device contributed positively to academic use of the device.

Acknowledgment

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Impact of E-learning on Child Education and Development in Rural Areas of India

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Abstract- The main aim of this paper was to analyse the impact of e-learning on child education and development in rural areas of India. In this study we found that students that use e-learning paradigms have significant improvements in academic performance as compared to the students that follow traditional teaching methods. Semi-structured interviews have been utilized for collecting the qualitative data. The interviews were conducted with all the teachers of the focus group. In the interview, most of the teachers indicate that students that use e-learning tools as part of the curriculum showed improvement in cognitive, social, linguistic, mathematical and literacy skill in this study. We also found that the use of the computer as a learning tool helps children learn quickly and improves their attention span.

I. INTRODUCTION

E-learning is the use of different types of media such as: text, image, audio, video, information and communication technologies (ICT) - to help students in education. Education is considered to be one of the most vital factors facilitating "poverty alleviation" as well as accelerating "economic growth in developing countries" [1]; [2]; [3]. Using ICT for imparting education is seen to have enormous potential for the governments working towards meeting the increasing demand for education while facing a rising shortage of teachers (UNESCO 2006). Bernard Luskin [4], a pioneer of e-learning, advocates that the 'e' should be interpreted to mean "exciting, energetic, enthusiastic, emotional, extended, excellent, and educational" in addition to "electronic". Hall [5] reports that e-learning is the fastest growing and most promising in the educational industry. Due to the enormous increase in popularity of e-learning in India, both public and private sectors are working together to develop an effective framework for e-learning. The Indian government is providing free education to the citizens, however, a large portion of the rural population, in fact, are not availing this opportunity. This is because they mostly live below the poverty line and cannot afford to send their children to school as they are helping their family to earn a livelihood. E-learning, if used effectively, can provide education to this hefty deprived group. According to Erica Loop, the attention span of children is very small, approximately 15 minutes [6]; [7]. Thus this phenomenon makes it very challenging to teach young children. They feel uninterested if they are not provided with a fun learning atmosphere. The E-learning environment provides a variety of very effective educational resources that help children to learn through enjoyable lessons; keep them actively involved in their learning and produce high quality work; beginning E-learning for children at an early age is an important step to consider [8].

The main aim of this research is to analyse the impact of E-learning on children education and development. The paper has been organized according to the following sections: in Section-1 the introduction to e-learning is provided; role of e-learning on child education and development is discussed in Section-2; in Section-3 the digital divide between the rural and urban areas are discussed; research methodologies followed by the result and conclusion are provided in Section-4.

II. ROLE OF E-LEARNING ON CHILD EDUCATION AND DEVELOPMENT

Education is a birthright and literacy is a prerequisite of it. Literacy is an essential means for individual “self-fulfillment, effective social and economic participation and the exercise of freedom” [9]. Education for all has been the primary goal of the government. The cabinet passes a proposal “to make education a fundamental right for children in the age group of six to fourteen years.” [10]. Government can achieve the goal “Education for All” if E-learning tools are effectively implemented in schools and higher education across the country. Following are some important point that e-learning contributes to child education and development.

A. COMPUTERS AND CHILD DEVELOPMENT

Computer plays an important role in curriculum and extra-curricular activities. “Learn while play” is an important methodology of teaching the early age children. ICT based learning has an important contribution to improve cognitive, emotional, linguistic, and literacy skill of a child [10]. It has also been found that children that use e-learning paradigm are innovative, quick learner and showed improvement in mathematical skill [11]; [8]. Children are actively participating in computer based activities, doing school work, playing games, talking with friends, active in social networking, and surfing the Internet. Use of E-learning showed a significant improvement in academic performance, student motivation, and class participation [8]. With e-learning tools, resources for children are designed with multimedia that helps children to learn through enjoyable lessons and games. Sakshat, “The national mission on education through ICT (NME-ICT) under Ministry of Human Resource and Development” is funding different project to enhance basic IT infrastructure and develop E-learning modules for school and higher education as well as designing an assessment tools for evaluation of quality of E-content.[12].

B. IMPACT OF E-LEARNING ON STUDENTS EDUCATION

“E-learning can be viewed as an alternative to the [traditional] teaching methods or as a complement to it” [13]). E-learning technologies has unlimited prospective to elevate the traditional educational paradigm. It change the way of learning, it change the instructor centric paradigm to student centric paradigm. In instructor centric paradigm, the student passively receives information, knowledge is transmitted from the instructor to the student, the student is entirely dependent on the instructor for guidance, receiving information and direction. In student centric paradigm, the student is actively involved. Students are increasingly become independent, self-motivated, self-directed learners with a higher-level of critical thinking and problem-solving skills. In student centric paradigm, the student can learn at their own pace, repeat the material to strengthen learning, or exploring additional material to improve it. An undoubted advantage of E-learning is their role in facilitating children with special needs. It is well known that digital technologies have a prevalent learning scope for multimodal facilities [14] using sounds, images, and written texts in different colours. Children, who cannot actively participate in traditional learning paradigm due to specific learning disabilities, have all been helped through computer technology.

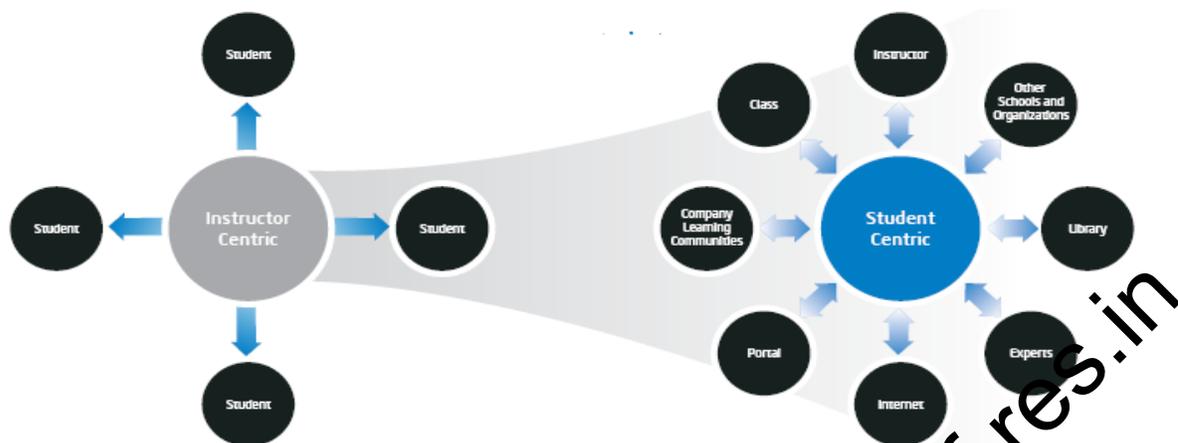


Figure.1: Shifting the Learning Paradigm from teacher centric to student centric [8].

III. DIGITAL DIVIDE BETWEEN RURAL AND URBAN AREA

The Digital Divide was identified by Pieper, Morasch and Piela [15] as “the divide between those groups of people who benefit from information and communication technology and those who do not have access to it” and this divide is still evident between the rural and urban areas of India. The Digital Divide, according to Herselman and Britton [16], is the educational divide between resource-advantaged and resource-deprived learners. India has many stumbling blocks to overcome before it can offer e-learning to its entire population. Large portion of the population live in rural villages that do not have access to telephone connectivity and the lack of basic infrastructure, poor communication and technology make it very difficult to implement the e-learning. Insufficient bandwidth of internet connections hampers the performance and ease of learning process. Bridging the digital gap requires substantial investments; “India has embraced wireless telephony increasing the teledensity to 75% in the last decade” [17]. The Information Technology and Communications ministry is working with different companies “towards bridging the digital divide between the urban and rural India by developing infrastructure”, improving communication and bringing down the cost of technology “to ensure that the rural areas of the country can usher the data revolution” [17]. The government of India has different educational schemes, especially for rural areas to improve the literacy rate. With the introduction of e-learning at school education, we have seen significant improvements in children academic performance and development.

Rural students, teachers and parents mostly all are naïve to computer technologies and e-learning paradigms. To make them understand the importance of e-learning, ministry of school education in India has to come forward to conducting workshops and seminars in rural areas in order to make them understand the importance of e-learning and impact of it on child development.

III. METHODOLOGY

In this study, we followed a multi-methodological approach [18] by combining qualitative [19] methods (by observing users, interviews, focus group discussions), and quantitative [20] methods (by using questionnaires, statistical analysis and experiments) together. The focus group for the research consists of students from six different schools from the Kashmir region of India. All the students were aged less than 18 and studying at various levels ranging from 1-8th grade. So gatekeepers were used for obvious reasons.

Students of three schools (Group A) were provided with the e-learning tools, students from the remaining three schools (Group B) were using the traditional teaching methods. They were observed for one full academic year. For the quantitative part of the research, students' grades were collected and analyzed. Results of one group were compared with that of the other group to test our hypothesis. The teachers and/or the supervisors of this focus group were also interviewed for the collection of qualitative data. The interview data were then analyzed to support the result obtained from the quantitative research.

IV. RESULTS AND DISCUSSION

The average grade performance graph shown in Figure.2 was collected from Group A schools that use e-learning methods as part of the course curriculum. Figure.3 shows the average grade performance graph of Group B schools that uses traditional teaching methods.

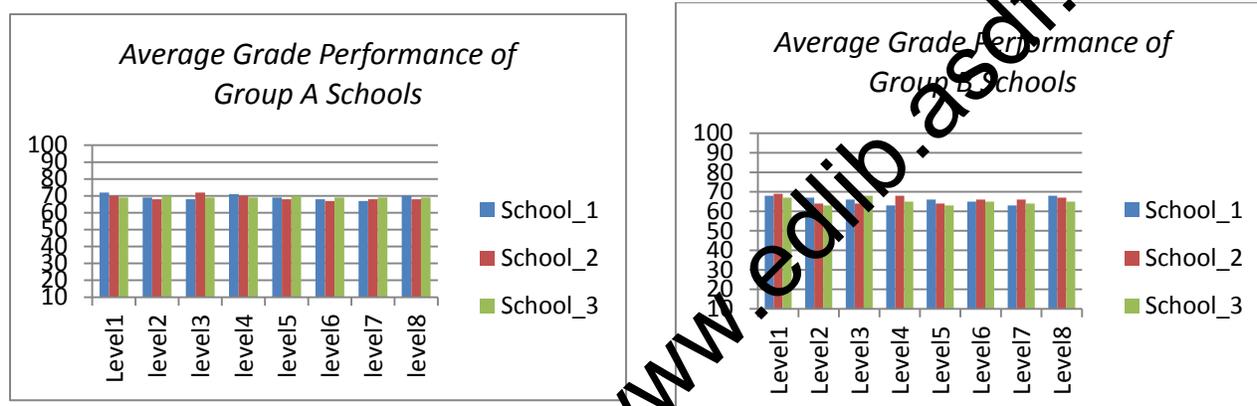


Figure.2: Average Grade performance of Group A Schools.

Figure.3: Average Grade of Group B Schools.

Figure. 4 shows the comparison of average grade performance between group A and group B schools. The graph shows, schools that use e-learning tools as part of the course curriculum have significant improvement in academic performance at all levels as compared to the schools that use traditional teaching methods.

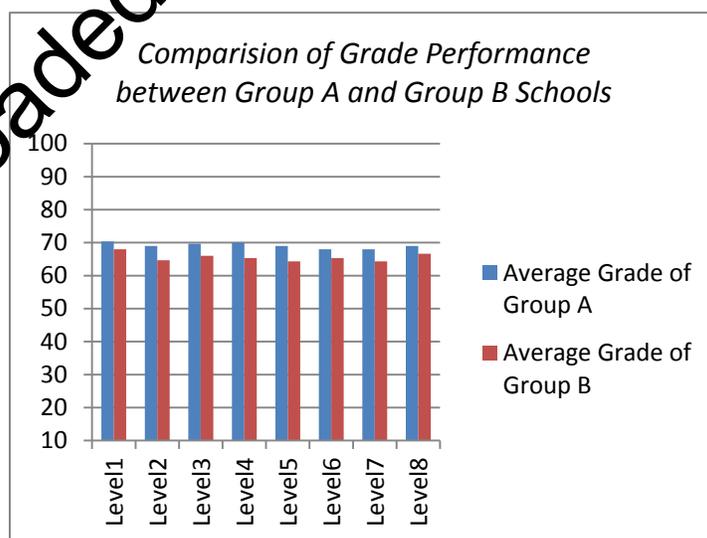


Figure.4: Comparison of grades between Group A and Group B.

In the interview, most of the teachers indicate that students of group A showed improvement in cognitive, social, linguistic, mathematical and literacy skill as compared to the Group B students. The interviewers revealed that Teachers and/or supervisors having perceived that student attendance was improved to a great extent and students are more actively involved in their learning. In the interview, the majority of the teachers have the same opinion that children learn quickly if text is integrated with multimedia and showed improvement in their attention span. Regardless of the small sample size and short span of time, significant differences were detected in the study that supported the positive impact of e-learning tools on children education and development compared to traditional teaching methods.

V. CONCLUSION

In this paper, we analyze the impact of e-learning tools on child education and development, especially in rural area. We found that e-learning tools have positive impacts on children academic performance, social, cognitive, literacy, linguistic and mathematical skills. The main factors that motivate students to use e-learning are the flexibility, User centric, Accessibility, Collaborative, and Adaptability of learning as well as the possibility to make an individual study plan. Although some negative impacts have also been observed. In rural areas, students and teachers are unwilling to use new technologies, have a high illiteracy rate, have insufficient bandwidth and a lack of basic infrastructure which make it difficult to implement e-learning. However, the government is working with different companies "towards bridging the digital divide between the urban and rural India by developing infrastructure", improving communication and bringing down the cost of technology "to ensure that the rural areas of the country" also reap the benefits of information and communication technology. We believe that e-learning has a wide prospective in the near future and it will definitely improve the quality of education and the literacy rate of the country.

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Curriculum Design for e-Education: Make effective use of course data

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Abstract-This paper provides an overview of how an XML-based information model is used for managing course data in e-education. The work presented in this paper has been funded by JISC as part of a number of projects under the e-learning programme and more specifically the course data coordination activities. The projects' outputs included toolkits for generating, comparing, matching and using course data with the use of the XCRI-CAP information model that is known as eXchanging Course Related Information – Course Advertising Profiles. The initial stage of the project work focused on transforming course data descriptions in text format to XML files based on the XCRI-CAP model, allowing course providers to compare and contrast their provision according to the XCRI-CAP fields (e.g. duration, learning outcomes, description). The second stage of the project was concerned with the visualization of course data in a way that would allow course stakeholders (e.g. applicants, students, providers) to assess the extent to which certain user-defined keywords exist in course definitions. Finally, the third project stage was focused on developing tools to match courses to potential job profiles in an attempt to align specific courses to available job opportunities. The paper provides a brief background on the project work and summarises the main outputs as walkthroughs of the developed toolkits.

I. INTRODUCTION

The Middlesex University Skills and Education Planning Tools (MUSKET) projects provided the means for enhancing the creation and manipulation of course data. More specifically, the project aimed at (i) producing tools transforming information for academic courses that may be in the form of structured documents into the XCRI-CAP information model, (ii) generating XCRI-CAP feeds from course data that reside in the institution's existing systems, and (iii) providing training courses and supporting resources for the dissemination of the role of XCRI-CAP in the management of course data. A range of stakeholders, including marketing of new and existing courses, registrar functions, career service and open day events as well as curriculum design, development and delivery procedures, could use the project's outputs.

The first stage of the course data programme helped the institution to form a strategic alliance between the School of Science & Technology and in particular the Computer Science Department and the Centre of Learning & Teaching Enhancement. This allowed the existing skills and knowledge gained from the first two projects under the MUSKET group of projects to be applied to a new set of problems. The CLTE involvement allowed access to certain stakeholder groups and it ensured that the project received the necessary input from marketing, registrar and university wide services with a significant role in course data. The involvement of the computing services ensured that the project would be able to retrieve course data from systems and databases that were in use (i.e. PIP, MISIS).

The first stage of the project ensured that stakeholder groups were identified and engaged in discussion about a number of issues, including (i) the nature and type of course data being held and their current state, (ii) the systems being used the structure of databases including the elements used to hold course data elements, (iii) the role of course data in various operations and services and the needs for course data that may not have been fulfilled so far, and (iv) the possible uses of streaming course data according to user needs. This final discussion point allowed to link existing uses of course data to the XCRI-CAP information model and the possible benefits from the JISC

create new labour market approaches and facilitate new business models” [1]. “Recent research undertaken by the Council for Industry and Higher Education [2] and for the DfES [3] highlights that employers are seeking quality of provision, relevance to business needs and a delivery method suited to the company rather than the HEI. The need for improved communication between HEIs and employers is a common feature of both reports. The Leitch Review of 2006 challenges institutions to deliver learning opportunities so that 40% of adults of working ages have a higher education qualification” [4]. The collection of projects developed at Middlesex University was based on the eXchanging Course Related Information: Course Advertising Profile (XCRI-CAP) standard [5]. The XCRI-CAP information model uses XML to provide consistent description of course documentation with the aid of identified course data fields. Previous work focused on the development of tools supporting the transformation and mapping of course data [7, 8, 9].

III. PROJECT WORK

The project’s second stage focused on the development efforts and more specifically on creating the XCRI-CAP feed for the selected courses. The main difficulty was to identify the source of data as the institution had three main potential sources. Initially a CRM system was investigated, with no success as its role was not to provide course data but focus on future collaboration opportunities. The MISIS system that is being used by academic and administration staff as well as students was also investigated as a possible source of data.

The development of the XCRI-CAP feed would allow the project to provide a single source for course data in the form of a COOL-URI. The scope of the project was to ensure that the <http://musket.mdx.ac.uk> portal would provide the XCRI-CAP feeds for the course data according to the type of course a user might be interested in. This was achieved and apart from the complete XCRI-CAP feed for the entire course provision that exists in the PIP database, the portal also includes sample XCRI-CAP feeds for the different course types as identified at the original proposal.

However, there are still course types that are not entirely covered by the PIP database, mainly short courses and training courses that are not accredited or validated. Such courses do not fall under the main categories of learning provision but still offer a learning experience which is not easily retrieved due to the fact that it does not adhere to the standardised procedure of curriculum design and development. In order to deal with such types of courses, the MUSKET-ICIF project extended the work that was done in the original MUSKET project and was disseminated through the MUSKET-BK benefit realisation project. Emphasis was given on developing further the algorithm used for the semantic analysis of course documentation to allow curriculum designers to transform any document that includes course description such as programme and module handbooks into XCRI-CAP format. This is achieved by providing the structure of each document in the form of clear headings used to describe the various parts of the programme description. The algorithm matches each heading with the most appropriate field of the XCRI-CAP model and the course data extracted from the content that is included under the heading of the original document. This solution allows the creation of an XCRI-CAP feed from any type of document that adheres to a reasonable structure.

The ability to generate course data in XCRI-CAP opens several opportunities for further analysis and use of the course data feeds. The MUSKET-ICIF project has developed online tools that can be used to compare and contrast programmes and modules against each of the XCRI-CAP fields that contains data for the courses that are compared.

The user has the ability to compare courses against pre-set keywords or even against keywords of their preference. The user can also decide which course data fields are compared, whether the entire course data feeds are compared like for like and even select weights for certain XCRI-CAP fields that should have highest priority. The project's online tools also allowed a number of visualisation options including (i) pie charts for the similarity of each course against the search keywords, (ii) pie charts for the selected XCRI-CAP fields used for comparison including any user provided weights, (iii) bar charts ranking the most comparable XCRI-CAP fields and (iv) tree maps showing the relevant frequency and number of instances selected search keywords were found in the course data.

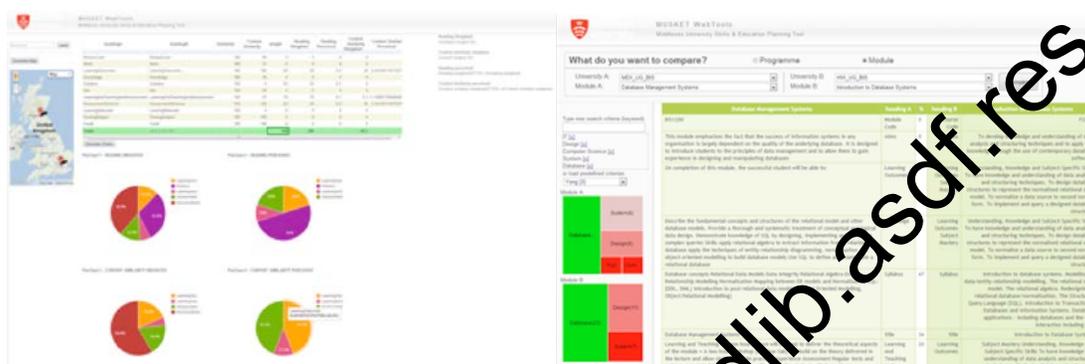


Figure 2: MUSKET Course Data Comparison and Visualisation

IV. IMPACT

The MUSKET-ICIF project has produced outputs that can have a clear impact on the following areas:

- Admissions – quite often departments have combined honours or major-minor programmes that are very similar to each other. Quite a few programmes may also share the same core modules, making it quite difficult for applicants to become aware of the differences between programmes. To add to the confusion, cross-discipline curriculum design may lead to programmes that are very similar and difficult to distinguish. A common pattern has emerged with applicants asking the same questions during open day events, applicant day events or even via email to programme leaders. Such questions aim at identifying the differences between similar programmes with respect to the topics covered, the learning outcomes, skills gained, technologies or specific aspects taught and even job prospects after graduation. The mapping of course descriptors against certain XCRI-CAP fields allowed the alignment of programme aspects such as modules taught, learning outcomes and career prospects. It means that students are able to understand differences between similar courses and perhaps the impact of their decision when they wish to change modules or transfer to another programme.
- Curriculum design – the final few months of the project coincided with the validation of all the undergraduate provision in the Department of Computer Science. Typically, the design of a new programme or the review of an existing one, takes under consideration a number of factors that may affect the programme structure and content. Some of the recent considerations of the validation team included (i) establishing a clear programme scope, (ii) attempting to target a specific segment of the student market interested in the area of each programme, (iii) avoiding significant overlaps with existing programmes, and (iv) providing competitive programmes compared to existing programmes from HEI competitors. The use of XCRI-CAP allowed creating

a consistent representation of programme structures regardless of discipline. The creation of XCRI-CAP feeds from a critical mass of institutions ensured that the Middlesex feed could be used by aggregator services in the future. The project's online tools allowed the like-for-like comparison of entire programmes or a selection of their headings that correspond to specific XCRI-CAP fields. The main benefit is that the project team has collected programmes from other institutions that are included in the project's repository that continuously grows. The repository is used for comparing programmes that are transformed to XCRI-CAP. One of the future steps is to integrate the online tools with aggregator services that utilise the XCRI-CAP feeds produced by projects participating in the course data programme. Another benefit for curriculum designers is that it is possible to use the visualisation functions to assess the extent to which certain programmes are similar, making better-informed decisions when it comes to programme content.

- Programme delivery – the use of XCRI-CAP allows the creation of programme pathways and facilitates mapping similar programme components such as modules and units. This ensures that when significant similarities are identified between two modules this can be used when delivering a programme with optional modules. The use of XCRI-CAP can be also used to determine pathways including pre-requisites, possible module options and alternative programme structures. This is achieved by transforming the programme content into XCRI-CAP and searching for certain criteria in order to identify potential programme paths. The MUSKET-ICIF tools are currently being extended to map course information to career prospects and possible study pathways.
- Marketing – the MUSKET-ICIF tools are currently being demonstrated to the project stakeholders. Their role can be critical to the institution's efforts to pull course data and better manage necessary course advertising information. The use of the XCRI-CAP feed allows a consistent view of all programmes offered by the institution, while the online tools support the identification of marketing aspects of courses that do not fall under any of the traditional undergraduate programmes offered by Middlesex. Currently the use of the developed tools allows the classification of different programme details according to how suitable they are for different marketing objectives. Furthermore, the use of XCRI-CAP allows the generation of information that could be used for both KIS and H&AR initiatives.

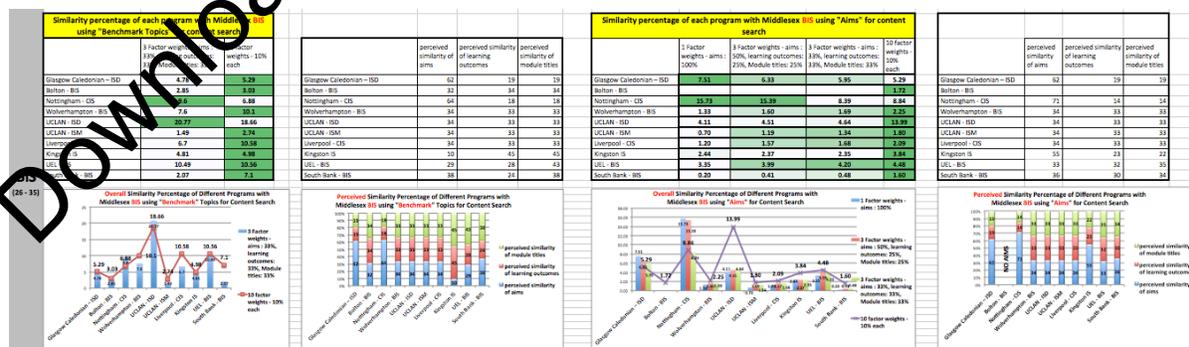


Figure 3: MUSKET Course Content Similarity Matching

V. CONCLUSIONS

The project has produced a solution for the effective and efficient use of course data cross the institution. The project's outputs included (i) a set of tools that can be used to transform any structured-document that contains programme or module specification into the XCRI-CAP model that defines each element of course data, (ii) an XCRI-CAP feed for a range of courses offered by Middlesex University based on course data residing in the existing database (PIP) used by the University's marketing unit, and (iii) a range of resources including accredited course at postgraduate level, with supporting documentation for sustainable training in the relevant technologies (i.e. XCRI-CAP).

ACKNOWLEDGMENT

The project team would like to thank JISC for funding an exciting and ambitious project that changed the way course data has been collected, manipulated and used across the University. The programme coordinator, Ruth Drysdale offered guidance and with the programme support and synthesis teams allowed the project to maintain a clear scope and progress throughout its duration.

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Mobile Academy: A Ubiquitous Mobile Learning (mLearning) Platform

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Abstract- The paper reports on an ongoing research project into the development of "Mobile Academy", an Android-based mobile learning (mLearning) application (app). The project comprises three major phases: requirement analysis, application development and testing and evaluation. To satisfy the user requirement analysis, a detailed ethnographic study was conducted to investigate how people from different background use mobile devices for learning purposes. The initial analysis and evaluation of the first version of the projected app demonstrates very promising results. Making use of the app seemed to have, in general, a positive dimension in facilitating educational use of mobile devices.

I. INTRODUCTION

Despite the predictions of some sceptics, the growth of computational power continues in broad accordance with Moore's law [1,2,3]. On the other hand, the prices of computing and networking equipment per unit performance metric (e.g. MIPS or Mbit/s), including mobile devices and charging access the Internet, are decreasing at an inverse rate. Hence, the usage of the Internet almost anywhere in the developed (and increasingly in the developing) World has become a norm. Further, the widespread adoption of smartphones and, more recently, the concept of the Internet of Everything (IoE) has led to the inspiration of using mobile devices for any kind of internet use, including even financial transactions. Such widespread mobile usage of digital and electronic techniques, technologies and applications holds huge promise to widen the horizon of teaching and learning, especially through mLearning.

The goal of the present research is to develop a ubiquitous mobile learning platform for universal types of users to facilitate teaching and learning on the move. Previous ethnographic surveys conducted by the authors partially fulfill the requirements analysis and suggest the development of an mLearning platform to be simultaneously used, in particular, by people from different cross-national boundaries: this cross-national (or cross-cultural) aspect is believed to distinguish the work from other examples currently known.

The initial phase of the proposed project, developing the first iteration of the Mobile Academy app for Android-based handheld devices, has been implemented, tested and verified to demonstrate the merits and capabilities of the scheme through a set of experiments. However, the investigation will continue to improve for the app to be able to adopt a wider range of real world usage.

II. RESEARCH BACKGROUND

Mobile learning is seen as one of the leading edge teaching and learning technologies [4]. However, there has been no formal definition of mobile learning so far and hence the perception of it varies among individuals.

However, the definition as outlined by Sharples *et al.* can be considered as a working one. According to them, mobile learning is considered as the “process of coming to know through conversations across multiple contexts among people and personal interactive technologies” [5]. The supportive technologies here include any form of handheld devices that can support learning and teaching, such as smart phones, personal digital assistants (PDAs), tablets or even a simple mobile phone. Although it is obvious that laptops are somewhat mobile, they are excluded from the list [6].

Due to the pervasive adoption [7] of popular internet and networking modalities such as Social Media, Social Networking, Mobile instant messaging and the like, as part of a continuous development process, universities and other higher education providers are required to become accustomed to, and to adopt them to facilitate learning and education. Mobile communication, simultaneously with other Internet communication technologies, is becoming wide-spread as a means of education and is expected to bridge the gap [8] between formal and informal learning and teaching methodologies. The stakeholders now have to pay attention to how people embrace and live with the new technologies [9], as this trend will greatly contribute to the dramatic transformation of education systems’ characteristics and traits.

The multidimensional and exponentially increasing use of mobile technology is influencing cultural practice and facilitates novel contexts for learning [10], although the integration of mobile technologies in teaching is observing a little slower rate than social media, due to the fact that the instructors themselves first need to be equipped with the knowledge of how to use them [11]. However, from the way that mobile devices and networking technologies are becoming a routine part of daily life, it can be foreseen that mLearning will soon be widely adopted by the education sectors around the globe.

However, like any other technologies, mobile phones and other handheld devices suffer from technical limitations which should be carefully considered. These limitations have been categorised into three major groups [12] based on users’ pedagogical, psychological and technical limitations. The aim of the present project is to develop a ubiquitous mobile learning app, “Mobile Academy”, to address these limitations.

III. RESEARCH METHODOLOGY AND DESIGN

The complete project has been divided into three phases as follows: 1. The Requirements Analysis, 2. Design and Development and 3. Testing and Evaluation.

The Requirements analysis phase involves identifying the needs of the users: the students as well as the teachers. Opinions from both the parties were sought and an extensive survey of existing mLearning apps was conducted. Thus, based on the needs identified, strategies for developing the required functionalities to satisfy the requirements for the high-school case were developed, as described in Table-1; use case diagrams, as shown in Fig. 1, were also used.

The second phase of the project involves designing and developing the app: some coding was also involved at this stage. The overall functionalities and navigation while using the app can be best described using the following flowchart, as shown in Fig. 2.

The app was developed using Android 4.2 (Jelly Bean). It is thus compatible with any handheld devices running Android 2.3 (Gingerbread) or above. User Centric Design (UCD), Participatory Design and other design and development methods of Human-Computer Interaction (HCI) were deployed at this stage.

TABLE I
FUNCTIONALITY REQUIREMENT ANALYSIS

No	Requisite	Applied Event/Function
1.	Gmail Login	Opening the application
2.	School Creation/Editing/Delete	Teacher account
3.	All School Lists	Schools
4.	Settings for an examination	Exam name
5.	Uploading documents	Teacher account chapter list upload
6.	Viewing documents	Schools chapter list
7.	Viewing all results	Results
8.	Terminating interface	Exit

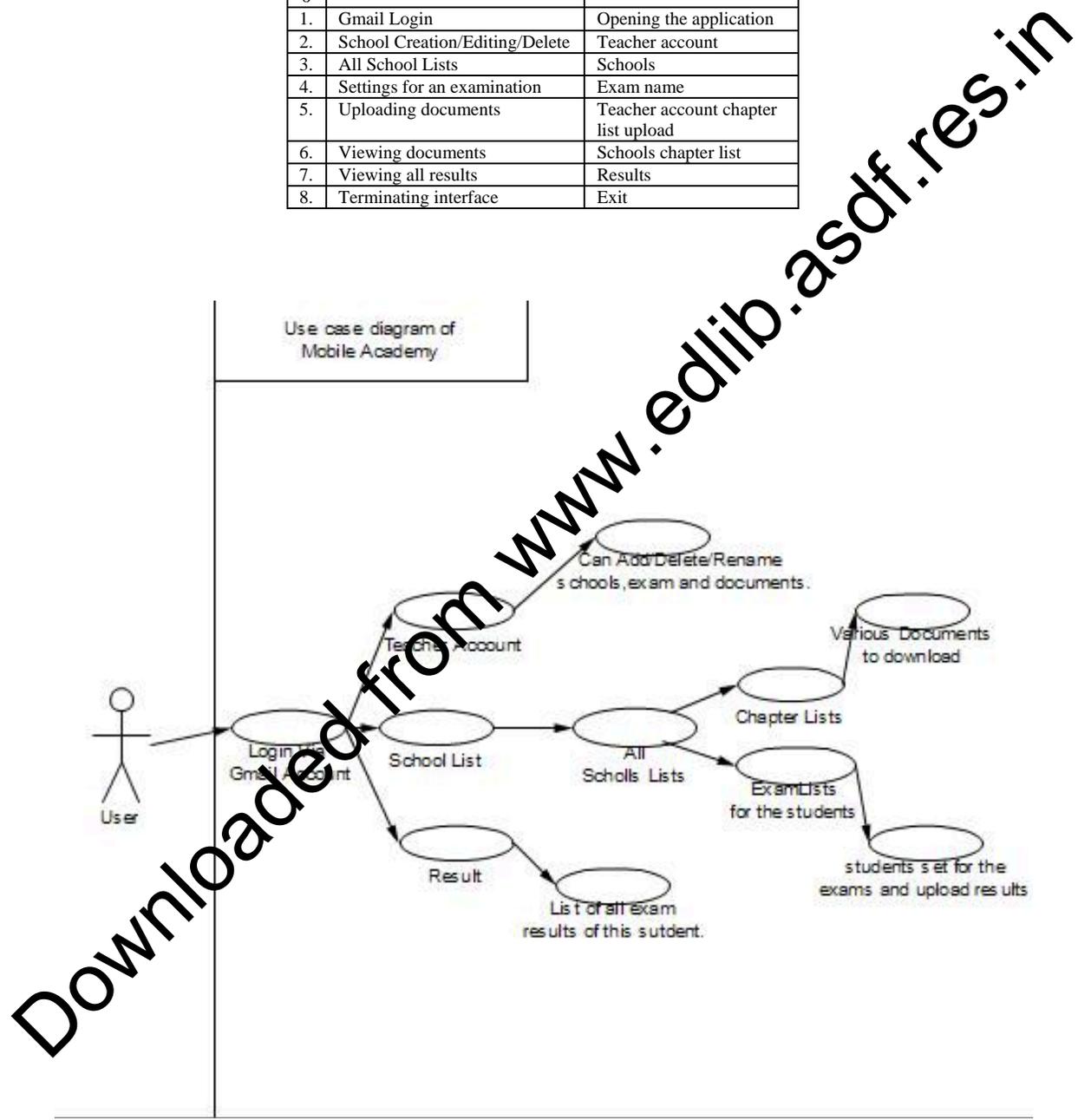


Figure 1. Use Case Diagram for the first iteration of the Mobile Academy app

As an example, the creation of a new school instance within the app, using a teacher’s account is shown in Fig. 3: Fig. 4 demonstrates the process of setting up an exam. The teachers can set the questions and the answers so that,

upon completion, the results are immediately calculated by the system and displayed. The exam can be protected by instructor set keys (password) and can be validated for a specific time only. The grades are saved into the students' records. Fig. 5 displays the options for the students regarding enrolling into different schools: this can be restricted by instructor set enrolment keys (password). However, this process of restricting the enrolment is optional. The instructors can opt out if they so choose.

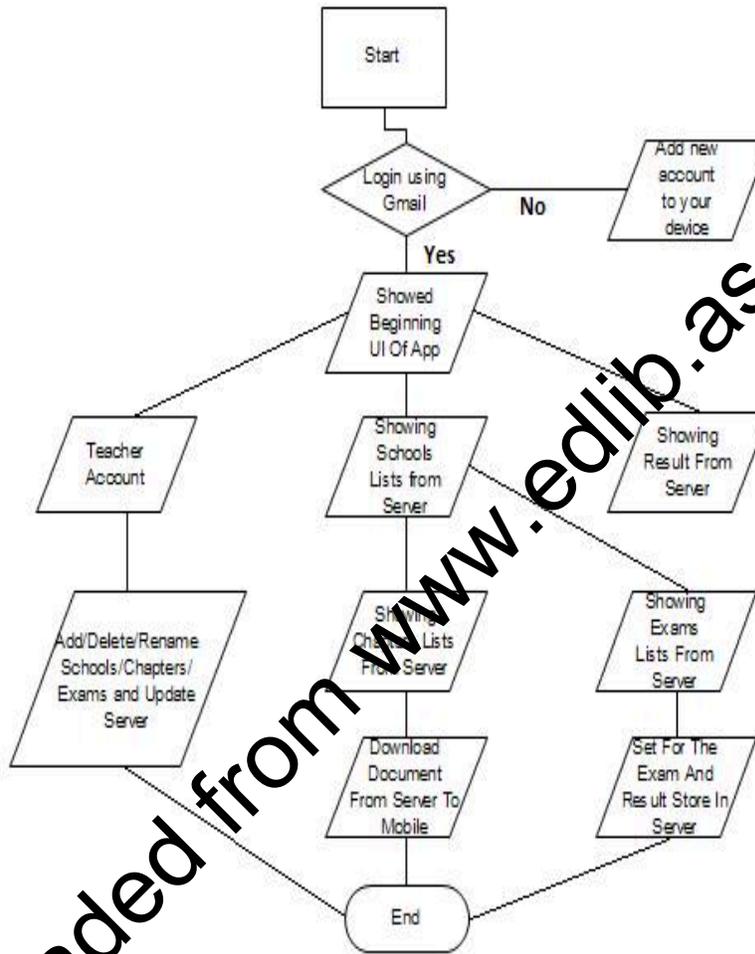


Figure 2. Functionality and navigation flowchart of the Mobile Academy app

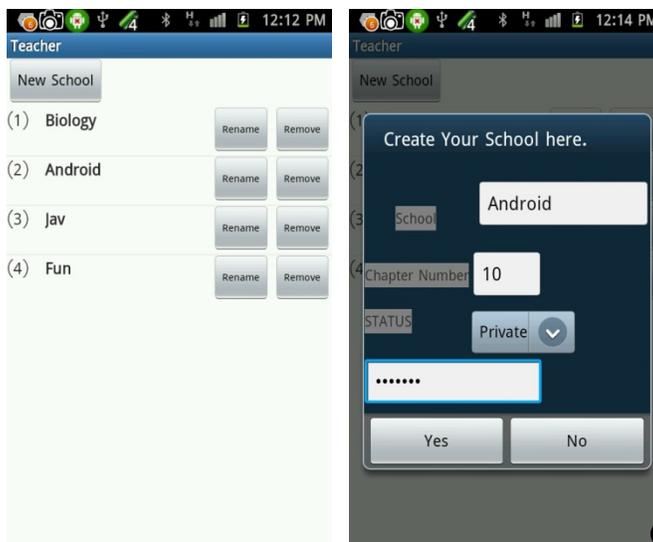


Figure 3. Creation of new school instance within the app, using a teacher's account.

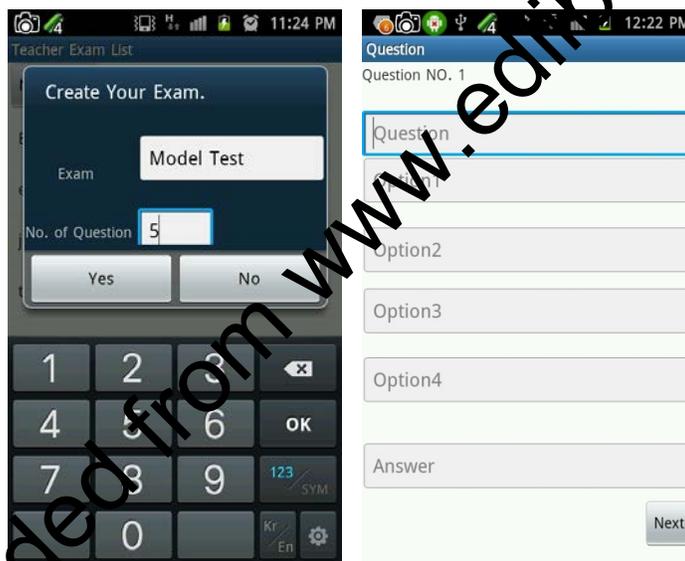


Figure 4. Exam setting up process.

III. TESTING AND EVALUATION

As the app was developed using Android 4.2 (Jelly Bean), it is thus expected to be compatible with any handheld devices running Android 2.3 (Gingerbread) or above. However, this does not guarantee full compatibility. Hence, to confirm such compatibility, cross-device tests were conducted and satisfactory results were obtained. Some devices, especially smartphones with very much smaller screens, suffered some usability problem at the first iteration of the app. This was then solved by modifying the overall design of the app. Fig. 6 demonstrates an example of playing, while conducting the cross-device compatibility tests, video lecture uploaded by the teacher. It can also play animations and audio files. The functionalities of the app were thoroughly tested and any other bugs found were resolved.



Figure 5. Students' options for enrolling in different schools.

The app was informally used for testing purposes while teaching, at the University of Hail (Saudi Arabia), for the Data and Computer Communication (COE 341) and Multimedia Systems (SWE 423) courses, consisting of a total of 16 students. All of the students were already familiar with using at least one e/m-learning app such as Edmodo, Khan Academy, Cisco NetSpace and similar. Due to time constraints, a detailed evaluation had not yet been conducted at the time of writing this paper. However, most of the students were satisfied with the functionality of the app. Features such as attending exams, reviewing grades and availability of the study materials at any place and any time were identified as the most popular ones. Some of the participants suggested implementing an online version of the Mobile Academy and integrating it with the app.



Figure 5. Playing Video Lecture.

IV. CONCLUSION

The project involved designing, developing and testing an mLearning app to be used by a wide range of users from different backgrounds. The initial version of the app has now been developed and tested for proper functionalities as well as cross device compatibility. A small scale initial usability test was conducted which provided positive results. However, the app is planned to undergo more iterations and future large scale usability tests. Cross-cultural usability tests are also required to achieve universal usability.

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Usability Evaluation of a Mobile Application in Extraordinary Environment for Extraordinary People

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Abstract- In a contemporary world, people become dependent on electronic devices. Technologies help to clarification and structure life in many ways to meet the need of the children oriented requirements. The children suffering from disabilities (e.g. autism) has desperate needs for elucidation and structures their life. MumIES is a research based system facilitates to support and manage their living. This paper works on MumIES system to evaluate usability of the system in extraordinary environment for extraordinary people. The paper shows from the survey observation users need supporting tools to access the children's potential and challenges and to give the full support to overcome disabilities. Usability evaluation has been considered one of the key challenges to MumIES system. The paper represents analysis, design of usability studies for the extraordinary user in environment.

I. INTRODUCTION

In contemporary world, people become dependent on electronic devices. According to the article published by The Guardian (Yeomans, 2013), children spend more time in PC, TV and mobile devices. Technologies help to clarification and structure life in many ways [1] to meet the need of the children oriented requirements. The children suffering from autism have a desperate need for elucidation and structure their life [2]. Bhuiyan et. al. [3] have introduced MumIES (Multimodal Interface based Education and Support) system which is designed for the children with special needs. The initial prototype has been developed on the Android platform and can be used on a Smartphone or other platforms for the children with special needs.

In this paper, usability testing has been taken into account for evaluation of MumIES system. Usability testing refers to an evaluation process to measure the target audience usability criteria [4]. A product or service to be usable it should have some basic criteria. These are usefulness, efficiency, effectiveness, learnability, satisfaction, accessibility. Usefulness concerns the degree to achieve user goals about a design, product or service. Efficiency measures the user's goal how much accurately it accomplished and complete within the time limit. Effectiveness refers to the product behaves in the way that users expect. Learnability measure the user's ability to learn the system. Satisfaction refers to the user's opinion about the product. Accessibility measure what makes products usable by people who have disability.

Usability testing is the portion of a large effort to improve the profitability, design decisions and minimize the frustration and errors for users [4]. To achieve the testing goal, system need to form a proper design, by gathering data to identify and measure the disability of existing product and accommodate supporting material before the product become release. Another goal is to eliminate frustration and design related problem of user's point of view.

So that, user may find useful, effective, efficient and satisfactory product. For usability testing basic elements are

development of research questions, use a sample for the users, represent the real life work environment, observe the point of end users, and collect the qualitative and quantitative measure for performance and preference basis.

In a software development life cycle usability testing required in every phase on the basis of researchers questionnaires, the state of the product completeness, and the time required for the solution of the problem which has been found during testing. For this, four types of test are used for product usability testing for research or software development work [4]. These are: exploratory (or formative), assessment (or summative), validation (or verification), and comparison test. A product or service design and define is the basic concern of the exploratory testing study. Its objective is to examine and analyze the effectiveness of initial design perception. In this stage critical design issues has been considered during the interaction between the user and test moderator. Whereas assessments test occur during the first or middle or after the fundamental design of the product for quantitative measurement. In validation test study, it's assure that the problem which discovered in early test, has been removed or recovered and possibility of finding errors is less than earlier testing stage. And the last test is comparison test which is conjunction with every three testing stage.

Evaluation studies are generally methodology based; can be conducted following standard guidelines for ordinary users and environment. A test plan is a standard guideline which serves as a blue print to evaluate product and user of the system [4]. A test plan consists of purpose, goals and objectives of the test; research questions; participant characteristics; method; task list; test environment, equipment and logistics; test moderator role; data to be collected and evaluation measures; report contents and presentation. The reasons for performing the test have focused on purpose, goal and objectives of the test section. Research questions required to describe the issues and queries through questionnaire to resolve the research. It is very important to determine the target user of the product by analyzing participant characteristics during testing. Method section describes the synopsis of the test plan. The task list section is consists of tasks which perform by user during testing. To perform the task specific environment and necessary equipment are required for user. The test moderate duties and responsibilities need to describe in the moderator role section. The performance and preferences data should be collected on the base of research question in the data collection section. In the report content section, it lists the points that will appear in the test report. And finally in the presentation section consists of communication results of the development team both prior to and following the report.

To analysis the usability studies of the MumIES system in perspective of Bangladesh. Some school and organizations are visited for research and investigation to conduct usability evaluation in extraordinary environment for extraordinary users.

II. RELATED WORK

To support a wider range of people including the elder and disabled people, researchers are working actively in this area for multimodal interface [5] and learning [6] system through mobile technologies. These technologies attract children to educate themselves and other function like playing game, watching TV, making contacts, gather information etc not only this also have internet connection. On this basis, games [7] are considered for the implication of developmental and learning disabilities, special cognitive and educational needs. It [8] has been found that children who are engaged at home with various type of multimodal texts by using different media and gather



Figure 1. The interface of the MumIES system.

skills. Multimodal text refers to the path of communication works across multiple ways. This multiple modes or ways includes language of speaking and writing, movable image or static image, audio, video, gesture, non-paper based texts etc. MumIES system is about the modes of communications in visual, text, audio, and electronic [3]. A research [9] has been focused on to enhance social skills of the children with special needs. Another research [10] has shown mobile video modeling system for the special needed children. Open source mobile based application [2] has been taken into account to efficiently and accurately capture necessary information and behaviors. Here a behavior stands for self-attack or injury, emotionally burst which can negatively impact in the human social structure of life.

III. BACKGROUND STUDIES

Mobile technologies bring opportunities in learning and developing multimodal interface for needed people. A paper [1] uses this enthusiasm, for the children with ADHD (Attention deficit hyperactivity disorder), who needs special care for clarity of learning and to structure their life. An ethnographic study used to identify their learning activities. In research methodology, ‘etic’ and ‘emic’ perspective has been taken into account for analysis requirement in order to generate in depth understanding of needed children’s learning requirements and its educational impacts. Bhuiyan et al. [11] this paper, have introduced MumIES (developed in mobile technology) system for children with special need. A heuristic evaluation technique has been used to assess the system. For implementation of MumIES system, many schools has been visited to gather data and to prepare a specification for the system. In UK, as a part of research several cases have been studied to achieve better understanding of how the technologies impact the children. The proposed MumIES system aims is to provide self assessment and overcome the barrier and improve personal excellence, self confident and structure their life. This system takes instructions from touch, motion and speech, and also provides feedback with text, sound, light and vibration. The proposed system aimed to use Artificial Intelligence (AI) in two areas; first one is ubiquitous and multimodal activity monitoring agent. In this area intelligent interfaces act as agent tracker and keep records the activities of user. Markov decision process algorithm is used to develop the proposed intelligent scheme. The second one is to categorize multimedia libraries. For this area development user’s profile based search and data mining algorithms are used. User’s profile based search is made on the base of activities needs of a child and using libraries data, system suggested appropriate education and support materials. These two areas are developed in MumIES system.

This system required categories are designed based on individual needs, goals and challenges. In Fig. 1 the system

TABLE I
THE CHARACTERISTICS OF PARTICIPANTS

Characteristics	Desired Number of Participants
Participant type	
regular	12
backup	4
Total number of participants	16
Frequency of use per day	
<i>infrequently</i> : 1–5 times	4
<i>moderately often</i> : 5–12 times	4
<i>very often</i> : 13 or more times	4
Types of user	
Parents	2
Teacher/career	8
Counselor	4
Doctor	2
Age	
21–30	2–3
31–40	4–5
41–65	4–5
Gender	
female	6
male	6

interface has been shown. Every general category has some necessary sub categories to have heuristic evaluation. The system develops history using graph, records activities and progresses. The researcher aim is to include interactive tools for the children, which can be developed based on their needs and activities identified by the agent.

MumIES system has been managed using open source platform code.google.com to collaborate with other researchers worldwide. Code.Google is a platform in which researcher and user are able to make direct communication, exchange their thought and use codes to implement on their own devices. In this platform MumIES has been introduced in Dec, 2013. A good number of researchers (MumIES: Multi-modal Interface based Education and Support for Children with special needs) are involved in this project. Researchers from different parts of the world are contributing their findings and knowledge in the domain of the research as the authors have been working in one specific area.

IV. RESEARCH METHODOLOGY

In this research work, usability testing has been taken into account to evaluate the Smart phone based MumIES system. Usability testing criteria such as usefulness, efficiency, effectiveness, learnability, satisfaction, accessibility has been considered for proper assessment of the system. The exploratory usability studies have been designed to gather assessment data about the effectiveness of MumIES system. Usability testing plan has been taken into account to gather data to create baseline usability measurement on the basis of user perspective. The participants of the MumIES system are a forum of users, parents of children with special needs, care-worker, researchers and teachers, therapist (TABLE 1). These participants perform the main task help to accommodate data/ information to development efficient MumIES system. Questionnaires and case study has been used for data collection and to estimate the existing MumIES service. Therefore, both empirical methodologies, i.e. data about error and success rates has been measured as well as qualitative and quantitative data about participant's experience using MumIES system and other existing systems also have been considered for the research.

Few cases have been studied after observation of the participants. Some schools, resource teachers and a forum are established [12] for the children with special needs. They have been still trying to build an inclusive education system. By using MumIES, the children who need special attention within inclusive education system able to take special care and treatment. According to the case study [13], it has been found that, children who have disability had taken a special treatment for a period of time and then again he or she can keep up with her/his classmates. Some researchers [14, 15, 16, 17] has already proposed policies and planning to improve the quality of education and support system, but could not get the efficient technology based output from them. MumIES can bridge the gap in the domain. However, the intention of this paper is to introduce a MumIES system which would evaluate the usability of mobile based support system for the children with special needs in extraordinary environment for extraordinary people.

V. USABILITY EVALUATION IN MUMIES SYSTEM IN BANGLADESH

This paper proposed to evaluate usability studies of MumIES system in extraordinary environment for the extraordinary people for the children with special need in Bangladesh. Some schools, association and foundation were visited for data collection and data analysis. Some common question has been asked to all participants. During this study, 12(twelve) individual 40 minutes usability study session conducted. Through their help it has been made possible to collect some important data for the system evaluation. The users were teachers, therapists, parents, principal of the special school, chairman of the foundation/ association, president of an association and doctor. Most of the teacher's are young and they are very much interested to have a such smart tool that guide them proper way so that they can take care of their students efficiently and effectively. They need a tool that can measure the student performance and at the same time give some suggestion for further improvement. Most of the parents are service holder. They do not get enough time to take a proper care of their disable child. They also wish to have a supporting system which help them and give them proper direction to take a good care of their children. Principal and chairman of the organization or school have the same vision as parent and teacher have, but they want more to keep track all the performance which has been measured on the basis of children development and produces a statistical outcome so that they could evaluate the performance of their school or organization. Doctor's also feel that they need a system to keep track their special patient condition and also suggest some solution through Artificial Intelligent (AI). This AI may help both the care-worker and the parents to manage and handle the autistic children when sudden difficult situation occur. All the users are facing different environments. Like as doctors are working in hospital whereas teachers, therapists or care-workers are working in a school or organization. Both are handling many children in different way. All of them need a smart tool to keep records of the children and desired to access easily to find the record(s) by simply clicking on the mobile device. It has been found that from the survey according to the user requirement MumIES system meets users' basic needs.

To meet the goal of quantitative evaluation of the research, questionnaires had been made which are as follows:

- A. You are a _____
- B. In perspective of Bangladesh, how successful the MumIES system will help the children with special needs?
- C. Does the system/service meet the basic needs of disable children?
- D. How much effectively it replace the existing supporting material or technologies to the user?

- E. How well can mobile application be used, considering mobile context, mobility and slow network connection?
- F. Does the system reach the users goal efficiently?
- G. Is the system/service providing an appropriate balance of ease of use and ease of learning?
- H. How well do users understand the symbols and icons?
- I. Any further suggestion?

VI. INTERVIEW AND OBSERVATION

The following participants were interviewed and observed on their own environment.

“X” is the Occupational Therapist, working since three years. She explains about the way they give treatment to the children. First when the child admits they observe his/her behavior and make assessment report. After that they make a goal plan for that child, which is known as Individual Education Plan (IEP). One of the goals she discussed about a child who is unable to write or color a picture. First they make sensory integration treatment in this treatment it content seven (07) sensors. These are vision sense, visual sense, auditory sense, tactile sense, muscle sense, vestibular sense, and proprioception sense. After evaluation of each sense they manage that child to finally grapple a pencil in her hand and develop her understanding and concentration skill and able to write/ color picture. As she came to know about MumIES, she admits that this type of software is very helpful for both parent and teacher/carer. Because parent wants to know their child condition and development phase which is difficult to explain sometimes. But if they have such software which not only contain data about the children strength and weakness but also produce some suggestion about how to handle and educate their children.

According to the participant “Y”, she is an academic coordinator, one of the schools of autistic children in Bangladesh. They follow some specific teaching techniques which are as follows: teach own name (Who are you?); Sign follow (School, Medical, Smile, Left, Right); Written instruction; Time consult (where it is day or night or evening, what time is it? etc); Money handling (like, if you have 50/- taka on your hand and you bought a pen by 10/- taka, then calculate how many taka left?); Road Crossing; Activity of Daily Life (ADL). She also said that five (5) sense of human is not appropriate for them to sense properly. Some children do not like that somebody touch them and in some other cases child do not sense even his/her hand got heated. They do not know how to response, even some child they do not rectify any taste of food. Inner Sense: proprioception and vestibular also taken care of. She found that most of the children are so expert on the some specific field that, if they get proper guideline, they can improve their job skill on that specific area. Like if someone is good in computer operator or like to play games in computer, in this specific area if the child gets proper direction then the child can learn how to earn from this area. This school is specifically working on to improve students’ job skill on their expert area(s). Specific software has been developed for money handling system. As she came to learn about MumIES system she admit that this type of software can help them to handle those disable children to give proper guideline as they already do in paper-work and student strength and weakness can easily measure for their development.

Participant “Z” is the General Secretary of an association. He admitted that MumIES system may help to full fill the basic need which is the routine work of autistic children. As they share their experience, the autistic children have to do some regular works. There is not special treatment that they required. They need only proper care and

maintain regular routine. That is why, a participant suggest to create a level basis system, like a child(x) who do not have a knowledge of the color s/he should have to practice it regularly to gain the idea of the color. But the child (y)who have already got the idea of the color knowledge s/he can color the scenery, so s/he do not need to practice color matching games or anything like that. So, here two children are different and one child is advance than another, so the care-worker who have not any idea about those children, but if s/he got a service and s/he can see the symptom of the children and can get direct idea that the children x, have different level of routine life and children y have another level of life style, this device may suggest care-worker to maintain those level through this system. According to the participant, he suggest that slow network connection may be not required if the system have multiple video's or suggestive document implicitly, so that sudden decision can be made from those useful documents. As for example, if child become very angry for the food s/he is going to take, maybe there is some AI suggestion will be appear when this type of situation arise and child may start to take food after apply those treatment which the care-worker may get from the service. Considering mobile application, he wished that this app should be in hand of all parent in very soon. He also suggest to make a link up type system, that the parent may look after whether the care-worker taking care of his/her child properly or not, he suggest to make an acknowledgement option so that parent may track that whether the routine work is working properly or not. If not than parent can give some reminder to the care-worker. According to the participant, MumIES system needs to modify in perspective of Bangladesh, because most of the parents are uneducated or know only native language. So, if the apps in native language version then the parent will use the apps properly, but still smart phone or mobile device is very expensive for some parent to buy or to maintain those devices. Because most of the parent are from rural area and it is difficult for them to buy those expensive device.

Participant "W" is a Doctor and also a chairman of an autistic children school. She and her organization are trying to develop each child according to their specific specialization field. And make them self confident and improve their skill in the right direction. They use work on their behavioral, social and communicational area to make them independent and be social. The MumIES system will help to measure the student current status and further improvement. She also hopes that the student her/himself may use for his/her own skill development purpose.

VII. DISCUSSION AND RESULT

The result shows the importance of the usability of study, before further design, development and implementation of the MumIES system. For the usability testing research question, user's environments, and the points of end user has been collected on the basis of qualitative and quantitative measures for performance and preference data analysis. The collaboration in Google's code system provides a platform to disseminate the findings of the study with other researchers worldwide. However, through interview and observation, it has been found that system able to perform independent learning and support platform for the users. The primary findings from the qualitative investigation show significance of the study.

VII. FUTURE WORK AND CONCLUSION

The children with special needs required sufficient resource and technology to support them and to educate those children. From the interview it has been found that care-worker and parents needs tech support for keeping track each child for the betterment of their life. It has also be found that from observation, to reach to all level of people,

system need to add an option to translate the instruction into native language so that the users will use the apps properly. Another future plan is keep record in not only smart phone but other mobile devices as well to keep not only one children record but also the records of all student of a school or foundation.

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A Web-based Mechanism to Avoid Mispricing Products on E-Commerce Platform

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Abstract- Online mispriced product incidence has been increased dramatically in recent years. Unlike brick-and-mortar retailers, pricing error brings more financial or custom relation loss to online shopkeepers. Hence to avoid significant losses caused by mispricing products, it could be a benefit if a vendor can prevent this human carelessness during stocking online. In this article, we present a misprice preventing mechanism which based on the concept of web price mining. Via using business process modelling, our method has the flexibility to replace any algorithm components as well as integrated with any reference sites easily. Experimental results indicate that our mechanism can prevent mispricing product in most cases.

I. INTRODUCTION

The mispricing product incidents on the online shop have been increasing dramatically in Taiwan in recent years. Unlike brick-and-mortar retailers, pricing error brings more financial or custom relation loss to online shopkeepers. It is because thousands of orders can be placed before online retailers detect the problem [3]. Since most companies who encoder this issue refused to fulfill those orders, damaged has been made for not only their reputations, but also the loyalty of their customers. Hence, it could be a benefit if a vendor can prevent this human carelessness during stocking online.

In order to acquire the reference price of a product, researchers have introduced several algorithms which based on web mining to handle this issue [7, 8]. Web mining technology involves framework mining, context mining and log mining [4]; and is used widely for commercial purposes, e.g. user behavior [1], news discovery [6], analyze social network connections, terrorist threat detection [2] and usage mining [5], etc. A web mining algorithm builds a mining target model and use program to extract information from markup language or through an application programming interface (API) directly [7]. In addition, Web price mining has been used as a business strategy for price comparison [7] and price forecast recently [8].

In this study, we introduce a mechanism for preventing mispricing products online. This mechanism is based on the web price mining concept and can be implemented as an assistant function/plugin for any E-Commerce platforms. In order to make our mechanism flexible to adopt any E-Commerce platform or replace price mining algorithm easily, we implemented this service via business process modeling notation.

II. PRELIMINARY

The price query process presented in this study involves two computational technologies: “Business process model and notation” and “application programming interface.”

A. Business Process Model and Notation (BPMN)

Reusable process is one of the core features of the smart system service. BPMN is a standard format for graphical representation of business process model. It defines the elements, like flow objects and connecting objects, etc., to

form a process. Several commercial products [9-11] can be used to design and implement business process into the information technology level.

B. Application Programming Interface (API)

In computer programming, an API is used to specify the interaction method between different software components. When an API is implemented as a web service, it accepts a set of Hypertext Transfer Protocol (HTTP) request messages and returns any types of data object. The most common return data object format is Representational State Transfer (RESTful) or JavaScript Object Notation (JSON).

III. METHOD

In this section, we first present how we implement our mechanism followed by the structural steps of our mechanism.

C. System Implement

In this study, we choose Bonita to implement the API. In addition, we also design a Google Chrome web browser plugin to examine the mechanism on an E-Commerce platform. A central server is established for our API to provide the price referring service. A database is used to store all the pricing information, includes product name, price, URL and latest query time of products which has been queried by someone before. We also select Yahoo! (tw.mall.yahoo.com), PChome (hwww.pcstore.com.tw) and Postmall (postmall.post.gov.tw/postmall/) as the price reference E-Commerce platforms (which have been implemented as a node in the process) because each of these three platforms covers the most of common products.

D. Price inquiring process

The price inquiring process includes 6 steps (see Fig. 1):

1) *Price inquiry*: User sends a price query request via the API. The input data could be the product title only or includes the product description.

2) *Product name extraction*: When the server receives the request, it will analyze the input data to figure out which product's price the user is seeking for.

3) *Finding exist information*: Based on the result obtained from step 2, our process will check if this product has been queried before through seeking it in our database.

Case 1. If the product is not in our database, the server will query its price from the selected E-Commerce platform directly.

Case 2. If the product is stored in our database, our process will start the "update price information" sub-process (see subsection F).

4) *Store information*: The process will save the price information and the related product URL which obtained from those preselected E-Commerce platforms into the database.

5) *Return the price information*.

In step 1, after employing our plugin, users first fill in the product title and the product description fields. The plugin will detect user activities and trigger the price querying API automatically. It is noteworthy that, our process

does not restrict the user to use a precise product name while calling the API. For example, the API accepts a title term like “A must have Paul Smith watch once in a lifetime”, rather than just use “Paul Smith watch (model xx-yyy)”. We deploy the CKIP Chinese Word Segmentation System introduced by Academia Sinica (Taiwan) [12] to extract the possible product name that the user is queried for. With the advantage of using process engine, this algorithm is replaceable by other syntax or pattern analysis algorithms.

The core step, step 3, is used for querying the product price from those preselected E-Commerce platforms. We used APIs that provided by those platforms to handle the price query task. It is noteworthy that, we obtain multiple feedbacks from individual platforms in most of the queries. In that case, we used the algorithm that we used in step 2 again to compare these feedbacks with the product name we are asking for in order to find the perfect matches. The product may or may not be queried before. Thus, the process would need to deal with those two cases in different ways. We will describe how we are solving these two cases later in section E.

All query results will be stored in our database (step 4) in order to reduce the query time for the same product. Each record includes the product name, the web URL of this product, the price as well as the latest query time.

E. Update price information sub-process

A record would be stored in our database if a product which a user is querying has been queried by someone else before. In order to keep the record up-to-date, process will refresh this record via re-obtain the price information through five steps as follows:

- 1) Use the URL information from the database to obtain the new price again.
- 2) Check the product name shown on the current web page that directed by the URL matches the product name we are querying for.
- 3) If the product name matched, update the price information.
- 4) If the web page that the URL pointed to does not exist anymore, re-query the platform again to get the new product page as well as its URL. After that, go to step 3.
- 5) Return the price information.

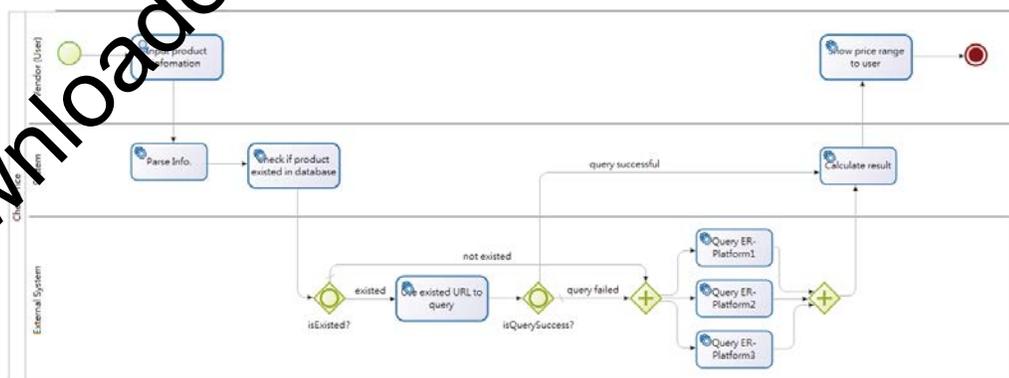


Figure 1. The price querying process implemented by BPM.

F. User interface

As we described before, we implemented the price querying process as a web browser plugin. In this section, we will illustrate how this process works as a mechanism for the prevention of mispricing. It is noteworthy that, although we demonstrate this mechanism via web browser plugin (Greasemonkey), this mechanism can also be embedded as part of the E-Commerce platform's function through calling our API directly from the web page.

The plugin keeps monitoring the product title and price fields on the product stocking form. The price querying API will be triggered once when a vendor fills in the product title. After the API gets the reference price from the other EC website, the plugin will compare the reference price with the amount the vendor fill in. If the vendor inserts a price which is lower than the price range given by our API, warning information will be shown on the web to inform the vendor to modify the price (see Fig. 2). We also suggest the developer to lock the form submit button for the vendor.

IV. CONCLUSION

Online mispriced product incidence brings the loss of business reputation of a company. In any crisis management strategy will come with certain drawback or side effect; especially it is against the law to cancel these orders in some country. Hence, to avoid significant losses caused by mispricing product, it could be a benefit if a vendor can prevent this human carelessness during stocking online. In this article, we present a misprice preventing mechanism to deal with this issue. Via using BPMN to implement this mechanism, our method has the flexibility to replace the syntax parsing algorithm as well as add or remove reference sites easily from the process. It is noteworthy that, people who want to build up their own application based on our mechanism can/should select those tools and/or programming languages they are familiar with. Experimental results (data not shown) indicate that our mechanism can prevent mispricing product in most cases. Thus, our mechanism should be beneficial to e-shop holders. In the future, we will focus on dynamic selection or referring EC website so that developers will not need to modify it in the BPMN process.

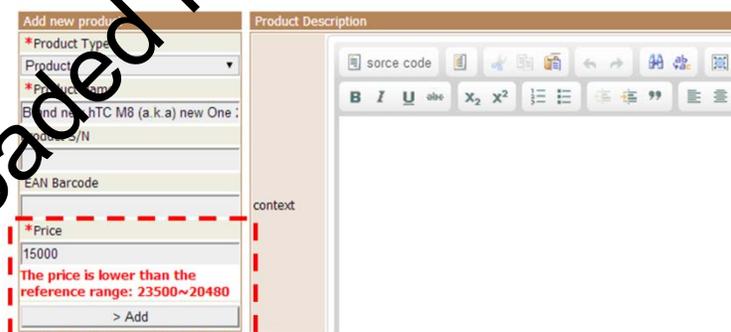


Figure 2. The illustration of suspicious price warning.

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An investigation in social network use for e-education: The case of Facebook

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Abstract- With the advent of Web 2.0 tools, educators are looking to these new technological tools to examine its potential in enhancing teaching and learning. While its runaway success as a social networking tool is now renowned, the use of Facebook for educational purposes may be considered still at its infancy stage. This paper will bring together recent research findings on how learning experience of students at higher and further education level is influenced by the latest development and technological advancements of social networking sites.

I. INTRODUCTION

“Social networking sites have seen tremendous growth and are widely used around the world. Nevertheless, the use of social networking sites in educational contexts is an under explored area. Social networking sites (SNSs) have the potential to facilitate interaction, communication, and collaboration and as a result have been prominently featured in discussions centring on the use of technology to support and amplify educational endeavours” [1]. Empirical research on their role in complementary education is limited, even though researchers have identified an accelerating use of social software in formal learning contexts [2].

This study, focuses on the investigation of social networking tools such as Facebook as aid tools for students in their educational progress when beginning a new program of study. The available literature on the support social media provide for student educational and cultural adjustment processes, is limited. This study makes several contributions to the literature. First, it attempts to review previous literature by examining popular learning theories and provide an overview of the role of learning technologies in education. The concept of Social Learning Technology is introduced followed by a framework for its use and implementation in further and higher education. The methodology of this study will explain how primary and secondary data is collected and how qualitative and quantitative approaches to data analysis contributed to the outcome of the experiments. The final part of this study will focus on examination and testing of the framework together with an evaluation plan. To fill in this gap in the literature we present a case of pilot studies of learner’s perspectives and experiences at an undergraduate university computing course and at an advance level ICT college course in an attempt to capture the influence and role of social networks such as Facebook on learner’s educational experiences.

The literature review conducted identifies the work of many researchers focusing on the use of social networks and its effects on learning for many years since the emergence of information and communication technology in e-learning environments. Research studies suggest that using social networks with a potential to substitute learning management systems has pedagogical, social and technological affordances, which allows distribution of announcement, sharing ideas and resources and implementation of online discussions. However, substitution of LMS with social networks has constraints due to lack of support for file format that allows direct uploads and also the lack of organisation in developing discussions.

II. LITERATURE REVIEW

Using Facebook as a substitute for LMS enables learners to interact with peers and conducts easy communication but it fails to provide a safe environment as student's perceived privacy is decreased. Research performed in this area suggest that for effective use of Facebook in learning, many other factors such as effective instructional design, positive instructor's attitude and strong technical support are crucial. [3]. Another area which has been under researched is the effectiveness of social networks in higher education due to lack of studies that supports the successful implementation strategies of social networks for learning in higher education. Studies suggest that many factors need to be giving careful practical attention such as the type of learner and also learner's characteristics need to be considered. [4]. Web 2.0 tools can promote user participation and knowledge production and thus fit well with social constructivist pedagogical theories. These tools have the potential to transform classes from teacher-centric, transmission instruction to social constructivist, student-participatory approaches, from individual-focused pedagogies to learning community approaches. Even as constructivism has and continues to be a main focus of learning theorists, the technological tools used in education have become increasingly powerful and crossed the gulf between day-to-day life and education.

Web 2.0 tools can promote user participation and knowledge production and thus fit well with social constructivist pedagogical theories. These tools have the potential to transform classes from teacher-centric, transmission instruction to social constructivist, student-participatory approaches, from individual-focused pedagogies to learning community approaches. Even as constructivism has and continues to be a main focus of learning theorists, the technological tools used in education have become increasingly powerful and crossed the gulf between day-to-day life and education. Social Learning Technology has been embraced by some and disgraced by many, yet today's digital natives navigate virtual worlds without hesitancy or misgivings. Research suggests, "Students are far more technologically savvy than the institutions that support them" [5]. This poses a problem as teachers try to reconcile personal constructivist pedagogies with a tool they are unaccustomed to or intimidated by. Yet, it's this very social learning tool which opens the door to new and innovative applications of constructivist teaching and learning methods. According to [5], "The vast amount of information that computers supply on a daily basis has allowed teachers and students new ways to explore education compared to ordinary instructional tools" (p. 329). Social Network Technology offers flexibility and adaptability reflective of pedagogies across various learning models based in constructivism.

II. THE RESEARCH STUDY

The essential processes in this study included observation, investigation and analysis of participant's educational experiences in the complexity of real classrooms. The processes in this study allowed views of the participants and complex group interactions and interpretations in the group's natural environment. The description of participants experience is qualitative and analysis of data is inductive which help to enhance the possibility of some kind of objectivity to this study. Learning environments need to be effective with complex interaction of many variables. Assessment of learning is a better one when learning is taking place by observing how the learners are participating and progressing in the learning process. In this study the interpretive research method based on a pilot study was

used to investigate the use of social networks in the classroom. The constant comparative method [6] was used to analyse online survey responses, arriving at categories and data patterns.

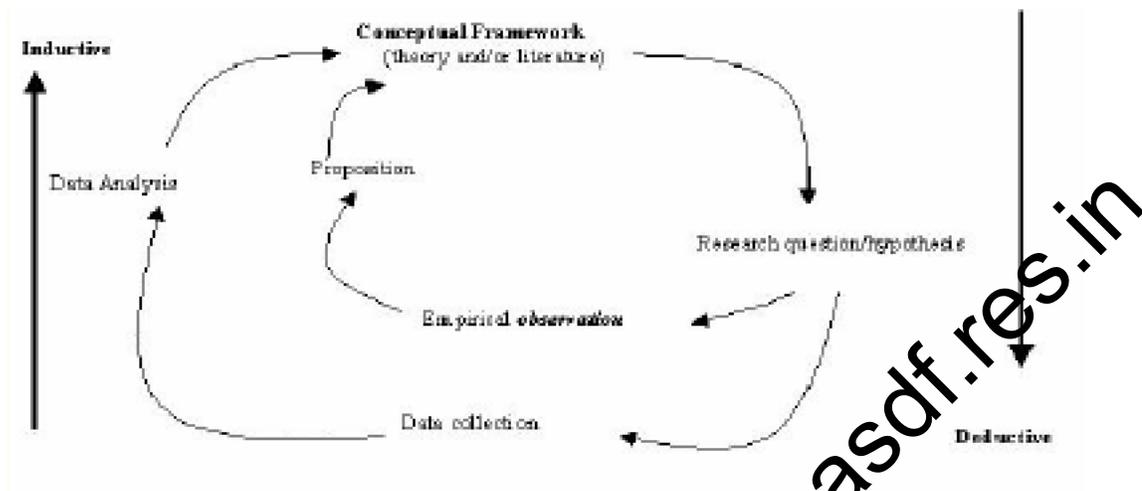


Figure 1. *Surviving Your Dissertation: A Comprehensive Guide to Content and Process* [7]

Open coding of all data was necessary in order to identify emerging patterns with regards to student's online learning experiences on the same course of study. The patterns were compiled and codes confirmed across all participants. Open coding of data resulted in patterns that could be grouped into themes. Learners found their interactions with others were important in helping them make sense of the subject matter and reported that these interactions extended their learning. The ease with which participants were able to communicate was also deemed to be important to the social connectivity.

The participants in this study included students at Middlesex University and its associated Further Education College studying on degree and advanced level courses. Learner's achievement data and online performance in a pilot study were collected and compared in order to establish the match between student's level of attainment and their online performance while using social networks such as Facebook as a complementary study platform.

A second pilot study was conducted in order to evaluate the role of social networks and its effects on learning outcomes through enhancement of communication methods. Both qualitative and quantitative data were gathered and analysed with some suggested guidelines. Experiments were designed according to participant's level of study. The first pilot study involved three groups of students at Middlesex University on the first year of an I.T. degree course on a study period of two weeks. The second pilot study involved four groups of students at an associated FE college on an advanced level ICT course on a study period of two months.

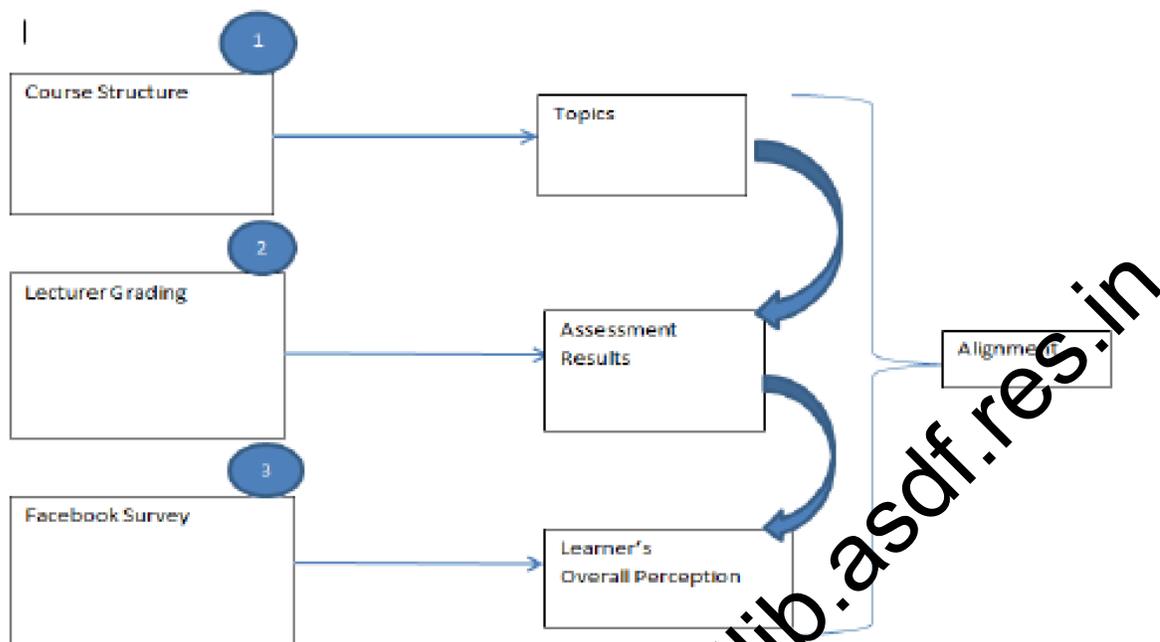


Figure 2. Pilot study process

III. DATA COLLECTION – SURVEY

A survey was used to collect responses to open-ended questions that sought feedback about (a) student experiences, and (b) specific learning activities and attributes of the course. The first study survey consisted of questions related to student’s learning activities, tutor’s teaching style and learner’s attitude towards their tutor, learner’s assumptions and regards towards using social networks as a tool and its future potential.

Data collected related to participants’ response to questions. Data was coded and themes identified. Also data related to participant’s predicted achievement grades were analysed against the data collected related to some open ended questions that relates to learner’s feedback on their instructor’s level of support and tutoring style. Statistical analysis identified that a positive correlation coefficient identified through this study suggest that there is an strong relationship between participant’s level of achievement and their preference for their tutor’s teaching style and their attitude towards using Facebook as a collaborative tool that enhances student’s learning experiences.

In the direct question and answer of 42 participants, 81% stated that they like using FB and 52% said it does facilitate communication and connection between people. Around 14% thought it causes distraction from studying and 10% said they did not like doing difficult things using FB while also 10% did not know FB’s potential use. Around 7% thought they do not like the lack of privacy and also around 5% said that FB pages lack required structure for learning. Less than 1% said they do not like using FB at all.

III. DATA COLLECTION – INTERVIEWS

Interviewing participants in the three groups identified some themes. Those participants who favoured and enjoyed using Facebook as a social media also used it for establishing communication and connecting to others within the same group or other groups outside university. A large proportion of those who favoured using Facebook also regarded its use as a positive aspect that enabled them to use instant messaging, chatting, tagging photos,

watching videos etc. A comparison of the themes indicates that a user with a high positive response also corresponds to a low negative aspect. Amongst the implicit themes, there are a few anomalies that do not follow the pattern. For example user25 has a high positive response and also a relative high negative aspect in comparison to the other users. This could be an indication of the user's balanced view of face book use. This implies that this participant has either informed views on positive and negative aspects of face book or that is in favour of use of this media on moderation. A small proportion of approximately 4.8% of the users were able to lend themselves to both the positive and negative aspects of Facebook use; obviously indicating that the vast majority were very one sided.

IV. DATA COLLECTION – ASSESSMENT RESULTS

Students are assessed on the knowledge of these topics by completing tasks within projects that include individual and groups work and submit their reports through the MLE environment on the college's website. Another module undertaken by the second year groups is software design in which students learn the history of development of different programming languages along with learning how to program within a fourth generation language such as visual studio. Assessment is based on demonstrating their knowledge of history of different programming language generation and classification, characteristics and features as well as development; testing and documentation of software designed and programmed using a 4GL. Majority of student's work is based on independent learning and assessment while a small fraction of each module is based on group work and presentation.

V. DATA COLLECTION – USING FACEBOOK FEATURES

Students can use the present features in Facebook to upload their individual response to the questions or topics they have been asked to response to. The tutor can upload topics in more than one way. In order to upload presentations the tutor can convert its file format into a video format that can be then be uploaded for viewing by students within each group. The tutor can then for each student within the group to view the video and students can then upload their response within the group page. All students within the same group would be able to view each other's response and provide further comments on each other's answers to the questions or the topic of the video presentation.

VI. DATA COLLECTION – FACEBOOK FOCUS GROUP

The focus group held examined the effectiveness of using social network Facebook for improved communication by learners on advanced level of ICT course. All students who had completed their first semester at college were given the opportunity to participate in this study. Almost all students who were invited took part in this activity with a minority of those who had a more isolated presence and were not welcoming interactions with other classmates or tutor.

VII. FINDINGS

After analysis of the collected data, it became evident that the following themes emerged:

- a) Social context of learning through social networks – All students who participated in the online pilot studies stated that they valued interactions with peers on Facebook. When asked to reflect about their course

experiences, students predominantly focused on describing their connections and interactions with others, and the value they found in peer collaboration and support.

- b) Pedagogical consideration – All learners indicated the ease of interaction and communication offered through the social networks and the opportunity of student centred pedagogy used by their lecturer has made positive contribution to his teaching style.
- c) Mediated learning through SNs – All participants indicated that social networks promise true potentials in harbouring enhanced collaborative online learning environments.

The concept of social learning framework is useful as it is aimed to help us improve and change the way we learn. The problem faced by many educational institutions is the various use of e-learning across different levels of studies as the focal method of integration of technology in education. This method although still widely used in education, is reputed as deficient in bridging the gap in facilitating communication, participation and collaboration between social groups. With the rapid growth in the technology advancement and profound use of Web 2.0 tools and social networks, learners dedicate a great percentage of their time online within the communities of family and friends in order to exchange ideas and foster the feeling of belonging to social groups and networks of people from across different parts of the world.

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Implementation of an interoperable interface to exchange B2B messages between heterogeneous computer platforms

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Abstract—In a Business-to-Business (B2B) scenario strategic goals are *integration* and *interoperability*. *Integration* regards the process, within an enterprise, of linking different software systems to become part of larger systems. *Interoperability* is strictly linked to the standardization of commercial messages and communication protocols. In this work we present the implementation of an environment that provides a common and coherent interface between different trading partners and that can be easily integrated with the computer systems and any B2B middleware used by the enterprises involved in the e-commerce communication. We show how to apply it to connect two B2B middlewares: Oracle B2B, a commercial platform, and Hermes 2.0, an open source project developed by the University of Hong Kong. The commercial transactions are based on the electronic business eXtensible Markup Language (ebXML) standard and the related ebXML Messaging Services (ebMS) communication protocol. The interactions take place through web applications that provide a common view of the system to the trading partners involved in the communication.

I. INTRODUCTION

The Internet has radically changed the way of communication between companies in electronic commerce (e-commerce) scenarios. Almost all the companies relied on the Internet in order to use a common platform for processes automation and global visibility [1, 2, 3]. This caused a platforms fragmentation in the field of business messages, making the role of *interaction* strategic for the e-commerce. *Interaction* consists of *interoperability* and *integration*: organizations spent a lot of time and economic resources in solving integration and consistency problems between several software systems [4, 5].

While *integration* typically attempts to build a monolithic view of the enterprise [6], *interoperability*, that can be viewed as inter-enterprise *integration*, is an essential requirement for today's successful business [7] and it is focused on the exchange of meaningful, context-driven data between autonomous systems [6]. Its goal is to simplify the management of business transactions between trading partners creating a common platform, based on standards, in order to reduce inter-enterprise integration costs and improve business trading. *Integration* and *interoperability* strongly depend on standards such as the eXtensible Markup Language (XML) [8], the United Nations rule for Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) [9], the electronic business eXtensible Markup Language (ebXML) [10] and other standards for data format and inter-enterprises exchanges.

In this paper we present the design and the implementation of an interoperable environment that provides a common and coherent interface between trading partners, hides the underlying technology, and can be easily integrated with computer systems and in Business-to-Business (B2B) middlewares.

II. STANDARD USED IN B2B COMMUNICATION

The goal of the standards used in B2B communication is to electronically connect trading partners through the exchange of structured messages containing business data [11]. All interactions take place over networks like the Internet or Value Added Network (VAN) in a completely automatic way [12]. Internet with its high connectivity and low costs provides a standard and economic platform to companies and their partners [13]. There are many B2B protocols available that define various aspects of inter-companies communication to provide an explicit specification of requirements in order to implement the automation of the collaboration between companies [19]. Typically, their basic concepts are: messages format, activities for sending and receiving of messages, business messages and acknowledgment messages, time-out and retry logics, duplicate check and avoidance and roles [14].

In this section we describe one of the most important standard used to implement UN/EDIFACT transaction: the ebXML standard and the related ebXML Messaging Services (ebMS) [15] protocol, that are used in this work to implement commercial exchanges between the heterogeneous platforms considered.

A. ebXML

ebXML is a set of standards based on XML and proposed by the Organization for the Advancement of Structured Information Standards (OASIS) [16] and the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) [17]. In this way, organizations have a standard method to communicate in common terms, define their business processes, and establish trading relationships [18].

ebXML is based on the concept of *trading partnership*, that allows companies to find new trading partners and to agree on the technical aspects to implement the electronic communication. A *trading partnership* is realized through two XML based documents: the *Collaboration Protocol Profile* (CPP) and the *Collaboration Protocol Agreement* (CPA). With CPPs, companies can indicate the line of business, process, exchange techniques, supported technologies, and security methods implemented. Merging their CPPs, companies create the CPA document, where they define business processes, messages structure, and technologies used to implement the commercial transaction. A typical ebXML creation of *trading partnership* scenario consists of three phases: an implementation phase, in which the trading partner analyzes his business processes and publishes them into a central public server called *registry*, a discovery and recovery phase, in which trading partners access to the *registry* to discover business processes and interfaces published by other trading partners, and an execution phase, in which trading partners merge CPP into CPA documents and start the exchange of ebXML messages through the ebMS protocol. An ebXML message consists of two parts: a *header* that includes all the information about routing and delivery, and a *payload* that contains the commercial data to be exchanged between trading partners. *Payload* can contain any type of data: XML document, binary data and so on.

B. ebMS

ebMS is a standard protocol defined by OASIS, that implements the message enveloping and header document schema used to transfer ebXML messages over communication protocols such as the HyperText Transfer Protocol (HTTP) [20] or the Simple Mail Transfer Protocol (SMTP) [21], and manages the sending and receiving ebXML messages [22]. ebMS is defined as a set of layered extensions to the base Simple Object Access Protocol (SOAP) [23] and it provides the message packaging, routing, and transport facilities for the ebXML infrastructure, using the

information contained in the trading partners' CPA documents. To recover this information and thus allow the exchange of ebXML messages, a Message Service Handler (MSH) is needed: a software platform that implements the ebXML architecture and is able to send and receive messages in accordance with the specifications described in the ebMS protocol.

III. DESIGN AND IMPLEMENTATION OF THE INTEROPERABLE INTERFACE

In a B2B messages exchange scenario, two enterprises want to send business messages over the Internet. The communication must be carried out in a totally independent way from their computer systems and B2B middlewares. A B2B messages exchange relies on the definition of the standard used for the message format and the related communication protocol, on the B2B middlewares used by the enterprises, and on the *integration* issues with trading partners' computing platforms. We developed a web application that implements a common Graphic User Interface (GUI) to provide an interoperable and coherent environment between trading partners, and manages the issues related to the *integration* with a company's computer systems and B2B middleware. The web application essentially consists of two parts: the common GUI, and a specific module that is different for any B2B middleware and organization and consists of two *adapters*, that are software components involved, on one hand, to manage the *integration* with the company's computer systems, and, on the other hand, to interact with the B2B middleware in a completely transparent way for the end user. The web application handles both the sending and receiving of commercial messages. It is worth noting that the web application has the important characteristic of being totally independent from the computing platform on which it runs. In fact, given its web-oriented nature based on generic servlet containers, it can be used on any computer system and accessed from any computer on the same network. In addition the web application is completely unrelated from the standard used in the B2B communication because it depends only on the methods exposed by the B2B middleware to allow access to its services. The standards and the communication protocols are managed directly by the B2B platform. The fact that the web application is independent by both the computer systems and the standards used for B2B exchanges, makes it fully portable to any platform used to exchange business messages.

A. The common GUI component of the web application

The common part, which provides a simple and intuitive graphical interface for the insertion of the information to be sent or the recovery and integration of the messages received, has also the purpose of hiding the interaction with the company's computer systems and the B2B middleware in order to provide a monolithic view of the entire environment for the exchange of commercial messages.

B. The adapters of the web application

As mentioned previously, the *adapters* are software components involved in the *integration* stage of the web application. They are specific for any B2B middleware and computer system and must be modified during the setup phase of the environment in order to allow the web application to interact with the company' computer system and B2B middleware, solving the *integration* issues. The setup stage involves two phases: the analysis of the methods exposed by enterprise's B2B platform to interact with it and of the *integration* issues with the company's computer system, and the adaptation phase that consists of the modification of the *adapters* in order to make them able to

exchange information with the B2B middleware and to integrate them with the enterprise's system. In a typical scenario an end user (via GUI) or the computer system ask the web application to send or retrieve a message. Fig. 1 shows the generic architecture of the interoperable environment and its usage via GUI: in this scenario the trading partner A accesses the web application via browser and inserts the data to be transferred, including any attachment, through the interface provided by the application (stage 1). Then the *adapter*, related to the B2B middleware, recovers the information and delivers the data to the platform in the format required by it (stage 2 and 3). At the end of the interaction and at the complete retrieval of all the data required, the B2B platform starts the communication (stage 4). For the reception the trading partner B accesses the web application to retrieve a message by its unique id (stage 5). Following the request the web application connects to the B2B middleware through the *adapter* (stage 6 and 7) and retrieves the message with any attachment in a location specified by the end user (stage 8).

IV. AN INTEROPERABLE ENVIRONMENT PROTOTYPE

In this section we present a brief description of the methods of interaction and integration used to modify the *adapters*, of the computer platforms adopted to implement the interoperable environment, and of the development of web applications to provide an interface for the exchange of ebXML messages. The creation and the configuration of CPA documents related to the *trading partnerships* for both platforms are omitted.

A. Oracle B2B

Oracle B2B is an e-commerce gateway enabling the secure and reliable exchange of business documents between trading partners [24]. Together with the Oracle SOA Suite it provides an architecture enabling a unified business process platform, end-to-end instance tracking, visibility, auditing, process intelligence, governance, and security.

Oracle B2B consists of two servers: the administrative one and the managed one. The former deals with the system general management including the creation of new trading partners, the partnership documents and the general state of the platform services. The latter handles directly the dispatch and the retrieval of commercial messages. The managed server can not be accessed directly, but only through a Service Component Application (SCA) implemented specifically for each partnership and to which our web application interfaces in order to send B2B messages.

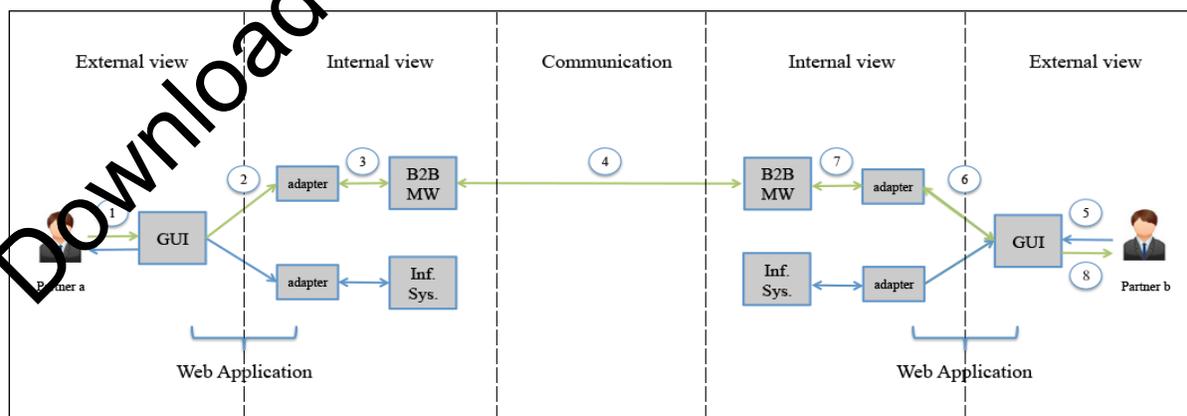


Figure 1. The generic architecture of the interoperable environment and an example of B2B message exchange.

B. Hermes 2.0

Hermes 2.0 is an open source gateway, developed by the Center for E-Commerce Infrastructure Development (CECID) of the University of Hong Kong, that provides a secure and reliable information transfer using common communication standards such as ebMS 2.0 [25]. This gateway implements a web service that handles either incoming and outgoing requests and can be directly called using SOAP Application Programming Interface (API) within the web application.

C. Development of the web application adapter to send messages from Hermes 2.0 to Oracle B2B

To implement its web service, Hermes 2.0 uses Apache Tomcat [26]: an open source servlet container developed by the Apache Software Foundation (ASF) [27] and is able to host web applications. To setup a SOAP messages exchange it is necessary to recover the information about the *trading partnerships* stored within Hermes SQL database. In particular, it is necessary to get the following values: *CPA ID*, *Service*, *Action*, and *Transport endpoint*.

The web application retrieves these values and provides them to the Hermes web service through an instance of a class, which implements the SOAP communication and extended SOAPRunner class. The SOAP message contains the *payload*, which represents the real messages to send, the *attachments*, and the *body* that includes the information, recovered from database, needed by the Hermes web service in order to process and send ebXML messages. It is worth noting that the message can contain every type of *attachment* with only limitation for image size that must not be larger than 5MB. The *attachments* are sent as binary string of data.

D. Development of the web application adapter to send messages from Oracle B2B to Hermes 2.0

To send an ebXML message, Oracle needs the creation of a web service associated with the *trading partnership*. As described in section IV.A, to create the web service a SCA application must be implemented. It consists of a set of pre-configured software modules that provide an external interface to connect to Oracle B2B. The principal software component of a SCA application is the *Mediator* that manages the recovery of the message and the interface with Oracle B2B in the middleware infrastructure. The SCA application also defines the Web Services Description Language (WSDL) [28] schema that is essential to create an own web application that exploits the created web service. Unlike Hermes 2.0 that uses the SOAP API to communicate with its web service, it is worth noting that in Oracle B2B only the methods exposed by the SCA application in the WSDL schema must be used to send messages through an external component.

E. Receiving a ebXML message

In this section we discuss about the receiving methods implemented for Oracle B2B and Hermes 2.0. Oracle B2B implements automatically the retrieval of the message for the textual part and for many Multipurpose Internet Mail Extensions (MIME) [29] *attachments* through an appropriate configuration of the environment. As regards Hermes 2.0, it is necessary to implement other modules of the web application in order to extrapolate data from the Hermes web service and to provide a GUI to the end user. The web application recovers the ebXML file indicated by the user and parses it to catch the text content and to implement the conversion of any *attachment* to the original format.

V. CONCLUSIONS AND FUTURE WORK

In this paper we show the design and the implementation of a common interface between the trading partners, that can be easily integrated with any computer system and B2B middleware architecture used by the enterprises involved in the e-commerce communication. The strength of this environment is that the web applications are completely independent by both the enterprise's computer systems and the standards used for B2B exchanges, making it fully portable to any platform used to exchange business messages.

As future developments it could be taken into account the possibility of using the cloud computing technologies to made the interoperable interface completely free from the enterprise's on premises resources and available from all over the world.

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