



fusion 2019

PROCEEDINGS

NATIONAL SYMPOSIUM ON HUMAN COMPUTER INTERACTION 2019

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Preface

I am very pleased to welcome you to National Symposium on HCI 2019 in Malacca! We chose the theme Fusion, which we hope within just a day, you are able to ‘taste’ the combination of various ‘flavours’ delivered by our very own community that is diverse and of rich cultures. What we aim for this symposium is to learn from one another’s past and ongoing research from all over the country. The diversity of the 22 accepted papers asserts the theme fusion.

HCI always pushes its boundaries to further understand the interaction between human and computers, to improve its usability and with today’s context, computers have expanded to cover all form of technology, improving not just the usability, but as well as the user experience. While user interface has always been the common topic when it comes to HCI, it is high time for us now to further investigate and explore social interfaces. Starting by looking at the bigger picture, Abdul Razak’s first reflects on the shift of paradigm from user-centred to human-centred design, which is related to topic by Harun’s on nurturing confidence via design thinking, which both share the same aspiration that is recognising the full worth of user’s emotions. Striving for social interfaces that works and acceptable, covers aspects as per presented by Awang and Nasruddin’s on social cognitive factors and sharing behaviour in education context, Kin et al.’s gamification waste for green community, Hamid et al.’s sustainable visualisation in switch management to Ghazali’s persuasive technology for behavioural change.

Driven by scientific research and developing empirical understandings of users, Harun’s paper first discusses how user driven research can be achieved via participatory design, while Meng et al.’s study explores the notion of interactive mobile AR. Further works describe how the HCI methods, tools and techniques being applied to derive to rich insights. Mohd Yusoff et al.’s study focuses on the design of smart building automation system for 6LoWPAN network, Ismail et al.’s implemented user requirements analysis for dengue surveillance, Sharin et al.’s applied image processing and eye detection for selfie images on mobile application, while Abdul Wahab et al.’s opted for UEQ in evaluating a shariah-compliant fashion e-commerce prototype.

More HCI work started to emerge for the special needs, especially children. There are two papers reporting on autism: Mazlan et al.’s brain activation on children with autism, and Mohamad Daud et al.’s game-based intervention for autism spectrum disorder. Other special needs for children are discussed by Abdullah et al. on children with learning difficulties, Mohamed Zain et al. on dyslexic student and Azmi et al. on children with disability of the arm, shoulder and hand. A paper by Wong et al. meanwhile, focuses on the needs of the older adult when using smartphone.

As previously mentioned, Malaysia context is rich with its values and cultures. Cultural heritage is also one of the areas that can be enriched via HCI. A paper by Ariffin et al. presented a work on appropriation of mobile application design in the local context, while Shiratuddin et al. focuses on heritage adaptive AR. The use of social media in our local workplace settings has been the interest of Azman et al. as their work measures the user engagement metric of the usage of social media of Malaysia Higher Education institutions.

Last but not least, we have a work carried out by Wong et al. on the mapping of colour, mood and music in a 3-D model that explores further the emotionally inherent interface.

We are thrilled with our guest speaker whom is our very own honorary member, Nor Laila Md Noor (a professor at UiTM) to kick off our symposium. With her vast experience, there is so much we can learn from her. The one-day symposium is designed in such a way that we don’t just learn from one another’s ongoing research on HCI of various domains, but, to also explore the possibilities of working together collaboratively. The exciting brainstorming session is hoped to facilitate to achieve this goal.

To all attendees, don't forget to have fun, and enjoy the symposium, as much as we do as we organised this event! Let fusion brings us together and eventually allows us to set path on how HCI can contribute and make impact in the landscape of Malaysia's ICT and digital transformation.

Associate Professor Dr Masitah Ghazali
myHCI-UX President

15 February 2019, Malacca

Fusion 2019

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A League of Their Own: Cultural Appropriate Design Impact to Mobile Applications in Local Context

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Abstract

The human computer interaction which includes user experience and usability for culturally aspects are generally overlook for mobile application interfaces design. Additionally there is scarcity of digital content for mobile learning and its evaluation. For an instance the mobile learning require special attention in terms of their usability aspects, such as cultural aspects which is significant to improvement of mobile websites and software applications quality in the development of local content. On the other hand, the cultural appropriate design is a fusion of general usability and cultural elements for local context evaluation. Therefore, this paper presented the reflection on the impact of application of culturally appropriate design guidelines for a mobile learning in the local context.

Author Keywords

Mobile learning; usability; local cultural context

ACM Classification Keywords

Management, usability, user centred design, education.

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Introduction

The research on cultural appropriate design guidelines is motivated by lack of local content in [3, 4, 6]. For example in Malaysia development of local content follow SKMM Guidelines. In fact there is lacking of local user interface design guidelines for mobile applications for developed countries such as in Malaysia. One of the significant challenges for using software comes from the lack of guidelines for acknowledging local culture in software design [10]. This relates to no one design can fits all.

Uniqueness of Local Culture

This study is inspired by previous local cultural literatures for usability design guidelines: In existing literatures there is no interconnecting at all with mobile learning and mobile technology. This article proposed for the fusion of culturally appropriate design with general usability to evaluate the usability of mobile applications for local context particularly in mobile learning. The following are amongst the local cultural influences that impacted the local cultural identities [1, 2].

- Local Language (Bahasa Malaysia): Language plays an important role in Malay society. Bahasa Malaysia is the official Language and, together with English, is widely spoken.
- Local Philosophy (Malay and Islamic): The Malay philosophy of life is related to nature and also to Islamic philosophy.
- Local Aesthetic Values (Flora and Fauna) and Local Colours (from Nature)
- Local Cultural Content: Malay culture highlights the importance of art and craft. It is reported that local cultural design elements embedded in lessons can motivate students in their mobile learning.

Usability for Local Context

In human computer interaction (HCI), usability is crucial to improve the quality of the software design. This is because design issues need to be detected and reported to improve the quality of the software product and reduce the high implementation cost in the later stages. The usability aspects are under researched in mobile learning [5], particularly in terms of the local context [1]. HCI experts, such as Nielsen, have highlighted the importance of usability design guidelines to produce quality software for the local context [7]. Meanwhile, a previous study on mobile learning found that the fusion of general usability principles and cultural appropriate design principles are important in determining the quality of a software product, particularly for mobile learning in a local context [2].

Mobile Learning

The mobile learning process may involve the use of mobile devices, such as smart mobile phones, and laptops, etc. Mobile learning is also known as the process involving conversations across multiple contexts among people and personal interactive technologies [5]. In general, facilitated by the use of a range of mobile devices, mobile learning can also be considered to provide accessibility to learn independently irrespective of the place and time. This usage of mobile learning devices may also be extended to various fields. Thus usability for cultural appropriate designs plays an important role in using mobile devices, such as smart phones, particularly for the users in terms of mobile learning

Implementation

Aspects of culture could help to improve the usability of the mobile learning user interface. Current research deals with the usability aspects and cultural aspects of the websites but not many research results could be found for mobile learning in terms of appropriate local culture. Sources for mobile learning interface usability that relate to the cultural issues have also been overlooked [1, 4]. Mobile learning applications that acknowledge local culture may be a way of improving usability and keeping the Malaysian culture alive, and, thus, avoid, the pressure of the globalizing forces of overseas mobile content [6].

Case One: Mobile Apps

In this study three mobile applications have been evaluated which is namely Songket, Batik and Jawi. From the study the users preferred the Batik mobile applications due to its suitable content, aesthetic values, using local languages and embedding local philosophy. The second mobile application which is Songket is still appealing particularly for its aesthetical values however has some button issues which cause the application to hang. However the Jawi application is fun to play with but lack of Help information on how to play the mobile application [1].

Case Two: Mobile Web Site

This study has been conducted with students to evaluate mobile portal web site for a local university. It has been observed that students prefer using mobile web site portal that utilized local language such as Bahasa Malaysia. Some students found it was difficult to understand the content information if it is in English language. Students also prefer realistic error management in handling the mobile web site portal.

Potential for More Local Content

The findings highlight local content that could be made available for applications by embedding Local Cultural Appropriate Design for local users for different software applications [4, 9]. These studies indicates the fusion by embedding the principles from culturally appropriate design guidelines for evaluation, thus demonstrating the significant impact on the mobile application of cultural appropriate design [4, 10]. Additionally, these cultural design principles are embedded to improve the usability of mobile learning for a local context. These principles include local language, local philosophy, local aesthetics, and the use of suitable local content [1]. Likewise, these cultural principles can be embedded in the different types of mobile learning software content for future usage to facilitate in learning [9].

Conclusion

The contribution of this study is the reflection of impact of usability design principles which include the fusion of general usability and local culture in the software design. This indicates that local cultural factors in usability are also important when designing digital mobile content for mobile learning. The current project is the CADG principles implementation are on mobile games in learning STEM subject in mathematic in local primary school.

Acknowledgements

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Gamification “Waste to Craft” Mobile Application Classroom

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Abstract

Waste management has been a major issue in Malaysia community, campaigns and activities have carried out by different organizations. However, many of the citizens are unsure how to manage these wastes. This research is to educate the green community to be more aware of their waste management intention. A “flipgrid” assist mobile application (EdCraft) is used as a tool for a “waste to craft” classroom where participants will create a video, based on selected unused item and turn it into beautiful craft. To gamify this activity, ranking participants video content based on “likes” is implemented. User experience of the mobile app will be studied to improve the engagement and loyalty of the participants. Ultimately, improve waste management awareness.

Author Keywords

Gamification; waste management; mobile application; Human Computer Interaction;

ACM Classification Keywords

Human computer Interaction(HCI), Field studies, Social content sharing, Mobile devices.

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Research Activity and Experimentation tools

Waste to craft activity:

This is an activity where participant create video content that they learn from an instructor in the classroom or video tutorial.

Tools:

A “Flipgrid” assist mobile application – where users can learn the usage of waste material and create their own video on creating useful or beautiful craft.

Usage: Using unused item or material to create beautiful or useful craft video content. Video content is gamified through ranking based on “likes”

Introduction

This short paper is an ongoing research under minifund project of Multimedia University on September 2018 and expected to finish on September 2019.

As waste management has been a serious issue in Malaysia, especially household waste in urban area (Pauze, 2016). Based on 11th Malaysia Plan 2016-2020, one of the outcome is to increase the recycling of household waste.

Mobile technology is a common possession nowadays, most of the Malaysian owns a smartphone. This advantage has increased the potential for ICT to act as a catalyst for development of new styles of learning and teaching (Hennesy, 2005). Many people are utilize ‘mobile internet’ to access with different content for video (YouTube), micro-blogging(Twitter) and even sharing useful tips with Pinterest (Pete, 2010)

Classroom does not just limited to traditional physical classroom. By taking this advantage, Edcraft is used to make a mobile classroom where the participant of this research can create their own video content through “waste to craft” activity

Waste to Craft Activity

As awareness campaign is important, as well as the activity to engage participant, waste to craft activity will taking part as the major part of the campaign activity. Participant will use their own creativity to create their own craft from the recyclable waste that they collected. The activity will take the advantage of the green community’s motivation to create their own

craft and by creating their own digital content and shared in the mobile application (**Flipgrid**)

Using Gamification to Engage Participation in Waste to Craft Activity

Gamification is often direct to many purposes (Don, M.H.W, 2014), it has been used in many different sizes of community to engage users participation. From smaller startup, mid-sized companies to fortune 500s and large companies. Most of the time, gamification is used in the world of business and marketing because it contains the three core-marketing concepts: engagement, brand loyalty and brand awareness (Garm, 2014). This core-marketing concepts will be useful to generate green community awareness and to draw members to engage in the waste management activity with a stronger participation rate.

Participation is often relate to social drive, the gamification model, Octalysis proposed by (Chou, 2015) described social influence and relatedness by ranking participants in rank, and it is used in the Nike + mobile application to engage participant to train more and develop a healthier body. As community education is lacking, the participation is a significant factor to engage more users to achieve the common goal for a green environment and gamification is the strategy to maximise the experience of waste management.

Preliminary study

A prototype is developed as in Figure 1 to test on a green community for better UX(User Experience).

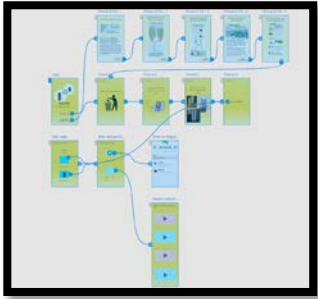


Figure 1: Edcraft mobile application flow



Figure 2: In this image, the unused red packets are crafted into a fan by the participants. Image taken during the preliminary study

Mobile Application Design

Figure 1 shows Edcraft app flow, start from the upper left, first page where users can learn more about “waste to craft” or start activity. Top row shows the recycle information. Middle row is the tutorial of the mobile application and lower row is main feature of the app, flipgrid classroom creation and video tutorial for the material.

Research Design and Methodology

The research activity is based on the design of Classroom Action Research. Where it is about the inquiry from researcher in the environment to gather information on how well is the learner learn. Action research also concern about how to improve teaching or tools to solve problems.

In this research, researcher is taking the advantage of the green community to gather preliminary study data from the UX of the prototype of waste to craft mobile app. The preliminary study has taken the instrument for collecting research data as table 1 below:

Table 1: Instruments for collecting research data

No	Data Type	Data Collection Technique	Data Collection Instrument
1	Green community response	Observation/Interview	Interview sheet
2	Learning activities	Observation	Field note sheets

Data taken from the research will be further analyses in the next stage of the research.

Work Performed so far

Data collected are for further improve for the prototype of the next data collection and by getting the result from the questionnaire, Interview and observation, user Experience of the Edcraft the fun elements of gamification are to explore to achieve the expected outcome.

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Measuring Social Media of Malaysia Higher Education Institutions Based on User Engagement Metrics

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Abstract

The purpose of this paper is to analyze the impact of all twenty Malaysia public universities in social media channel. We analyze how all twenty public Malaysia universities have been ranked based on user engagement in social media. User-generated contents from every selected official Facebook pages since November 2017 was collected and analysed. Engagement metrics based on number of likes, comments and shares were used to evaluate the effectiveness of social media posts. The results show that Universiti Sains Malaysia is the most engaged Facebook page compared to the other public Malaysia universities.

Author Keywords

University rankings; Social media; Facebook;
Engagement metric; User-generated content.

ACM Classification Keywords

K.4 Computers and Society

Introduction

In many years, there is enormous percentage of people around the globe have access to social media [1]. There are millions of active users which are

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Figure 1: Data Collection methodology of the study, The php programming tools have been developed to collect all related information from selected Facebook pages based on 14 months of social interactions

participating in online social pages, blogs and many more. Facebook is well-known social media and social networking services that have more than 2 billion active users on average [2]. Nowadays, social media plays an important role in branding, disseminating information and purposed as an official engagement space, being part of digital presence of a university. Social media impressions and reach analyses have been used in gauging the performances of the social media uses, where indications of number of likes, shares, and comments [3]. Nevertheless, there is no available tools to rank and analyze the social media engagements of the universities as an effective communication platform. The closest related tool is the uniRank Facebook University Ranking which aimed to provide a non-academic League Table of all world Universities based on the popularity (number of likes or fans count) of their main Facebook page [4].

The number of Facebook like is one of the metrics that organizations normally measure and report to their community, funders, and sponsors. Although knowing the size of the community is useful to a certain degree, the number of facebook like tells us little about the conversations and the actual level of engagement on social media. The analysis of university performance in social media, therefore, needs to go beyond this simple count of users. In order to get a better understanding of the level of engagement, the engagement metrics offers a much clearer picture as it allows universities to gauge how much engagement they are getting on the social media platform.

Hence, the aims of this study is to analyze the impact and investigate how all twenty public Malaysia

universities have been ranked based on user engagement in social media

Methodology

Facebook Graph API has been used to retrieve all data from 20 official Facebook pages of public universities. Figure 1 shows the data collection methodology of the study. PHP programming tools have been developed to collect all related information from selected Facebook pages based on 14 months of social interactions. Data structured and sorting algorithm were used in order to rank and compare between engagement metrics from all university Facebook pages [5]. The following Facebook Engagement (E) metrics is used in analyzing the university social media engagements with the following parameters [6];

$$E = \left[\sum_{i=1}^n L \right] + \left[\sum_{i=1}^n C \right] + \left[\sum_{i=1}^n S \right] + \left[\sum_{i=1}^n R \right]$$

Where;

- i. Like (L)– The number of people who click the like button on a post.
- ii. Comment (C)– The number of comments made on posts. These are visible on your page, found under the post the user commented on.
- iii. Share (S) – The number of times user share posts to another wall, pages or groups. This will show in their timelines as well.
- iv. Reaction (R) – People reactions on the post consist of *Like, Love, Haha, Wow, Sad* and *Angry*.

Result and Discussion

The result shows (table 2) the top 10 public university among 20 public universities in Malaysia is University Sains Malaysia (USM) with 280228 total engagement of people talk about followed by Universiti Malaysia Sabah (UMS) with 226967 total engagement of people talk about and the third rank is Universiti Teknologi MARA with 174480 total engagement of people talk about.

Rank	University	Engagement
1	Universiti Sains Malaysia	280228
2	Universiti Malaysia Sabah	226967
3	Universiti Teknologi MARA	174480
4	Universiti Putra Malaysia	159370
5	Universiti Teknologi Malaysia	139289
6	University of Malaya	124496
7	Universiti Sains Islam Malaysia	112371
8	Universiti Teknikal Malaysia Melaka	98564
9	Universiti Kebangsaan Malaysia	89592

Table 2: Malaysia Public Universities Engagement Rank

The ranking of this page is caused by the reactions of Facebook netizens of the university official Facebook Page daily post. From this result, USM gets the first rank because of a video posted about a talk show by USM Vice-Chancellor that managed to capture 7000+ reactions and 1.1k comments. The topic of the forum touch about love in womans. From small scale evaluations, majority of the high engagements were contributed during convocation sessions.

Conclusion

Social media plays important role in organization and personal branding and digital presence. Thus it is crucial to analyze the performance of the engagement made through this communication channel. Comparative studies and evaluations using post engagement of Facebook usage gathered from the Facebook Graph API itself really helps in researching and investigating the trends from real-world social media, enhancing the Facebook function and help the people to see the most popular public Universities in Malaysia.

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Brain Activation Study on Autistic Children

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Abstract

Mental disorder is described as a mental or behavioral pattern that leads to personal functioning impairment. Currently, there is a lack of study to measure the patient's cognitive activities with learning disabilities. Therefore, this paper aims to present a result of an experiment that has been conducted in order to identify the brain activity of children with Autism Spectrum Disorder. The experiment involved 7 participants by using functional Near Infrared Spectroscopy. Four mobile apps have been selected for the experiment. MATLAB & Simulink are used to analyze the raw data. The results have shown that application with animated pictures and more colorful interface can increase the ASD children's interest in playing the app and the effectiveness of their learning experience.

Author Keywords

Autistic children; brain monitoring activation; mobile application; attention span; learning disabilities.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Interaction design, empirical studies in interaction design.

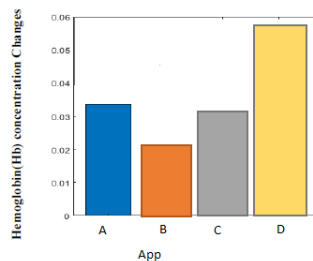


Figure 1: Mean average of Brain Activation of Channel 1

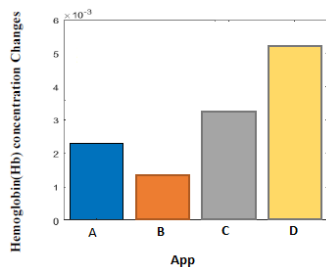


Figure 2: Mean average of Brain Activation of Channel 2

Introduction

Mental disorder is described as a mental or behavioral pattern that leads to personal functioning impairment [1]. Autism Spectrum Disorder (ASD) is one of the top list of mental disorder epidemic is the developmental disorders. The number of children diagnosed with ASD are increasing worldwide over the years. Currently, there is a lack of study to measure the patient's cognitive activities with learning disabilities. This is important in order to increase their interests in learning and in aiding them in the process of expanding their cognitive skills as they suffer from cognitive disabilities. Hence, the objective of this paper is to present a result of an experiment in order identify the brain activity of children with ASD.

Related studies

Several researchers have conducted on brain studies by using several neuroimaging techniques such as pet scan, Electroencephalogram (EEG) and functional magnetic resonance (fMRI) [2]. Another popular technique that is often used by international researchers is also a non-invasive neuroimaging technique similar to fMRI which is known as the functional near infrared spectroscopy (fNIRS). So far, there hasn't been any published paper on the usage of fNIRS to investigate the brain activity of children with ASD in Malaysia. The use of fNIRS varies based on the purpose of the study and has many advantages as it is able to measure the attention of a patient and assess their performance while carrying out an activity. With this kind of technology, researchers are able to assist ASD patients to improve their disabilities by understanding them directly by studying their brain activities.

[3] started to delve into studying the brain activities and the development of children with ASD and infants that have a risk of having ASD. The study is conducted using a non-invasive neuroimaging technique called the functional near-infrared spectroscopy (fNIRS) which works by observing the oxygenated and deoxygenated hemoglobin concentration changes at different areas of the brain [4].

Methodology

An experiment has been conducted to identify the brain activity. 7 participants aged between 6 to 12 years old diagnosed with mild ASD were tested with 4 different mobile applications. The applications are based on unique characteristics and attributes. App A is purely based on real live human pictures and videos; App B also uses real live pictures as their quiz similarly to the App A; App C contains activities on picture exchange communication system and App D focuses on teaching social stories and visual schedules by using a visual support app to improve the autism children's socially appropriate behaviours. The participants have to wear a headset equipped with 2 channels, to represent the left brain and the right brain. The results are depicted by averaging all the 7 participants' brain activation from the two channels.

Results

The mean value varies due to the time taken for each subject to finish the app and depending on their attention span on each application. These are shown in Figure 1 and Figure 2. App D had the highest mean average activation. The results have shown that application with animated pictures and more colorful interface have increased the ASD children's interest in playing the app and the effectiveness of their learning

experience. This is consistent with the study conducted by [5].

Conclusion

This study shows the potential of using Neuroimaging technology such as fNIRS in determining the brain activation based on the hemoglobin concentration changes to see the effectiveness of an app towards ASD patients in retaining the children's attention and interest. ASD children are attracted to animated pictures with colorful interfaces.

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Towards Interactive Mobile Augmented Reality

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Abstract

Augmented reality (AR) is an interesting technology which could overlay virtual information on the real world and it proven has certain advantages on different area such as education, engineering, design etc. However, traditional AR lack of interactive between user and AR environment. It is either simple browsing or passive viewing only. Hence, this paper discussed the previous and ongoing studies which embedded different interaction techniques to enable user to have a rich interaction with the AR environment. The function and usefulness of the AR application will be increased by having the interaction technique.

Author Keywords

Human computer interaction; Interaction Technique; mobile augmented reality; interactive augmented reality

ACM Classification Keywords

• Human-centered computing~Mixed / augmented reality • Human-centered computing~Interaction techniques

Introduction

Augmented Reality (AR) technology able to blend the digital information with the real-world environment. An easy understand example is the Pokémon GO AR game

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where player could see the 3D virtual Pokémon animated in the real-life outdoor physical area [8]. In general, AR platform includes projection[6], wearable[9] and smartphone[1]. Projection and wearable AR is not in the mainstream yet due to the projection AR requires a huge empty place and sophisticated setup. Even though with the recent emerging of AR Smart Glasses technology such as MagicLeap, users can have a free-hands interaction and make the AR interaction interesting; however, the device is costly and not widely available. On the other hand, smartphone has a very high penetration rate. In Malaysia, there were 75.9% of the phone user are using the smartphone [3]. The availability of the smartphone makes the mobile augmented reality more feasible and popular in the current research.

Research in Mobile Augmented Reality

The traditionally marker-based AR limited to simple interaction like moving and rotating the 3D model using the marker. It is more for viewing purpose only, modifying or direct interaction with the content is minimum [2]. Hence, this paper aims to discuss the exploration of the interaction techniques in the mobile AR (MAR) platform for user to interact with the AR environment. The research will be discussed in this paper includes a training guidance system [10], an alphabet learning application for the children [5], a mobile AR that allows user to experience the chemistry experiment (AR Chemistry Lab)¹, tangible and spatial interaction for the kitchen design purpose¹ [7]. The researches mentioned above have explored different kind of interaction techniques. It consisted gaze [10],

¹ It is an ongoing research.

menu type User Interface (UI) [5], tangible [7] and spatial awareness interaction technique [7].

In research [10], a MAR was developed to study the possibility of MAR in product disassemble training. Stereoscopic view was implemented to display a realistic 3d view to the user, hence, user can perceive the depth information and judge the position of the 3D model. The 3D content helps user to retain training knowledge. The system architecture used the combination of smartphone with virtual reality case instead of the augmented reality glasses. This solution is cheap and easy to be widely implemented in the different contexts. However, this setup eliminates the touch interaction where user cannot reach the phone's screen while being mounted in the virtual reality case. The interaction could be possibly applied includes speech, gaze, remote controller or even direct manipulation with hand. A simple gaze interaction was selected in the study which user can select the 3D dice menu to trigger the disassemble steps animation. Then the user can perform the disassemble process on the physical product by following the animation. Even though it is not a fancy interaction technique, but it is feasible to select the 3D dice menu (Figure 1).

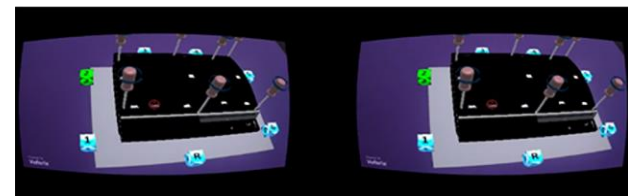


Figure 1: 3D dice menu UI with gaze selection

The menu type interaction, which is a common and simple UI, was selected in the study of [5] is due to the



Figure 2 A simple page by page content navigation with menu type interaction applied so that children can digest it easily.[5]



Figure 3 User can put the distilled water into the volumetric flask by holding and turning a physical card board.

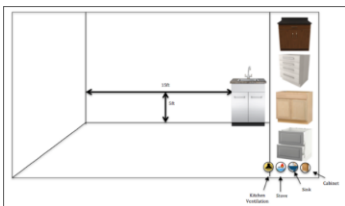


Figure 4 Spatial awareness interaction technique with the menu selection [7]

application focuses on the children. The research found out additional interaction rotation and scaling of the 3D model seems trivial to adult, but it brings out the interest of children to have longer attention towards the app (Figure 2). Meanwhile, AR Chemistry Lab focuses on the students in the secondary school. Hence, a non-conventional interaction, natural interaction that mimic the real-life interaction using tangible interaction concept is adopted (Figure 3). We expect the students can have more engagement toward the app and improve their learning with the involvement of physical movement interaction. An experiment will be performed to confirm it.

The research in [7] also using the tangible concept which the MAR target on the kitchen design. The physical medium of the tangible interaction is using the cube and card. The physical cube serves as the kitchen cabinet design while the card represents the color or kitchen's accessory design. Naturally, cube consists six faces which minimum six marker/ selection can be attached. Hence, different cabinet designs can be selected easily by rotating the cube. Other than that, when the colors/accessories marker present in the AR scene, the color/accessory cabinet will change accordingly as illustrated in the Figure 5.

Kitchen design is strongly related to the space which kitchen area need to be measured so that the kitchen designer could determine the size of cabinet to meet the measurement. With the technology of Tango/AR Core[11], ARKit[4] etc, an indoor spatial awareness augmented reality application can be easily been implemented. Figure 4 illustrates a spatial awareness interaction technique which the virtual 3D kitchen cabinet can be directly displayed and snapped to the

wall around the kitchen area. Thus, the user does not require to use a marker to associate with the 3D model and adjusting the 3D model to align with the wall. Meanwhile, the color and accessories selection can be done through the normal menu selection.

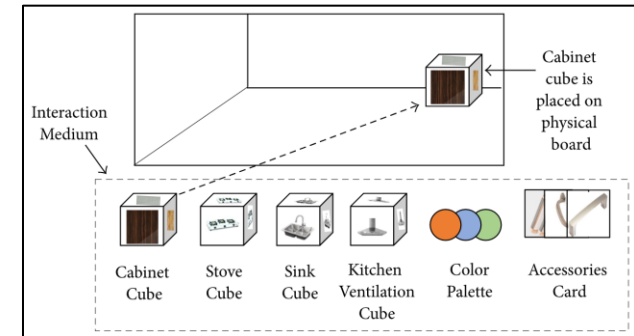


Figure 5: Tangible box and card interaction[7]

Acknowledgements

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Nurturing Confidence via Design Thinking

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Abstract

Design Thinking presents itself as an ideation tool that helps construct an intangible idea into a tangible form. Stemming from the design discipline, it gives designer a thought process on idea feasibility. The nature of the process ties in closely with the fundamentals of HCI which is to empower user. This paper discusses how Design Thinking can play a role in research work as well as classroom learning activities. The goal is to conceptualize Design Thinking as more than a design tool but also serve as a tool for self-empowerment among the designers themselves.

Author Keywords

Design Thinking; HCI; empowerment; creativity

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Introduction

Design Thinking (DT) is originally conceived to explore how design, science, technology and rationalism could offer a strategic solution to a problem at hand (Cross, 2001). The problem is conceived as Wicked Problem not because it is ghastly but rather recognizing that user problem is indeed complex and multi-dimensional (Rittel & Webber, 1973). DT again gained prominence

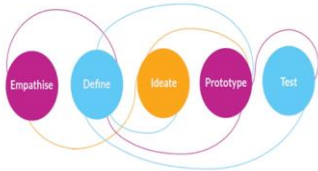


Figure 1: HPI-Design Thinking Model (Source: Hasso-Plattner Institute, 2018)

Phase	Description
Empathise	Understand how user experience specific phenomenon using probes, observation or interviews
Define	Analyse user responses into a series of behavioural patterns
Ideate	Brainstorm as many solutions as possible to address user issues
Prototype	Create a paper prototype to showcase idea in tangible form
Test	User give feedback based on demo of paper prototype

Table 1: Design Thinking Phases

in 1990s thanks to the Kelley brothers. Their book, 'Creative Confidence' (Kelley & Kelley, 2013) has been instrumental to many designers and developers as it showcases the many success stories of projects adopting DT. But more than that, the stories strike at the very core on how DT could change oneself to be more empathic and inspired to bring change on a larger scale. This has also affected the author similarly which is to be discussed in the following sections.

Design Thinking in Research

The author is currently researching on how food images could be used to simulate taste experience. DT method was adopted (see Figure 1 and Table 1) where her team used tools such as probes, paper and video prototypes to uncover related user challenges and user preferences. One key strength of DT is the involvement of users where by engaging with them, we were able to uncover pain points when tourists were trying to enjoy Malaysian food. Pictures definitely paint a thousand words but lacks in capturing food taste. They opine that at times they felt underwhelmed with the food taste, hence tricked by the picture but also overwhelmed and blame the picture for not doing the food justice (Bossert et al, 2010; Tuleu, 2011). The participants excitedly shared their Malaysian food experience which made us appreciate our local cuisine more. The users have found our prototype idea (i.e. ingredients list, user facial expression when eating) particularly educational and practical as it gives them a better sense of what to expect from Malaysian food. Nevertheless, they have cautioned us that less is more and to be tactical as to not take away the element of curiosity which is instrumental in the travel experience. The DT process took place in 2 ½ days, complete with analysis. The simplicity of the process and the use of

cheap tools were able to generate invaluable data for the research. It gives depth to the phenomena compared to the conventional user studies and provide faster feedback. More significantly, it has helped us to truly appreciate user process in the travel experience and has motivated us even more to market Malaysian cuisine through a digital platform, serving as a window to taste experience.

Design Thinking in Teaching and Learning

Analysis on previous student projects implied that their end products were not well-favoured by users as often students left the testing at the very end of the project development. The author then compelled current students to create paper prototypes of their system concept. The students were then asked to use the prototypes to collect as many user feedbacks as possible which is used to refine design requirements as well as iterate product design accordingly. The students appreciated the engagement with users as the users gave critical comments as well as useful ideas that they have overlooked. Their excursions took 5 days complete with analysis. Not only were the students able to finalize their product design with favourable feedback from the users but their attitude changed significantly. They blossomed from being shy and insecure to individuals who are confident, unreserved, more willing to take risks and has greater sense of ownership to their project.

Conclusion

DT is a powerful tool as it involves iterations of thought process as well as allowing designers to trust their judgement. DT when used properly holds great promise in nurturing creative confidence in oneself (Kelley & Kelley, 2013).

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Information Systems Planning Division, Administrative Management Bureau). She is also recognized as Design Thinking Innovation Ambassador by d.school Malaysia. She continues to apply DT and PD in her research work as well as in embedding them into the teaching and learning experience.

User-Driven Research via Participatory Design

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Abstract

Envisioning technology use by potential stakeholders requires the input from the users themselves. Often their input is sought on a ready-made design. Users often have little say how the technology can be envisaged as designers merely regard them as end-users. Participatory Design allows users to co-design with the researcher/designer by engaging them into the actual development process through tinkering and prototyping. This paper discusses the author's PD experience and considerations for researchers venturing into PD.

Author Keywords

Participatory Design; co-design; technology design; user-driven research

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Introduction

HCI has often emphasized the importance on technology ease of use and perceived usefulness (Venkatesh & Davis, 2000). We too ought to consider the *appropriate* use of technologies as it becomes inherently desired for a complimentary focus on the characteristics of both the technology and elements of

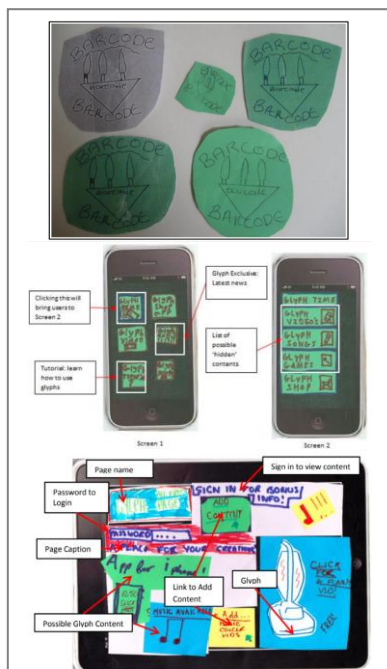


Figure 1: Some products from PD studies



Figure 2: Participants in action

the broader social structures which support certain kinds of user behaviours. Such understanding could be achieved through Participatory Design.

Participatory Design

Participatory Design (PD) is a technique that involves users in a series of design process to acquire their needs and preference of a system design. It epitomises the collaborative nature of design (Muller, 2003) where participants engage in a social design activity rather than producing individual thoughts. There are no specific steps or approaches to elicit user requirements, however the flexibility does not undermine the aim of designing *with* users rather than *for* users. Participants could give ideas through low-fidelity mock-ups, role-playing activities (Druin, 1999), or “quick-and-dirty” video animation to simulate the patterns of interaction with a new interface (Muller & Kuhn, 1993). Their feedback and behaviour helps in identifying their needs and desires for a useful or even productive system use.

Children in Participatory Design

Many researches have investigated children as technology designers (Hemmert et al., 2010; Chipman, 2011) with Allison Druin often regarded as a pioneer in PD with children. Children are capable in producing comprehensible artwork allowing for valid analysis (Hemmert et al., 2010). They too are more creatively overt and can easily express themselves through role-playing and prototype design. With PD, children could play the roles of user, tester, informants and design partner (Druin et al., 1998; Druin, 2002).

Requirements for Participatory Design

PD requires an iterative and pragmatic approach where every lesson learnt from previous engagement with

participants needs to be addressed and embedded into the design plan. In short, researcher need to pragmatically change the study design as to reflect the ongoing findings of the studies. The study would iterate until a desirable result is achieved and therefore, researchers need to be committed and constantly ready with analysis in pursuing this method.

A general series of activities involving prototyping, role-playing and brainstorming should be planned as to allow a sense of structure to the data collection process but needs to be tweaked pragmatically to respond to the ongoing feedback. Henceforth it is often advised by PD practitioners that those unfamiliar with PD should foremost join an ongoing PD study to truly appreciate the pragmatic nature of the method.

As PD often involve a group of 5 – 7 users to a single researcher, video camera should be utilized to capture user behaviours and user verbal thoughts. Here therein lies the true user requirements in addition to the design products produced by them.

The Impact of PD on Research

User exploration on technology use would involve a process of creativity. They may appropriate the technology by internalising them from external influences and inner desires, showing themselves through apparently ‘intuitive’ acts. In short, they would use the technology as they see fit based on previous experience and how it would suit with environment’s context of use. PD would enable us to understand emerging practice and consideration from the use of technologies. It also projects a sense of humility knowing that we do not have all the answers and the need to collaborate with users on idea conception.

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The Needs of Sustainable Visualization in Switch Management - A Position Paper

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Abstract

This study focus on the needs of sustainable visualization in switches network management, which is motivated by the constraints of the existing text based interfaces who are not well suited to all type of users. The gap to the study was derived from the previous reading, which was later confirmed by a simple interview conducted on 10 selected users. The results of the interviews were compared with the previous reading, and a theory model then developed, followed by a proposal to the further study on how a visualization techniques can stimulate sustainability, which finally helps usability.

Author Keywords

Visualization; Sustainability; Usability; Switch Management.

ACM Classification Keywords

HCI

Introduction

Switch is an internetworking hardware used as an intermediate devices between a network to a sub-network [1], or to another network [2]. Any data that goes into the network through the router, will go to the

switch before going through it and reach the computers that use the network. This means the switch is the hardware that receives every network data and it can be used as a part of the network monitoring tool [2].

Unfortunately, data that going through the ports on the switch is delegated and displayed with abstract and technical representation, usually in the form of numbers, text and command prompt. This creates problems for users that have less network technical literate [3]. Using switches with command prompt and reading data in numerical texts representation is not something easy for them, more appropriate and interactive techniques are required to enable all types of users to understand the data visualization [4].

The needs of visualization element

The literature review focuses on the research paper related to visualization problem and technique proposed in understanding switch management. From the 20 major papers selected [5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21][22][23][24], majority of them are hardly focusing on the needs of proper visualization technique in displaying the interfaces.

The discussion below is divided into three sections; (1) The problem of the existing interface, (2) Why Visualization? (3) Technique that being proposed and their (4) Contributions. Based on the analysis conducted on previous studies, several important criteria are integrated and concluded into the solution of the problem. As a result, theory model of proper a visualization technique for switch management are proposed in the Diagram 1.

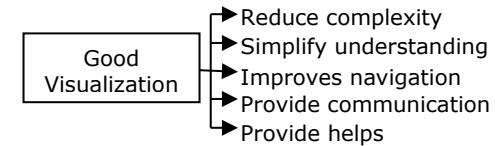


Figure 1: Technique in visualizing data.

The interview

A brief interview session then conducted with 10 selected users consisting of 5 non-technical participants and 5 computer technical participants. Each participant is shown by an existing switch management interface that displays the information about the data that passing through each switch port. The data that being collected are all about their understanding of the data visualization, and their views on how to improve the interface capabilities.

The five non-technical participants are all agree that the existing interface is very unhelpful for non-technical user and they did not have any idea on what they saw on the screen. The other five technical participants; 2 of them categorized as a network technical literate participants have no problem to understand the interface shown, while the other 3 technical participants (other than computer networking area) still faced problems to understand the interface.

The model theory

Sustainability means that users are able to fully understand the interface that is presented through appropriate visualization methods. In general, the participant in the interview session expects an effective and sustainable visualization on the interface that could drive to usability. This finding appears to be in line with the problems and solution proposed from the previous reading. It encourages the development of the

theoretical model of the switch management interface as shown in Figure 2 below:

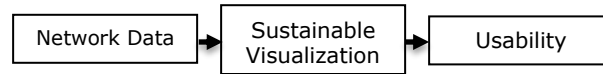


Figure 2: Model theory of network data visualization.

Future study

An advanced study is recommended, with a focus on researching the appropriate visualization design for a switch port interface, which seeks to help user's sustainability to further achieve usability.

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User Interaction Model in Heritage Adaptive Augmented Reality

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Abstract

Adaptive Augmented Reality technology responds to the user's unique characteristics, interests and context for real time information. Thus, providing better support for the user interaction experience. However, in literature there are lack of distinctive definition of a model required by AR technology to adapt to local context and environment. Furthermore, users' needs are crucial in enhancing their interaction experience in AR system. This study aims to propose a formal definition of adaptive AR model in the forms of user, context, interaction and environment models. This model will integrate storytelling mechanism to enhance users' experience and will be implemented in a heritage archaeology field. Under these perspectives, visitors will engage throughout the AR heritage guided visit, which will provide them valuable personal experience. It is found that, the importance of user experience especially in the form of affect and emotion is key in the successful design of heritage application interfaces.

Author Keywords

Augmented Reality; Adaptive; Storytelling; User interaction.

ACM Classification Keywords

Human-centered computing: Interaction design

Introduction

Adaptive Augmented Reality (A2R) is augmented reality applications that respond to the user's unique characteristics, interests and context with useful and effective real time information. Users' needs are crucial in enhancing their interaction experience. Currently the emerging technology allows such better support. However, some of the problems identified are the lack of definition of a model required by such technology to adapt to local context and environment, and the lack of established design guidelines [3,4,8]. Furthermore, storytelling as a mechanism to enhance users' experience while interacting in such augmented reality space is rarely included [2]. It should also be noted that the importance of user experience especially in the form of affect and emotion is a key issue in the successful design of heritage application interfaces [4,9]. Under these perspectives being able to engage visitors throughout an augmented heritage guided visit can provide valuable personal experience [4]. The personalization, adaptation and delivery of interpretation, and learning materials that best fit the visitors should be the center of design [11]. However, these are currently missing in the local setting of Malaysia [10]. Therefore, the main aim of this research is to propose a formal definition of such model in the forms of user, context, interaction and environment models. This model will then be implemented in a heritage archaeology field as a proof of concept.

Aim of Research

Based on the above discussions, the main aim of this research is to propose an Adaptive Augmented Reality (A2R) model in the forms of user, context, interaction and environment models. But, in this conference, only the user interaction model is discussed. Therefore, the

specific objective is to suggest the relevant user interaction model for the purpose of this heritage apps.

Concerned Research Questions

In particular, we are interested in answering these questions:

1. What are the components of the formal adaptive augmented reality model definition with respect to the local user, context, interaction and environment models?
2. Are there any effects of including the storytelling elements on the proposed adaptive augmented reality model?
3. Is there any positive influence of the local context adaptive augmented reality model on user experience?

Theoretical Framework

This study is centered on the User Experience (UX) theory proposed by Don Norman. Three dimensions of UX that are most often suggested in the reviewed literature: user, product and interaction. As Forlizzi and Ford [6] and Forlizzi and Batterbee [5] suggest, a simple way to think about what influences experience is to think about the components of a user-product interaction, and what surrounds it. Arhipainen and Tähti [1] define UX as the experience that a person gets when he/she interacts with a product in particular conditions. The user and the product interact in the particular context of use that social and cultural factors are influencing. The user has the aspects including values, emotions, expectations and prior experience. The product has influential factors, for example, mobility and adaptivity. All these factors influence the experience that user-product interaction evokes.

Hassenzahl and Tractinsky [7] emphasize again these three dimensions. They define UX as a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organizational/social setting, meaningfulness of the activity, voluntariness of use, etc.).

User Interaction Model in A2R

One of the specific objectives of this study is to suggest the relevant user interaction model in heritage A2R. In general, augmented reality has proposed several types of interaction techniques such as 3D interactions, natural interactions, tangible interactions, spatial awareness interactions and multimodal interactions. Siti Soleha et al. [12] studies multimodal interaction techniques in AR environment and conclude that gesture, speech and touch are frequently used to interact with virtual objects. Bekele et al. [13] classifies types of interfaces (interaction) for AR in cultural heritage into six; tangible, collaborative, device-based, sensor-based, hybrid, and multimodal interfaces. They found out that tangible and collaborative interfaces are used more often to interact with virtual information, though alternatives do exist. Damala et al. [4] presented the concept of A2R, which recommends AR content for museum visits. Based on data from sensors system, the status of visitors such as their behavior (gaze, gesture) and physiological signals (heart rate and other bio-signals) can be exploited for adaptive content recommendation, although this feature involves significant technical challenges.

Aim of Research

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Design of Smart Building Automation System for 6LoWPAN Network: The Platform Structure

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Author Keywords

Smart Building; 6LoWPAN; Internet of Thing

ACM Classification Keywords

Human Computer interaction (HCI); Hardware;
Network.

Abstract

Recently, the development of Internet of Thing (IoT) applications growth rapidly in multiple areas especially in Smart Building Automation (SBA). Most of SBA applications are embedded devices (ED) and 6LoWPAN network allows the EDs to connect and exchange information directly (end to end communication) with other ED on the Internet. However, the interoperability (interaction between the ED and human) become main issue in implementation, integration and evaluation of SBA. Therefore, this study focuses on the development of SBA based on 6LoWPAN infrastructure protocol that allows the flexible setup and full control that addresses algorithmic, networking and application development. This paper focuses in details the phase 1 of Waterfall model challenges by presenting four (4) critical aspects that need to be considered and analyzed in the development of SBA, and three (3) types of human computer interaction (HCI).

Introduction

SBA is the automatic centralized control of a building's heating, lighting, ventilation and air conditioning, and other systems through a home management system [1]. By having the latest smart building technologies, including IoT to serve the needs in the potential future, the infrastructure especially the network performance in the building, become the serious challenge to be taken care of. In addition, most of IoT applications are embedded devices (ED) which are categorized by low power, low memory, low cost [2].

Due to the high demand of ED connected over Internet, Internet Protocol version 6 (IPv6) Low Power Area Network (6LoWPAN) were introduced by Internet Engineering Task Force (IETF). 6LoWPAN is a wireless embedded Internet that used a standard link network for IEEE 802.15.4 in frequency range 2.4 GHz band [3] [4]. For this features, 6LoWPAN is a future network and become effective communication between each ED [1].

The main objective of SBA platform is to provide technical support and facilities which can be fully utilized by multidisciplinary developers of 6LoWPAN applications focused on automation and energy efficiency for smart/green buildings.

The aims of this study as follows: i) Global integration and interoperability, ii) High scalability, iii) 6LoWPAN orientation and compliance and iv) Technology independence.



Figure 1: The Waterfall Development Model

However, dealing with large number of EDs and technologies become a serious problem in achieving the interoperability among different manufacturers in multiple environments and systems [5][6]. Therefore, this study focuses on the design of SBA for 6LoWPAN network to achieve effective communication (interoperability) between the EDs and systems. The contribution of this paper is to present the proposed platform structure in designing of SBA based on phase 1 (Waterfall model) objective. The rest of this paper is organized as follows. Section II presents the methodology used in this study, whereas section III explains the result and the last section presents the conclusions and future work.

Methodology

In this section the Waterfall development model [7] is used as a guideline for gathering, evaluating, and reporting information in development of SBA. The development process of SBA involves five (5) phases as presented in Figure 1. However, this paper presents only the result of the first phase of Waterfall model i.e the requirement analysis phase.

Phase 1: Requirement Analysis

The initial phase of this study focused on literature review and benchmarking processes to address the following challenges:

- Comparative analysis of existing systems and solutions
- Comparative analysis of existing standards and protocols

Result

Figure 2 shows the design of SBA platform structure. SBA addresses a holistic approach such as algorithmic, networking and application development aspects of

6LoWPAN system. Based on comparative study in [8]–[10], the requirement analysis for development of SBA involves four (4) critical aspects. First, the network (IPv6/6LoWPAN) requirement and infrastructure of buildings and how IPv6 can integrate heterogeneously with other technologies (sensors, actuators, mobile devices and human interaction). Second, the 6LoWPAN application requirement and its standardization towards a new embedded application protocol for building automation. Third, novel algorithmic models and scalable solutions for energy efficiency and radiation-awareness, data dissemination, localization and mobility. Finally, the requirement analysis of rapid development and integration of building management applications. Besides, SBA platform structure were design based on three (3) types of human computer interaction (HCI) as below:

- The room environment response to human presence. (Example: The level of fan speed is controlled by room temperature and human position).
- Embedded device monitoring. (Example: Device is automatically switched off when the person leaves the room to save energy).
- User awareness. (Example: Standard touch screen in showing all information).

Conclusion and Future Work

This paper was intended to support the ongoing research project by analyzing the existing solutions to be considered for SBA development. It has explored existing platforms and solutions that could be relevant for SBA. Finally, this paper has presented the structure of SBA platform. SBA has the potential to be a platform in providing digital services in IoT implementation for Malaysia showcase for future wireless technologies. As future work, we want to analyse and present the implementation plan for SBA including the list of equipment and hardware, and deployment plan for SBA test bed.



Figure 2: The SBA Platform Structure

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Icon Recognition on Smartphone by Older Adults

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Abstract

This paper aims to examine the icon recognition on smartphone for older adults. A mobile-user interaction study was conducted with 80 older adults in Malaysia on 12 selected icons of an Android OS phone. It was found that older adults having problems of recognizing 7 out of 12 icons that match with their meaning and its function. There is a mismatched between user expectation and the icon design of smartphone user interface. It is suggested that smartphone user interface designers need to consider the needs of older adults based on their semantic memory for improved usability.

Author Keywords

Older adults; icon recognition; smartphone user interface; Android OS, semantic memory.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Introduction

There is a rising ageing population worldwide. Malaysia will become an aged nation by 2035 [1]. Smartphone has become a ubiquitous communication tool for everybody, including older adults. Despite the cognitive demand of struggling to learn a new interaction mode, older adults have gradually joined the smartphone

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 Make a call	 Battery full
 Photo	 Setting
 Message	 Gallery
 Call back	 Camera
 WhatsApp	 Contact
 Google Play Store	 Wi-Fi

Figure 1: Twelve selected icons for the study.

'senior' user cohort. However, many older adults still have the fear of using smartphones due to the complexity of smartphone user interface, advanced features and some mobile apps. Usually icon design are the upfront user interface elements that users interact with to navigate around the smartphone. It is important to know how the older adults perceive and interpret the meaning of icon design. Hence, this paper aims to investigate how older adults perceive icon recognition with its meaning and function on smartphone.

Research Method Participants

Eighty Malaysian young older adults (40 male and 40 female), aged 60-74, were recruited to participate in the mobile-user interaction study in 2016. All of them had at least 3 months' experience of using a smartphone. Those who suffers serious physical or cognitive illness were excluded from participation in this study. Out of 80, 11 (13.75%) older participants were Apple iPhone users, the rest ($n = 69$, 86.25%) were Android OS users with different brands and models.

Selected Icon Design

This study is part of a larger mobile-user interaction study. Twelve (12) icon designs were selected from Android 5.0 Lollipop Design mobile operating system (OS) based on the Samsung S7 Edge test device (refer to Figure 1). The reasons of selecting this set of icons are based on the previous study [2].

The older adults were asked to fill-up part of a questionnaire for the 12 icons about their meaning, whether they had seen it before and also the function they would expect from the particular icon.

Results and Discussion

The results show that the highest percentage of answer matched correctly with the icon design are 'battery full' (96.3%), followed by 'camera' (70%), 'make a call' (72.5%), 'message' (67.5%), 'setting' (65%), 'Wi-Fi' (63.7%), 'WhatsApp' (58.7%), 'contact' (53.7%), 'Google Play Store' (38.8%), 'call back' (27.5%), 'photo' (20%), and 'gallery' (15%). It is expected the 'correct answer' is correlated with the answers of 'have seen before' because this triggers the older adults' semantic memory that they could recognize the particular icon design with its function and meaning.

Overall, the pair (in percentage) of 'correct answer' – 'have seen before' are not correlated for icons such as 'photo' ['correct answer' (20.0%) – 'have seen before' (67.5%)]; 'Setting' ['correct answer (65%) – 'have seen before' (88.7%)]; 'Call back' ['correct answer' (27.5%) – 'have seen before' (63.7%)]; 'WhatsApp' ['correct answer' (58.7%) – 'have seen before' (93.7%)]; 'Contact' ['correct answer' (53.7%) – 'have seen before' (80%)]; 'Google Play Store' ['correct answer (38.8%) – 'have seen before' (58.8%)]; and 'Wi-Fi' ['correct answer (63.7%) – 'have seen before' (91.2%)]. This implies that there is a mismatch between older adults' expectation and the icon design on the smartphone user interface, which deviated from the intended actions. To avoid such confusion, it is important for the smartphone UI designers to distinguish the icon design using different color, or add-in some additional design elements to differentiate the icon recognition.

Conclusion

In summary, to adhere to ISO 20282-1: Ease of Operation of Everyday Products [3], it is crucial for the smartphone UI designers and mobile apps developers to incorporate older adults' requirement and relate the icon

design with their relevant prior experience and semantic memory [4, 5, & 6].

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Mapping The Color, Mood And Music In A 3-Dimensional Model

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ACM Classification Keywords

Information interfaces and presentation (e.g., HCI): Scanned color; song list; feedback; history.

Introduction

Music is the combination of elements such as pitch, timbre, rhythm, dynamics, tempo, texture, melody and harmony in different ways to create different diversity of music. Choosing the appropriate music to enjoy is important as specific music has specific impact on mood as music has the potential to influence one's mood, feelings and thoughts [1, 2]. Other than music, colors are also capable of influencing the way one feels, thinks and behaves as well [3]. These three elements are interrelated as there are evidences to show music-color association linked to emotional states [4]. Odbert et al. (1942) found that choice of color chosen for the songs elicits the same emotions than for songs eliciting different emotions. Barbieri et al. (2007) also concluded that music-color association occur via the underlying emotion common to the two stimuli [5]. However, most of the researchers used multimodal to represent the relationship either color-music or color-mood or mood-music [6,7,8]. This paper studies the relationship between color to mood and mood to color, the relationship between color to music and music to color, and also the relationship between mood to music and music to mood. It aims to produce a 3D model integrating color, mood and music by: (1) exploring the consistency of the relation between color to mood and mood to color, mood to music and music to mood, color to music and music to color; and (2) proposing a 3D model representing color, mood and music in the X-axis, Y-axis, and Z-axis respectively.

The remainder of this paper is organized as follows: Section 2 provides a brief overview of related work; Section 3 provides the insight of the experimental design; Section 4 describes the results and discussion; Finally, Section 5 concludes the paper and future work.

2 Related Work

Color is one of the most effective factors in a space that affects the way one expresses their emotions [9]. Warm colors, red and yellow, having long-wavelength are more anxiety involving higher arousal and displeasure. Cool colors, blue and green, having short-wavelength

Abstract

Listening to suitable music is important as different types of music have different impacts on the listener's mood. Similarly, color has the capability of influencing one's mood and choice of music as well.. The relationship between color and music, color and mood, and mood and music can be established. However, up until now, the three items have been mostly represented as two dimensional (2D) model. In order to link all the three elements together, i.e. color-mood-music, multimodals are required to represent them. In this paper, a three dimensional (3D) model is proposed that integrates these three elements together for music recommendation. Questionnaires were developed and posted onto social media such as Facebook and Whatsapp. Analysis of results revealed that the relationship between color-mood and mood-color, color-music and music-color, and mood-music and music-mood were inconsistent, interestingly, it was found that there was association between specific colors to specific mood and specific musical genres. This is useful as it helps to retrieve musical genre using a single model rather than multimodals.

Author Keywords

Color; mood; music; 3D mapping.

are less anxiety, less arousing but more pleasant [9,10] Figure 1. Color can be used to associate with music. Faster music in the major mode was associated with lighter, more saturated, yellower colors. Slower music in the minor mode was associated with darker, desaturated, bluer colors [8]. [11] found that "gray" was associated with sadder music whereas warm colors (red and yellow) and cool colors (blue and green) were associated with happier music. Music has the potential to influence one's mood, feelings and thoughts [2,3]. Music that has faster pieces are categorized as happy or positive sounding whereas slower pieces are deemed to be sad or negative [12,13].

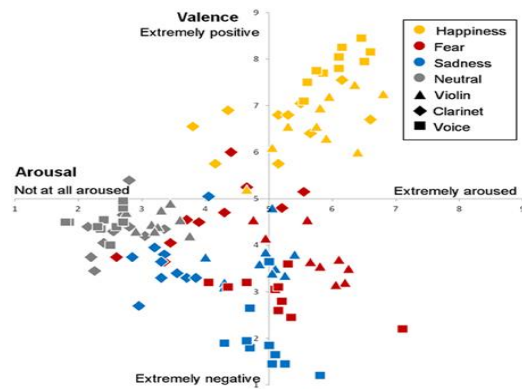


Figure 1. 2-D model of color-mood relation.

Establishing the relationship between mood and color according to musical preference was carried out by Moon et al. [7]. Pesek et al. [6] proposed a new novelty of using multimodal approach to associate emotions and colors perception to music with the inclusion of user context.

Research has been done on multimodal such as combining multimodal in data representation for music genre classification [14] and integrating user context with emotional and color perception of music for affective music information retrieval [6] as users seemed to process information faster and better when presented in multiple modalities [15]. However, integrating multimodal methods and its architectures need to be explored further and wider in its combinations [16]. To solve this problem a unimodal that integrates the association of color, mood and music into a 3D model.

3 Experimental Design

The aim of the survey was to find out if there was consistencies pertaining to relationship between color-mood (vice versa), color-music (vice versa), and mood-music (vice versa). A 3-dimensional model is to be created based on the data collected. Questionnaires were created and

distributed via social media such as Facebook and Whatsapp to all contacts. Samples of questions asked included, demographic information and consent such as "My cooperation in the research is voluntary and I can stop at any point", "Please describe your current mood by selecting the most appropriate color", "Music 1. Click the following link to listen to the audio sample. Then choose the closet mood you are feeling from the list below. You may replay the audio sample several times, but please choose only ONE closet answer". A grace period of one week was given to all participants to respond and as closing time. A total of 191 responded but only 50 completed all the questions. However, after cleaning the data, only 43 were eligible and considered for the analysis. Data collected was then tabulated for deeper analysis.

4 Results and Discussion

It was found that there are indeed inconsistent relation between color-mood (vice versa), color-music (vice versa), and mood-music (vice versa). This suggests that relation between two elements are not reversible. However, only the data obtained from color-mood-music association question were used to map into a 3-Dimensional model.

To compute a 3D model for the three elements, the ten (10) adjectives describing the mood were defined by Winer [17] and assigned a pair of values equivalent to pleasure and arousal by Russel [18] as in Table 1. For music scaling factor, each music genre was assigned a value obtained from Sample et al. [19] as in Table 2.

Mood	Pleasure	Arousal
Fear	-0.64	0.60
Sad	-0.63	-0.72
Happy	0.81	0.51
Calm (Untroble)	0.79	-0.01
Joy	0.72	0.48
Angry	-0.51	0.59
Relax	0.68	-0.46
Disgust	-0.60	0.35
Excited	0.62	0.75
Romantic	0.87	0.54

Table 1. Definition of Emotions in Terms of pleasure and arousal

Music Genre	Scaling Factor
Classical	0.88
Pop	0.532
Rock/Metal	0.773
Inspirational Religious	0.393
R & B Soul	0.715
Eaasy Listening (Relax)	0.471

Table 2. Music Genre and Scaling Factor

Element mood is represented using Thayer's Mood Model [20] where X axis represents the valence and Y axis represents the arousal. Each mood is assigned values [18]. Z axis represents the musical genres. From the analysis it was found that specific color was related to a specific mood and a particular mood was associated to a particular musical genre, as shown in Table 3. To retrieve a musical song, the color will be checked with the color column to see what mood and its associated song.

Color	Mood	Music Genre	Coordinates		
			X(Valence)	Y(Arousal)	Z(Music Genre)
Red	Angry	Rock Metal	-0.51	0.59	0.773
Orange	Happy	Pop	0.81	0.51	0.532
Yellow	Excited	Pop	0.62	0.75	0.532
Green	Relax	Easy Listening	0.68	-0.46	0.471
Blue	Calm	Classical	0.79	-0.01	0.88
Purple	Joy	Pop	0.72	0.48	0.532
Pink	Romantic	R&B Soul	0.87	0.54	0.715
Brown	Disgust	Rock/Metal	-0.6	0.35	0.773
Black	Fear	Rock/Metal	-0.64	0.6	0.773
Gray	Sad	Inspirational	-0.63	-0.27	0.393

Table 3. Tabulated values for 3D graph.

A 3D graph is created using X axis, Y axis, and Z axis representing valence, arousal, and music as shown in Figure 2.

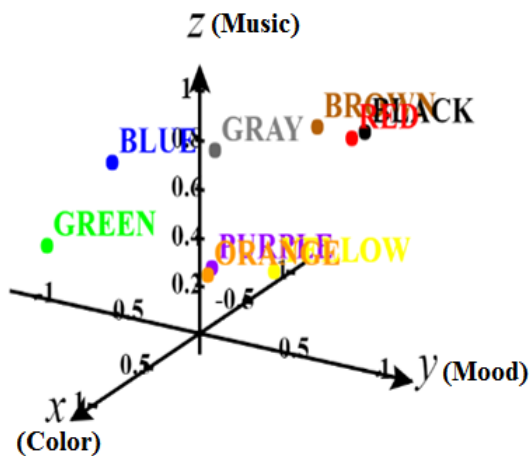


Figure 2. A 3D model showing the relation for color, mood and music.

Each color is associated to a particular mood represented by X-axis (Valence) with a value from -1 to 1 and by Y-axis (Arousal) with a value from -1 to 1 too. However, each music or genre represented by the Z-axis (Music) is given a value from 0 to 1. Depending on the color that is being scanned in, a list of songs from that particular category will respond accordingly. For example, if the user scan in green color, a relax mood will be displayed and a list of songs related to easy listening musical genre category will be recommended and displayed for user to choose the most likeable and suitable song to play.

5 Conclusions and future work

The overall aims of this work was to investigate the relationship between color-mood and mood-color, color-music and music-color, mood-music and music-mood and to establish a 3D model representing color, mood and music in recommending suitable songs that match the color of the ambience and the mood of users. The analyses presented revealed that there is a consistent relationship between the three elements. A 3D model representing color, mood and music have been proposed and will be further verified by another user study.

This model can be used to scan color or ambience of a room, instead of typing as typing has the tendency of creating typo error. In future, color extraction techniques such as color histogram will be used to identify the color as scanned which will then relate to the 3D model in order to identify the mood and suggest appropriate musical genres.

Since the current survey only consisted of 10 colors, more colors will be considered in future work. Color is cultural sensitive as different culture might experience different emotion [21] and this is reserved for future work. Music genres selected were rather limited and future work should include more.

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Technology-Based Intervention for Children with Learning Difficulties

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Abstract

Children with learning difficulties such as Attention Deficit and Hyperactive Disorder (ADHD), Dyslexia, Autism and Down Syndrome (DS) require different approach to teaching and learning. This is due to the fact that many of these children are struggling with multiple disabilities and multiple learning difficulties. Study investigating the use of ICT among people with special needs is getting more attention and interest by researchers in Malaysia. However, many of these studies are focusing on the development of assistive products which only cater to single disability and learning difficulty whilst in reality; children with special needs are normally having multiple restricted functional-abilities. The research aims to develop an assistive product based on the local contents using the current and relevant ICT technology. The MyLexics application is proposed in this study because of its potential benefits which improve children's learning, engagement and participation. Inclusive design principle is adopted in this study as we aims to intervene application which not only works for people with special needs but also works for other people.

This is in line with the aim of universal design which promotes accessibility to ICT regardless of abilities.

Author Keywords

Learning Difficulties, Children, Dyslexia, Mobile Application, MyLexics.

ACM Classification Keywords

H.5.2. Information Interfaces and Presentation (e.g., HCI), User Interfaces; J.3. Computer Applications; K.3 Computers and Education

Introduction

In Malaysia, it is estimated that 1 in every 20 students is dyslexic which means that each classroom in every primary school has at least 1 or 2 potential dyslexics [1]. This is supported by the figures from the Ministry of Education Malaysia that there are approximately 315,000 primary school children in Malaysia are potentially dyslexics [2]. There is also lack of local learning tools for children with learning difficulties in Malaysia [3]. In fact, many of the current applications were developed based on the contents adopted from other developed countries especially among the English speaking country [4]. Therefore, it is not only costly but some of the content might not relevant to our culture and children with special needs in Malaysia.

In 2010, FTMK has commercialised MyLexics which is an assistive learning courseware to help dyslexic children learn basic Bahasa Melayu. MyLexics is not only suitable for dyslexics but it is also can be used for children with other learning difficulties (e.g. ADHD, autism) and children aged 3 years old and above [2]. This research has led to more related research focuses

on children with multiple disabilities such as DS and autism. Our initial engagement with Pusat Impian Kita started in December 2016 in order to create awareness and supporting parents who has children with learning difficulties. We found that the parents are positive to help their children to overcome the learning difficulties. Thus, the current works attempt to improve the learning and participation among children with multiple disabilities with the use of MyLexics at Pusat Impian Kita – in fact, it offers more interactive and engaging learning environment for children with multiple disabilities. The usability assessment of applications through this research aims to promote and increase the assistive learning courseware intervention to help children with learning difficulties learn basic Bahasa Melayu in Pusat Impian Kita. This effort will not only contribute in enhancing the quality of life for children with learning difficulties – but, it also contribute to the collaboration and synergy by academia and related communities.

MyLexics 2.0 Application (MyLexics 2.0)

MyLexics 2.0 is a mobile application version of MyLexics – courseware that was developed to help children with dyslexia learn to read and write in the Malay language. MyLexics was developed based the 'Dual coding theory' by Allan Paivio [5] who suggested that a recall or recognition can be enhanced by presenting information in both visual and verbal form, combined with the Scaffolding teaching strategy [6] – providing assistance to student as-needed basis, fading it as the competence increases.

The content has been structured as building up process; the children learn the individual 'alphabets' and then combine the alphabets to make 'syllables',

finally they add the combined syllables to other syllables to form 'words'. MyLexics 2.0 (Figure 1) was designed based on mobile cloud computing to increase the numbers of the target users in the global market. Mobile cloud computing is a power tool to enable them to use this mobile application anytime and anywhere when needed irrespective of their movement. The advantages of mobile cloud computing; Mylexics 2.0 provides additional crucial feature by helping teachers and parents to monitor the progress of their children's learning in real time which cannot be done by previous version.



Figure 1: The MyLexics 2.0 application.

Summary

This research is to explore how the technology-based intervention of the MyLexics may lead to a better supporting about the needs of children with learning difficulties in Malaysia and more related studies will be carried out to ensure the prosperous solutions of ICT are accessible and usable to the community regardless

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Abstract

This position papers describes the works that had been performed and currently ongoing in the area of persuasive technologies. A spectrum of persuasion with regards to technology towards achieving behavioural change is illustrated, with building trust on one end, and behavioural change on the other. The spectrum is further categorised into three: (i) embracing the technology, (ii) dynamically updated information with moderate action response, and (iii) constant nudging and immediate change of action.

Author Keywords

Persuasive technologies; behavioural change; personalisation; community.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; K.4 Computers and Society.

Introduction

Over the course of 10 years, we have seen the booming of applications and systems developed to meet the needs (and the wants) of the users. With a vast number of smartphone users in Malaysia, which was estimated to reach 19.9 million in 2017 [1], an opportunity should be taken, especially when we have the aspiration to design and utilize the technology for

the betterment of the users. With this notion, our works look into persuasive technology and describe the spectrum by making brief explanation of our current and past projects.

Past and Current Works

In 2003, Fogg defines persuasive technologies as interactive computing systems deliberately designed to change people's attitudes and behaviours [2], including to change what they do or think. Persuading techniques are diverse, and the extent of usage of the techniques can reflect the degree of persuasion that the system has. The way we illustrate persuasive technologies as we applied in our works are as below, in which we categorised them into three, with two ends (see Figure 1).

Embracing the technology

The lowest degree of persuasive technology are of the ones which the computer systems push or provide information periodically, and the users may only receive the messages, reminders, prompts or recommendations as they use the systems. We further describe this category as systems which are designed to get the users to keep wanting to use the system, as

the users started to gain trust and confidence to keep continuing using them.

In our line of work, this can be seen in two of our projects, which both involved with undeserved groups. The first one is a learning software for children with cerebral palsy, in which the proposed design model (LSUIDM) is designed to meet the needs of the children in learning [3]. Incorporating the elements of game levels, with motivating caption and messages via audio, the children showed positive behaviour to finish each level, and opted to use the designed game as opposed to the conventional method.

Similar approach was applied for visual impaired users in B-DiNAMA project [4], where the mobile application was designed in such a way to give clear directions with encouraging and motivating responses. The feedback from users' were positive as they found the application builds up their confidence to be out by themselves, if not with a peer, as opposed to asking for help from the public.

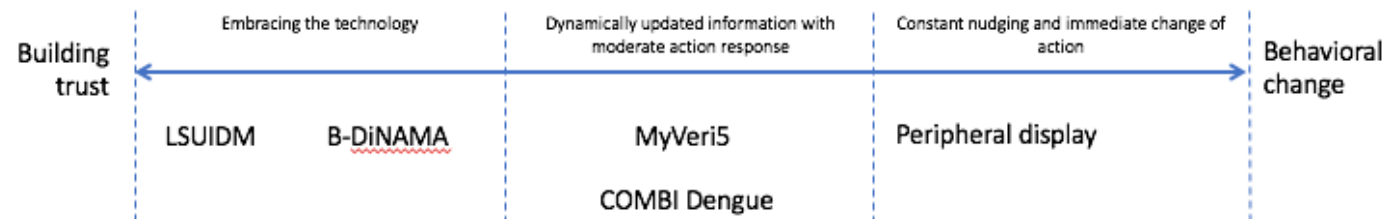


Figure 1: Spectrum of persuasion towards behavioural change

Dynamically updated information with moderate action response

The middle spectrum describes the persuasive technologies with information that are dynamically updated. As users started to use the systems, data will be recorded from time to time, and the messages as per described before, will be pushed to users even though while the systems are not actively in use. The users may or may not take action immediately, but they are aware of the changes, and will take response at the time that suits them.

MyVeri5 application was designed to motivate users to seek truth by verifying news and forwarded messages before sharing [5]. The mechanism of MyVeri5 allows users to submit any information to be verified, and dynamically receive the verified feedback soon after the respective agencies completed with the verification. Receiving feedback in the form of status: genuine or fake, of the submitted news or messages, instils relief and making users to continue using the app and even encourage the closest circle of friends and family to also use it.

The above application explores the idea of the six degree of separation, to give greater impact. A similar approach is applied in our COMBI dengue application [6], which combines with behavioural change theory, to encourage not just individual but the community to work together with the same goal, i.e. to eradicate dengue. The application provides reminders of activities one should perform, and updates of their circle colleagues and friends' activities based one nearby location, so to enable 'comparison' of self-progress to others.

Constant nudging and immediate change of action

Fully utilizing the use of sensors for close monitoring and tracking of user's actions or physical activities, the third category describes constant nudging and the immediate change of action from the user. We elaborate this category further into two, i.e. loose loop, and tight loop. The tight loop is of the ones which many of smartwatches today have, that the sensors embedded in the devices are able to record and analyse data, for instance heart rate, calories, which translate into personalized messages to nudge people to take the appropriate measurement. The extreme example would be a work by [7] where via motion capture, real time vibrotactile feedback is used to continuously nudge a violinist when playing incorrectly. We consider the violinist as primary target.

Meanwhile our work, describes the loose loop, which the sensors used are not directly tracking the users, rather, monitoring the real time data of certain devices (secondary target) and translate them for the usage of the primary target. In [8], we explore the types of peripheral display which visualizes the data of electrical consumption in an office, that could persuade the occupants to take the appropriate measurement when noticing the high usage of electricity. As the visualisation is always being displayed on the wall, i.e. constant reminder is given, people will keep 'knowing' and take the appropriate measurement on the fly.

Closing remark

The appropriate design and use of technology have been proven to benefit the people. In the context of Malaysia, the opportunities are there waiting to be grabbed so in return we could gradually transform into a more responsible, caring and concerned society. The

ultimatum of persuasive technologies is behavioural change, which can only be achieved when the desired actions are sustained. This itself is a challenge which seek and requires synergy from many collaborators to work together.

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Game-Based Intervention for Autism Spectrum Disorder

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Abstract

Autism Spectrum Disorder (ASD) is one of the fastest growing disorders that had been happening around the world. The ratio of children in Malaysia, diagnosed with autism is in 1 in every 625. Due to insufficient of learning auxiliary tool, ineffectiveness of teaching strategy and inadequate of good social-emotional development among children with ASD, this research project is initiated as a means of solution to aid in the situation. This research aims to design and develop a game for supporting social-emotional development of children with ASD. Most importantly, this research is to explore on how game can support social-emotional development of children with ASD

Author Keywords

Autism Spectrum Disorder, Children, Games, ASD, Social-Emotional Development.

ACM Classification Keywords

H.5.2. Information Interfaces and Presentation (e.g., HCI), User Interfaces; J.3. Computer Applications; K.3 Computers and Education

Introduction

Autism Spectrum Disorder (ASD) is a developmental disorder which the person tends to face difficulties in communication, social functioning and behavior. In

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addition, according to the National Institute of Mental Health, autism is known as a “spectrum disorder” because there is a wide variation in the type and severity of symptoms people experience. Besides, it is being mentioned that the communication and social skills of children with ASD including imitation, empathy and shared attention, present differentiated developments and in some cases with evident limitations [1]. Additionally, children with ASD have difficulty in understanding people as intentional agent. As the world keeps evolving towards modernization, the prevalence of autism is increasingly commonly today.

In 2014, according to the Centre for Disease Control (CDC), a rising percentage of the world population is being diagnosed with an ASD is estimated 1 per cent of the world population had an ASD [2]. Besides, in Malaysia, autism should no longer be considered as a rare disease but instead it should be recognized as a developmental disability that needed an urgent support. Furthermore, according to recent statistics, there are 300,000 people diagnosed with Autism Spectrum Disorder (ASD) in Malaysia [3] and it is identified that autism occurs more frequent in boys rather than girls. Thus, this number shows that it is important to give support to this people suffered with ASD. In fact, the increasing number of people diagnosed with ASD shows that it is important to support these children. Hence, the resources to cater this people are needed to be doubled in order to support their needs.

Nowadays, children are really fascinated by television and computer games and it goes same way to the children with Autism Spectrum Disorder (ASD). In addition, many children with ASD enjoy playing games

as they can improve their social skills, learn a variety of problem-solving and executive functioning skills.

Therefore, there is a question that have been motivated in this research which is how effectiveness game can support social-emotional development for children with ASD. Thus, there are 2 main problem that needed to be addressed:

- i. Inadequate of good social-emotional development among children with ASD.
- ii. Insufficient of auxiliary tool and ineffectiveness of teaching strategy to cater for autism education services.

Thus, the resource in the country to develop facilities and programs are much needed in order to overcome the increasing demand for autism education services.

Challenges that Children with ASD Encounter.

Bringing up a child with ASD can be a challenging for parents especially when other people do not understand the issues. A study found that although 95 percent of respondents recognized the name of autism but less than 70 percent can give specific characteristics of ASD [4]. These percentage shows that a lack of knowledge can lead to negative attitudes towards autistic individuals and families. Therefore, there a several challenges faced by individual autistic. One of it is education and care. There are three main problem to cater education services for children with ASD. According to [5], the problems are shortage of qualified teachers, objections to inclusion and as well as shortage of qualified caregivers. A survey was conducted and shows that only 6 percent of children in needs in Malaysia are enrolled in inclusive programs. Due to intensity of caring for their children, parents tend

to think that they should be provide form of care towards their children and sometimes school's activities do not meet the need for high quality care of children with ASD.

Furthermore, a healthcare system is also struggling to keep up with the growing demand for children with ASD. Due to shortage of specialist care make some parents thought that regular checkup visits could be challenging because of little understanding and accommodation of the children needs. Thus, this leads to the third challenges which is lack of autism friendly spaces. Waiting in line, riding a bus or even going to a restaurant could be highly stressful events for the children with ASD. Therefore, many simple changes would enable more families with autism to successfully navigate a space.

Games Potentially Supported the Development for Children with ASD

As the world keep evolving towards modernization, games have a biggest potential as a medium for intervention to cater children with special needs to learn, exchange and sharing contents and others. According to [6] games are found to have an incredible potential as a intercession for children with ASD because of the capacity to join attentively design elements with normally happening contingencies (i.e., having fun together).As a matter of fact, children with special needs benefit the use of computer-based technologies such as games to facilitate their educational activities in learning aspect. There are several platform of video games that have been widely used to facilitate children with ASD.

- i. Mobile Games: According to [7], Toca Boca which was a game development studio focused on child-friendly applications for tablets and smartphones. They found

that smartphones and tablets help autistic children to develop a new skill.

- ii. Virtual Reality Games: Virtual reality game also can be a powerful tool for training and rehabilitation since it offers safety, real time feedback, structured training and others [8]. For an example, a study shows that virtual reality game entitled 'Pink Dolphin Game' can improve the social and communication skills among children [9].
- iii. Augmented Reality Games: A study using augmented reality technology work as a Toon-Chat for children with ASD where the game help to enhance the communication development of children by covered their teacher's face with virtual cartoon and processed voice. This is because to reduce their stress of interacting with people and make them easier to understand emotions [10].
- iv. Kinect Games: Kinect game can be effectively to the children with ASD as Kinect technology has several features which make it suitable to cater needs of children with AS. For an example, a study using a Kinect game called 'Kinect Adventures' gives a positive impact in enhance their memory and push them to greater sociability [11].

Therefore, games can help the children to improve their social-communication, social-emotional as well as behavior towards peers, caregivers, teachers and people surrounding them. Subsequently games also can support social-communication and social-emotional development of children with ASD. According to [12], emotional development of children with ASD using paper based intervention which require the children to have literacy and writing skills were found not successful because the necessary components required are difficult to achieve by children with ASD. Thus, with a game that has

features such as face recognition enable the children to imitate the avatar as to improve their social-emotional development. For an example, a study shows a game called 'CopyMe' required the children to imitate the avatar's facial expression (i.e., happy, sad, angry, surprised, fear and disgust) [13].

Summary

This research is to address the following objectives: (i) to investigate on how game can support the social-emotional development of children with ASD, (ii) to design and develop the game for children with ASD and (iii) to evaluate short term used of the game in social emotional development of children with ASD. In fact, this research is expected to design and develop a game to support the social-emotional development of children with ASD. To summarize, this project is expected to help children with ASD that face difficulties in social functioning behavior, communication and to understand emotion.

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Abstract

This paper seeks to analyze the user requirements of designing community-based eHealth Mobile App for dengue surveillance. The methodology used for our project is Focus Group Discussion (FGD), questionnaires and interview. Majority respondents get health crisis information from television and their general knowledge and awareness about dengue is moderate. Features such as the information of dengue symptoms, prevention and treatment and Dengue map of Malaysia with hotspot area highlighted are among important features recommended. In addition, medical expert suggested the design of e-Health Mobile App should include COMBI (Communication for Behavioral Impact), so that the community can involve in the prevention of health crisis (dengue).

Author Keywords

User requirements, E-Health, Health crisis, Dengue Detector, COMBI.

ACM Classification Keywords

K.4 Computers and Society.

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Introduction

Dengue fever is a lethal disease that has become a global concern since the Second World War and is common in more than 110 countries [6]. Dengue fever virus is primary distributed by Aedes mosquitoes [9]. In some cases, the virus can also be transmitted through blood transfusion and organ donation [10]. Statistics have given that in 2017, 82,840 dengue fever cases were recorded with 171 deaths reported [1]. This shows that dengue fever is not a disease that should be ignored by the community.

Controlling dengue outbreak is already a challenging effort, with seemingly new strains of the virus continue to emerge [7]. Identifying ways to improve the awareness of dengue fever undoubtedly should hold highest priority. This is especially true for countries like Malaysia, which boasts a worryingly high number of deaths related to dengue fever [1]. In this regard, the usage of technology could be beneficial. Current mobile devices' technological capacity is making them easy and fast to use for various purposes including the sharing of healthcare information and awareness. They have also increasingly been used in health care for communication, monitoring, educating, and facilitating adherence to disease management [2, 3, 4, 5, 8].

In terms of managing and controlling an outbreak, a mobile based application could be used as a dengue surveillance system, for example, using GPS systems to track, identify and warn users of hotspots dengue locations. The dengue hotspot tracking will be helpful to the Ministry of Health as they can come up with a countermeasure to eradicate the dangerous mosquitoes in the hotspot.

As controlling the outbreak of dengue fever is very much a community problem, finding a community-based solution is necessary. Thus, a proposal of a mobile-based application on dengue surveillance should be done by including the community in the user requirements stage. Therefore, this paper presented the findings gained from collecting data and information from the community, through focus group discussions, interview and questionnaires.

Methodology

We had conducted 4 Focus Group Discussions (FGDs) with average of 18 participants. Participants are members of the public in Malaysia. A sample of multi-ethnic Malaysian citizens with various age groups, gender and diverse educational background were recruited in the hotspot area of dengue, Skudai, Johor Bahru. Participation in this study was voluntary and all participants provided written informed agreement. All information of the participants was collected anonymously, and the outcomes were used for research purposes only. At the beginning of each FGD session, a consent form was distributed to all the participant to sign. Once recruited, participants were then screened for qualifications, that is they must be aged 18 years or over, willing and able to give written informed consent. At the end of the session, the participants received a token of appreciation to thank them for their effort and participation in the research study.

To collect the data, a series of questions was developed. The questions were based on the following themes:

Selected demographic distribution

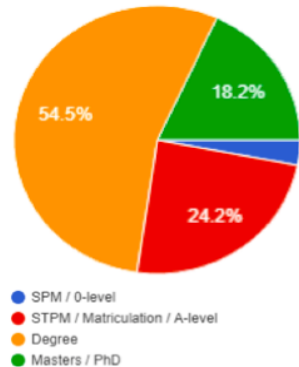


Figure 1: Demographic distribution based on Educational Level

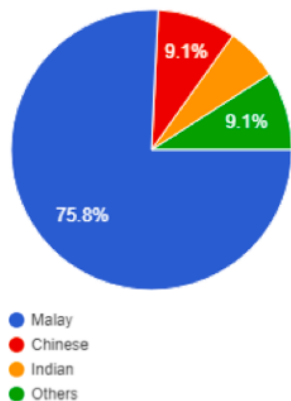


Figure 2: Demographic distribution based on Race

- Understanding of dengue fever
- General knowledge on how to prevent dengue, and its treatment
- People attitudes about the severity and susceptibility of dengue
- Prevention practices and barriers to prevention
- Treatment-seeking behaviours

These questions are distributed to all the FGDs to allow discussion. Groups were separated into the three main ethnic groups of Malaysia, Malay, Chinese and Indian and were conducted in the local languages of the participants.

Different educational background within each ethnic group were elicited to allow exploration of differences in groups from different educational backgrounds. All discussions lasted approximately 45 minutes to 60 minutes, and each of the discussion was audio-taped and later transcribed. FGDs conducted in languages other than English were forward translated into English. The facial expressions during the discussion were also take into consideration. Finally, an interview with the medical experts in the field are being carried out. This is to ensure the information gathered are true and enough.

Result and Discussion

A total of 4 FGDs comprising well-distributed ethnics in a group were conducted. Selected demographic distribution of the study sample is shown in Figure 1 and Figure 2. Table 1 shows the discussion outcomes based on given themes. User requirements of designing community-based eHealth Mobile App for dengue surveillance were then identified (Table 2).

As shown in Table 2, most of the respondents (84.8%) feel that the proposed Mobile App should provide information on symptoms, prevention, and treatment. 72.7% of them requires basic information on dengue, and the same percentage (72.7%) also prefers online AI-based chatbot. From the survey, respondents feel that it is not important to have features such as near real time update of dengue cases and healthy authority announcement. Only 1 person (3%) out of 33 respondents stated there is a need to have those features.

Theme area	Discussion Outcome
Knowledge about Dengue	- Know about moderately sign and prevention - Know the way to prevent mosquito breeding by remove source of stagnant water - Know about severity and will cause death. - Know home remedies such as Papaya Leaf Juice.
Prevention Practices	- Destroy mosquito breeding site - Prevent against mosquito bite
Barrier to Prevention	- Lack of community effort - Lazy to practice prevention - Perceived susceptibility that dengue gets by chance.
Attitudes towards Dengue	- Know dengue is severe and highly dead risk. - Some perceived low risk getting dengue.
Treatment	- Practice home remedies - Consult witch doctor - Take medical treatment in hospital - Seek immediately medical help

Table 1: Summarizes derived from the FGDs.

From the interview with medical experts, correct ways to treat patient were obtained. Efforts such as cleaning surrounding areas frequently, using larvicides, insecticides and fogging were stressed. Community-based effort such as the Communication of Behavioural Impact (COMBI) was also identified as being crucial.

Features	N	(%)
Dengue basic information	24	72.7
Symptoms, prevention and treatment of dengue	28	84.8
Map of Malaysia (with area coloured accordingly)	16	48.5
Online chat with AI professionals (aka BOT)	24	72.7
Videos regarding dengue information	10	30.3
Near real time update of dengue cases	1	3
Health authority announcement	1	3
TOTAL	104	100.0

N = Number of respondent; % Percentage

Table 2: Features and user requirements

Conclusion

It is important to increase awareness on dengue fever so that the public can be educated on prevention and management. Based on the findings discussed, the main user requirements for the development of eHealth Mobile App (Dengue) are the dengue information (such as symptoms, prevention and treatment), map of Malaysia with hotspot area highlighted and COMBI (Communication for Behavioral Impact). We can reduce the death cases involving dengue fever by providing users with helpful diagnosis before they seek doctor for consultation. With these features in the design of eHealth Mobile App (Dengue) it will be helpful for the

Ministry of Health and local community to come up with countermeasure to eradicate the dangerous Aedes mosquitoes in hotspot areas.

Acknowledgements

This work is part of our research work on using persuasive technology for dengue prevention. We thank all the volunteers, staffs of UTM ViCubeLab Research Group <http://vicubelab.utm.my> for provided helpful comments.

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Using Image Processing and Eye Detection to Improve Photograph Aestheticness of Selfie Images on Mobile Application

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Abstract

Self-photograph or selfie has become a popular and common activity on smart mobile devices nowadays. However, it is still difficult for the users to take a good selfie, which is time consuming and an endless task on mobile devices, especially for those who are not good at selfies. There have been few studies that worked on the approach of aesthetic in selfie. This study proposes an auto-captured mobile application for android users to take a good selfies and improve users' satisfaction when taking selfie. Our proposed system will help users taking selfies by providing an auto-captured camera and voice reminder that tell users to look at the camera lens. Aesthetic quality is estimated using empirical models for two compositional rules: eyes direction and head posture. We accomplish this by asking respondent to choose the most aesthetic selfportrait between looking direct to lens and looking direct to mobile screen, and we developed selfportraits of a 3D model of a human to be ranked from most aesthetic to least aesthetic. The study shows that 53% of respondent choose image of eyes looking direct to the lens as more attractive.

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Each submission will be assigned a unique DOI string to be included here.

Author Keywords

Selfie; photography; aesthetic photographs; head posture; eye gaze; eye blink detection; human-computer interaction

Introduction

Selfie refers to a self-photograph taken at an arm length by an individual using a digital or smartphone. It is one of the fastest ways to show yourself to others or record your everyday life for your own benefit. According to the authors [4],[6] the mobile phone is one of the most widely used electronic devices today. Advanced functions such as camera, e-mail, and mobile finance services in modern phones have broadened their usages and applications way beyond our imaginations from just a decade ago. One of the most used function is camera where can be used to capture memories of one self, such as selfies. Selfie became more and more popular with the development of social media. Now, it take an important role in our daily life. Along with its popularity, how to take a good selfie has become an issues to be solved. People want to look good on social media as facial attractiveness is a pervasive factor in everyday life. Even though people are often not aware of its impact, attractiveness affects our social perception and interactions in various ways [2]. Our attention is bound by pleasing people as an automatic effect which is hard to evade. Unfortunately, many of them encounter trouble when taking selfies. They often spend long time and take bunch of selfies trying to get the best shot that make them look pleasing and different from others.

Photography is defined as the art or practice of taking and processing photographs. Aesthetics in photography is how people usually characterize beauty in this form

of art. There are various ways in which aesthetics is defined by different people. There exists no single consensus on what it exactly pertains to. However, the broad idea is that photographic images that are pleasing to the eyes are considered to be higher in terms of their aesthetic beauty. According to the Oxford Advanced Learner's Dictionary, Aesthetics means "concerned with beauty and art and the understanding of beautiful things" 1 , and [10] "made in an artistic way and beautiful to look at". A more distinct discussion on the definition of aesthetics can be found in "Photo.Net Rating System"2. As can be observed, no consensus was reached on the topic among the users, many of whom are professional photographers. A related work have been proposed where a real-time selfie support system which provides suggestions for the head posture of the user and aimed to help user to take good selfies [7]. The aesthetic evaluation may vary due to different cultural backgrounds or knowledge differences. [9] introduced techniques enabling interactive guidance for better self-portrait photos ("selfies") using a smartphone camera. Aesthetics feedback was given for photos taken by mobile users from compositions, color combinations and the aesthetic rating [5]. The contribution of this work is to review and gather existing interdisciplinary knowledge of eye detector to implement on today's handheld. This work will be particularly helpful for some people out there to produce a better image as their memories in future. Some of us are very concern about the final image produced. The idea of this work will investigate the human eyes behavior during selfies.

Datasets

Our goal is to help amateur photographers take selfportraits that other people find it more aesthetically

pleasing. We accomplish this by asking respondent to choose the most aesthetic self-portrait between looking direct to lens and looking direct to mobile screen, and we developed self-portraits of a man 3D modelling where respondent ranked the portraits from most aesthetic to least aesthetic. We did the preliminary test as to confirm what problem that people facing when taking self-portraits. We conducted two tasks. Firstly, respondent were required to take two selfies of themselves with eyes looking at the mobile screen and with eyes looking directly into lens. After this, they were interviewed. For Task 2, respondent had to rank from the most attractive images to the least attractive images of 3D modelling of a man. The preliminary test were done with students from the Faculty of Computer Science and Information technology. They were five boys and fourteen girls with aged group 21 years old to 25 years old who had participated in this experiment. To overcome differences in the results during Task 1, the setup for this experiment was controlled. A room with a white background, a chair and a small coffee table has been setup for students to complete each task. Two SJCAM camera were used to record behavior of all respondent. Once the task were done, a face-to-face interview happened where respondent needs to justify their own choices.

Experimental Results

21.1% of respondents looked directly into the lens, while 78.9% of respondents looked at the mobile screen in the first task. They commented that they want to have a nice selfie and make people who look at their image to feel connected as their eyes look directly into the lens. Meanwhile, those looked onto the screen mentioned that they felt comfortable and want to check whether their face look nice, have good lighting on their

face, and that they have the best angle. In addition, they want to check where the button to take selfie is before they take the selfies. 52.6% respondents said image of eyes looking directly into the lens to be more attractive because looks more natural and they felt like the person in the image was looking directly to them and feel connected. The remaining 47.4% of respondents said that images that looked away from the lens were more attractive because selfie images with eyes looking directly into lens made them felt unpleasant. 73.3% of the respondents said that this issue mattered to them as they wanted to have a better selfie to show others and wanted to look confident in the image. For Task 2, 57.9% respondents said that they rank the pictures given by taking into account the head direction first, then the eyes direction. This is because the head plays an important role to show an attractive preference of the person's face as well as the facial expressions. The face will follow where the head is directed to. If the head is directed to the right angle, the face will also show its best features and the emotion can be relayed perfectly. Next is the direction of the eyes. This feature comes in the second placed because eyes can show how people feel during the selfie. If the eyes look into another direction instead of looking directly to the lens, it shows that the person is focusing on something else rather than taking a selfie, or that they don't have any interest to be in the picture, and the image might look awkward.

Conculison

From this experiment, we can tell that people actually want to have an aesthetic photographs but they don't know how to get the best photo and sometimes it is tiresome as they have to retake the selfie repeatedly to achieve the desired look. Some of respondents looked

at the mobile screen first because they wanted to check their face to get the best angle and some of them wanted to find where the button to take selfie was before they can take picture of themselves. Thus, we will be working on an auto captured selfie mobile application that will help people taking the best selfportraits of themselves. Our proposed system will help users taking selfies by providing an auto-captured camera and voice reminder that tell users to look at the camera lens.

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A Paradigm Shift: From User-Centred to Human-Centred Design

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Abstract

This paper reflects how research in Human Computer Interaction (HCI) has shifted my design paradigm, from user-centred to human-centred design. While user-centred design focuses on making the computer easy to use and delivering what the users want from the computer, human-centred design is about what is like to be human. From our studies, we learn that to be a human means being able to explore, share and experience without fear. Thus, we need a computer who understands us as a human and provides a safe environment for our interaction.

Author Keywords

User-centred design; human-centred design; usability; user experience; human-like computer; reflection paper.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

My First Encounter with Human Computer Interaction (HCI)

I first got to know about Human Computer Interaction (HCI) when I did my Master studies in UiTM in 2000. Prof Norlaila Md Noor was the person who introduced me to the field. She taught students the importance of

understanding humans in the design of a system. From her class, we learned how to make interface easy to use by other people so that people can do their work effectively and efficiently. Since then, I had developed an interest in making computers usable and accessible by the users.

Becoming an HCI Researcher

Due to strong interest in the field, I decided to continue my PhD in the UK under supervision of Prof Alan Dix at Lancaster University. Prof Alan Dix is one of the gurus in HCI whose book has been used as a textbook at universities around the world. At Lancaster University, I had an opportunity to work with Ethnographers, Social Scientists and Computer Scientists. Working with different talents from different backgrounds had directly influenced my point of views and eventually affected my research. I applied Participant Observation in which I used diary and interview as my main data collection methods. My work was also greatly inspired by Prof Don Norman whose work was on emotional design and whom I met at APCHI2004 in New Zealand. During my study years, I had acquired necessary people skills to help me understand people better, thus helping me design for certain people better.

From Usability to User Experience

Upon completion of my PhD in 2008, I started with a few usability projects in which my students and I had opportunities to evaluate some systems at UiTM. Later, we were given responsibility to perform usability evaluation of systems at some Government Agencies, universities and industries. Some of the usability studies we conducted had an impact on a particular user group: for example, how Immigration's Online Passport System affected elderly users in renewing

their passport online [8], how JPA's HR Login Page affected their senior employees in getting into the system [4], how an e-learning system affected lecturers in their teaching [2] and how Air Asia's mobile app affected travellers in booking for their flight tickets (as an expert reviewer). What we learned from these evaluation studies was either about the user acceptance or rejection. From our experience, if a user accepts a system, he or she will usually respond with expression of positive emotions such as feeling happy, satisfied, energized or even spiritualized. Likewise, if a user rejects the system, he or she will respond it by expressing with negative emotions such as feeling frustrated or demotivated. The emotions that users express are very much associated with their use experience. Due to this, we as HCI designers often design based on what users want and feel: a user-centred design approach.

Now is Human Centred Design

Starting from 2016, we have started to study *why people do things the way they do*. 2015 marks the year in which 'viral' or oversharing became a phenomenon in Malaysia. We investigated why certain parents overshare stories about their children on social media [7], why young children use social media despite potential dangers awaiting them [5] and why people share fake news [6]. Our Government through MCMC made efforts to raise user awareness about the potential dangers of social media, especially for the young children, however, the efforts did not yield a fruitful result. [1] revealed that it was not about the children who were not aware of the dangers. In fact, they knew it quite well, but the main reason why they went on social media was simply because everyone else was doing it. Janet Read, an expert in Child-Computer

Interaction (CCI), said during her talk in UM this year that a child should be allowed to make mistakes because this is how he or she learns about the world. She further highlighted that stopping children from going online is not a solution. We just need to have a computer who understands a child. A child who can explore the world without having to worry about their safety. She then coined a term 'child-like computer'. Similarly, the last two years our Government has been trying to educate the Internet users about the effect of fake news on politics and society, however, it was proven not to be successful as we are still getting fake news a lot, especially on social media. [3] and [7] both

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discovered the same reason why people share online: they thought that information they found would be useful to others. What we need is a technology that would check for facts either it is fake or real, leaving only the confirmed news which will then get shared with other users. From these studies, we finally understood what is like to be humans. As a human, we want to explore, share and experience without or with less worries. Therefore, what we need is a computer or technology who understands us and at the same time provides a safe environment for us to explore, share and experience.

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The Relationship of Social Cognitive Factors and Knowledge Sharing Behavior in Teachers' Virtual Communities

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Abstract

Knowledge Sharing (KS) between teachers in virtual communities (VC) has been affirmed to develop teachers' professionalism in this 21st century. This paper examines the KS behavior from Social Cognitive Perspective by investigating the relationship of Self-Efficacy, Personal Outcome Expectation, Community-Related Outcome Expectation, Trust and Knowledge Sharing Behavior in teachers' VC in Malaysia. Online web survey on participants were analyzed using SPSS. The findings revealed that teachers are positive towards KS behavior in VC and the predictor of knowledge sharing behavior in teachers' VC are Self-Efficacy, Trust, and Personal Outcome Expectation whilst Community-Related Outcome Expectation is excluded. Findings from this study contribute to the Information Technology (IT) fields by providing insights into the design and development of KS systems, promoting teachers' perception on the importance of KS behavior; provides new theoretical insights and also expanding the value in KS practices in education field specifically in Malaysia. It is recommended for future works to apply mixed method and content analysis techniques to provide a deeper understanding of KS behavior and the type of content teacher shared in VC.

Author Keywords

Knowledge Management, Knowledge Sharing, Social Cognitive Theory, Virtual Community, Teacher

ACM Classification Keywords

Human-Centered Computing (Social content sharing)

Introduction

Virtual Communities (VC) has become one of the most popular Internet applications nowadays with the help of the growth of Internet technology. VC provide internet user with a convenient and efficient way to share knowledge among other users. Therefore, VC are constantly created to promote knowledge sharing (KS) over the Internet.

According to Social Cognitive Theory (SCT) as in Figure 1, user behavior is influenced by two factors: personal cognition and environment (A. Bandura (1986 & 1997). Personal cognition includes self-efficacy and outcome expectation. Environment involves trust.

Problem Definition

Quality teachers are the drives to the realization of the transformation of education in Malaysia (Malaysia Education Blueprint, 2013-2025). Therefore, in this era, teachers can no longer work efficiently as individuals. They need to work collaboratively to improve their professionalism (Hord, 1997).

However, teachers' professional development (PD) in Malaysia occurs at individual and not collaboratively (Waheed, Salami & Dahlan, 2011). Teachers need to be as efficient so that they can give out best-teaching practices by progressively learn to gain more knowledge and skills so that they can give out best teaching practices (Mizell, 2010).

Furthermore, Khalid, Joyes, Ellison, & Karim (2013) suggest teachers in Malaysia participate more in communities of practices (CoP) in their schools to enhance the quality of their teaching skills. By reuse and reinvent other teachers' ideas, teaching activities

may improve and learning materials preparation time could be reduced (Van et al., 2013).

Knowledge sharing (KS) purpose is to accelerate the competitive advantage of organizations and individuals' action capability through knowledge contribution and knowledge seeking for reuse. (Senge, 1998 and Chen & Hung, 2010, p. 226). While this is true, very few research has been done to study knowledge sharing in teachers' context. As such, knowledge sharing among teachers is a road to an effective way to improve teachers' professional development, content knowledge, and pedagogical skills (Van et al., 2013).

VC are being widely used by teachers for professional support, guidance, and inspiration (Bond, 2004; Matei, 2005). Since teachers working time is very tight, online knowledge sharing in VC of practice able support them to develop their professionalism (Bill & Melinda Gates Foundation, 2014). In addition, Researchers in the education field and KM suggested the creation of VC of teachers as a new teachers' PD model, and as KM platform, a CoP can provide both tacit and explicit knowledge sharing opportunities among teachers. (Petrides and Nodine, 2003).

Less empirical studies have been done to investigate how CoPs can be sustained in education community (Kirschner & Lai, 2007). Knowledge is a valuable asset to share (Liebowitz, 2001).

SIGNIFICANT OF STUDY

The study contributes in providing new insights for KS system (KSS) development for teachers in VC based on understanding of their KS behavior in VC and model their behavior into a KSS.

LITERATURE REVIEW

SCT is widely accepted model for confirming the individual behavior (Compeau & Higgins, 1995).

Based on SCT, individual behavioral behavior is influenced by triadic factors which are 1) behavior; 2) environment; and 3) personal factors. SCT explains that there is the dynamic relationship between these

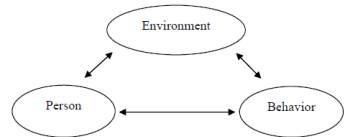


Figure 1: Social Cognitive Theory Model (Bandura, 1986)

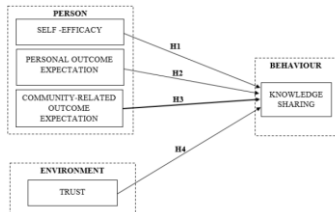


Figure 2: Research model

three factors whereby it influences each other (Gist & Mitchell, 1992; Wood & Bandura, 1989).

Self-efficacy also refers to self-evaluation against an action, trial, and confidence in making a decision (Lin, Hung & Chen, 2009).

The next factor is outcome expectations. This factor is the expectation of getting something after performing something (Bandura, 1997; Sexton & Tuckman, 1991). Similarly, Dziewaltowski et al. (1990) say self-efficacy gives direct impact on the action of an individual.

Chowdhury (2005) states that trust is the prominent factor for defining knowledge sharing activities efficiency.

Hence, this study hypothesizes:

H1: There is a significant relationship between teachers' self-efficacy and knowledge sharing behavior. In VCs context, the outcome expectation consists of two aspects which are 1) personal outcome expectation and 2) community-related outcome expectation (Chiu et al. 2006; Hsu et al. 2007). Hence, this study hypothesizes:

H2: There is a significant relationship between teachers' personal outcome expectation and knowledge sharing behavior.

In this study community-related outcome expectations is being examined as well essentially reported by Chiu et al. (2006) as being ignored in studies done by Wasko and Faraj (2005). In fact, some studies done have proposed that individuals share their knowledge with others because they have the expectation to help VCs to

enlarge its knowledge repositories and sustaining the VCs (Chiu et al., 2006) Bock et al., 2002; Kolekofski & Heminger, 2003; Lesser, 2000). Hence, this study hypothesizes:

H3: There is a significant relationship between teachers' community-related outcome expectation and knowledge sharing behavior.

Ridings et al. (2002) propose that trust is a fundamental component in encouraging the voluntary online participation between strangers in virtual communities. While, Pavlou and Gefen (2004) affirm that for effective collaboration, the primary basis is interpersonal trust.

Also, Nonaka (1994) showed that interpersonal trust is essential in for establishing an environment for knowledge sharing in organization or team. Moreover, McEvily, Perrone, & Zaheer (2003) indicate that trust is a valuable principle for knowledge sharing enhancement.

Identically Blau & Bierstedt (1965) and Kalantzis and Cope (2003) also posit that trust will be able to contribute to sharing knowledge of good quality by creating and maintaining the relationship. Hence, the last hypothesis is developed.

H4: There is a significant relationship between teachers' trust and knowledge sharing behavior as in Figure 2.

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Utilizing User Experience Questionnaire (UEQ) in Evaluating a Shariah-Compliant Fashion E-Commerce Prototype

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Abstract

The paper describes the idea of utilizing the User Experience Questionnaire (UEQ) in evaluating a shariah-compliant fashion e-commerce prototype. UEQ is a survey which can be utilized to evaluate the user experience quality of a product in term of Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation and Novelty. There are twenty six (26) items in this questionnaire with 7-point Likert scale. The main reason for choosing this tool is that UEQ comes with a data analysis tools which is very convenience to use. Data could automatically be analyzed and the graph is automatically generated by the data analysis tool. UEQ will assist the researcher in measuring the usability and user experience aspects of the e-commerce site as it allows a fast evaluation of the user experience of interactive products.

Author Keywords

User Experience; User Experience Questionnaire; E-commerce;

ACM Classification Keywords

H5.2 User interfaces: Evaluation/methodology, K4.4 Computers and Society: E-Commerce

Introduction

This research involves the design, development and evaluation of a shariah-complaint fashion e-commerce site for Muslim women in Malaysia. This site offers fashion products which are conform to shariah (Islamic system of life) requirements. The products offered in this site are stylish, fashionable yet elegant. The e-commerce site also comes with a built-in body-shape type calculator which can give recommendation of products based on consumers' body-shape type for example apple, pear and hour-glass. Beside that this site also has the ability to give recommendation of size for every consumers based on their body measurement.

With the rapid growth of online trading and e-commerce, the online shopping evaluation performs a very important role in improving user experience [1]. Nevertheless, majority of the research mainly proceeds from technical levels, which has lost sight on user evaluation, and fails to provide better user experience[2].

A good user experience is central for the success of this fashion e-commerce site. Therefore, it is very important for the researcher to be able to measure user experience in an efficient and reliable way[3]. There are many tools that can be utilized to measure user experience on certain products for example surveys, questionnaires, matrices. For this research the researcher will be utilizing the User Experience Questionnaire (UEQ) to measure user experience of the fashion e-commerce site.

User Experience Questionnaire (UEQ)

User Experience Questionnaire (UEQ) is a survey to

which can be utilized to evaluate the user experience quality of an interactive product. Although this questionnaire was initially developed to evaluate software products, it can also be applied to any kind of digital and physical product.

The aim of the UEQ is to provide a fast evaluation by the users and focusing on comprehensive impression of user experience. It allows the users to express feelings, impressions, and attitudes that arise when experiencing the product effortlessly and immediately [4].

There are twenty six (26) items in this questionnaire and according to [4], each item of the UEQ consists of a pair of terms with opposite meanings, for example:

Boring o o o o o o Exciting

Efficient o o o o o o Inefficient

Participants will then rate each item on a 7-point Likert scale. The answers are scaled from -3 (strongly agree with negative term) to +3 (strongly agree with positive term). Half of the items start with the positive term, the others with the negative term and they appear in randomized order [4].

According to [5], UEQ is arranged into six scales which are:

- i. Attractiveness: This scale measures the overall impression of the product. This scale will indicate whether the users like or dislike the product and whether the product is attractive, enjoyable or pleasing.

- ii. Perspicuity: This scale measure whether it is easy to get familiar with the product. It is also determine whether the product is easy to understand and unambiguous.
- iii. Efficiency: This scale determines if the users could solve their tasks without unnecessary effort. This scale also measures the efficiency of the interaction within the product.
- iv. Dependability: This scale determines whether the user feel in control of the interaction the ability of the users to predict the system's behavior. This scale also measures the confident level of the users when they are working with the product.
- v. Stimulation: This scale measure whether the users feel exciting and motivating to use the product. It also determines if the product is enjoyable to be used.
- vi. Novelty: This scale measure if the product is innovative and creative and whether it captures the user's attention.

Advantages of UEQ

There are several reasons which motivate the researcher to utilize UEQ in evaluating this shariah-compliant fashion e-commerce prototype. Among the reasons are:

- i. Availability - The questionnaire together with the handbook and the data analysis tool are available online at www.ueq-online.org. They are free of charge and can be downloaded in twenty different languages.
- ii. Data Analysis Tool - UEQ comes with a data analysis tools in the form of Microsoft Excel sheets. A maximum of 1000 testers' responses

could be recorded in a sheet. Data is automatically analyzed and the graph is automatically generated by the data analysis tool. Fig. 1 shows an example for an overall result for a product.

- iii. Language - The initial version of UEQ was designed in German [6], but has been translated to twenty (20) languages including Malay Language. Thus this tool is appropriate for this study as the respondents are Malaysian and they will be able to choose to answer the survey via English or Malay version of UEQ.
- iv. Efficiency - According to [3] generally, the survey takes around 3-5 minutes to complete including some demographic data [3]. Therefore, it can be said that UEQ is an efficient method to capture the opinion of a user towards the user experience of a product.
- v. Flexibility - Although UEQ was initially developed as a paper-pencil version, is also suitable to be used as an online survey via Google Forms, Web Survey, Survey Monkey and other online survey platforms.

Conclusion

The paper discusses the idea of utilizing the User Experience Questionnaire (UEQ) in evaluating a shariah-compliant fashion e-commerce prototype. UEQ allows a fast evaluation of the user experience of interactive products. It measures usability aspects like efficiency, perspicuity and dependability and also user experience aspects like stimulation or originality.

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Smart Door for Children with Disability of the Arm, shoulder and Hand (DASH)

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Abstract

People with disabilities interact with the environment differently compared to normal human beings. However, most environments are not design for universal accessibility. This is also for the case for people with disability of the arms, shoulder and hands (DASH). Our study aims to explore and analyze the significant actions of children with DASH related to opening doors in the real world and computing environment. The result serves as a guideline for designing smart build environment with IoT technology. We observed children and adults with DASH and found that in the context of opening a door (real or computer-based environment), gestural interfacing for people with DASH should focus on the top or the bottom part of the body i.e. the head, nose, mouth tongue and toes. We proposed system architecture for smart doors in IoT environment for children with DASH.

Author Keywords

DASH, HCI, Gesture Interface, IoT

ACM Classification Keywords

H.5.2. Information interfaces and presentation: User Interfaces

Introduction

Perfect humans are awarded two hands with two legs and operate their daily lives differently. However,

human beings born without perfect limbs have different ways of running their daily lives. Adult and children with disability of their arm, shoulder and hands (DASH) have difficulties executing many tasks. Interacting with computers, mobile phones, buying food and drinks through the vending machines, and also opening doors.

Door locks

Digital door lock plays an important role on the smart home system, not only for door owners but also for family member incoming/outgoing security awareness [1]. In our contemporary living environment, most people, like to maintain privacy and security as well as like to avoid losing keys or passwords for their doors at home [2]. Additionally, many would like to own a fast, convenient and cost-effective exclusive door lock controller to establish some peace of mind.

Traditionally, splitting spring padlocks and combination locks are used to control the closing/opening of doors [3]. In recent years, locks have been made to use keys, turntables, buttons, circuitry, radio frequency technology such as radio frequency identification (RFID), and other safety devices as part of their operation.

An example of an innovative smart door is door lock design which has a non-contact pattern recognition controller to recognize a tiny pattern that can be displayed by mobile devices [2]. The recognized pattern is built using a two-dimensional text and graphics method that can be stored by owners' mobile devices. Therefore, when a key-owner comes near a door's control panel, the established two-dimensional text and graphics cypher can be displayed. Other type of digital door is where the design provide both carried key and non-carried key interface. The most practicable design is to combine smart card (carried) and touch screen panel (non-carried) [1].

Children

One of the important issues to consider when designing for children is their physical appearance. Four

supporting sections concerned with design, evaluation and implementation of interactive computing for children [4]. These are; the use, the computer system interface, the development process and the human characteristics. For example generally children use the computer for play and children are constantly adapting to interfaces. Therefore, the development of systems must take specific account of the physical sizes and abilities.

Our study

Our study is focusing on children with DASH which includes children with motor dysfunction and people with abnormal limbs i.e. without arms, shoulders, hands and fingers. Specifically, our study focuses on gestural interfacing. The motivation of this study relates to the fact that little study has been done to support disable communities in interacting with the environment through the Internet of Things (IoT) platform. Universal access should also be provided for the disabled communities in Smart build environment such as in homes, offices and learning space facilities. This is as suggested by [5] to build friendly smart city design facilitating the disability community consisting of accessibility, safety, minimized problems, and flexible environment.

Therefore, the aim of our study is to explore and analyze a suitable smart door system design for children with DASH in an Iot platform.

Interview and observation with adult/children with DASH

We conducted 3 interviews to people with DASH to answer a questionnaire and one person with no noticeable disability. They are two males and 2 females. The participants have the following disability: no elbow for right hand, no shoulder for right hand and no shoulder for both hands. We asked the questions in Table 1.

Table 1: Questionnaire for DASH people

No	Questions of opening a door
1	How do you open doors? Do you ask someone to help you? Do you use any tools to help you opening a door?
2	How do you open your wardrobe door? Do you ask someone to help you? Do you use any tools to help you opening a door?

Our observation from 12 YouTube videos of adult/children with DASH identified their most common use body part to interact with the environment. Based on the interview and the observation we concluded that the most common method for children/adult with DASH to interact with the environment is by using the head, nose, mouth tongue and toes.

Proposed architecture for opening smart doors

This research is focused on gestural interfacing with existing system which include computing and real world. We focused on opening a pull door such as wardrobe door, window and drawers. Figure 1 shows a door that can be opened using a sensor placed on top of the door. The door can also be open using a camera that reads a suitable gesture from a child with DASH through a web interface. The opening door mechanism is through an Arduino set that sends the gesture signal to the door.

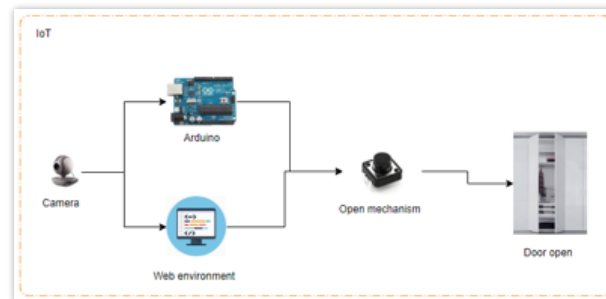


Figure 1: Proposed architecture system for Smart Door.

Acknowledgement

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Integrating Multisensory Learning in Mobile Application Development for Dyslexic Student

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Abstract

This paper points out the idea of integrating multisensory learning in a mobile application development for dyslexic student. The main reason of suggesting mobile application developer to integrate multisensory learning is to uphold a pertinent learning approach which suits the need and ability of the learner that directly use the developed mobile application. Multisensory learning is a learning approach that integrates visual (V), auditory (A) and kinesthetic (K) main sensory receivers, or VAK learning style model. Multisensory learning could help dyslexic student to actively learn using their vision, hearing and touch sense. Suitable learning approach should be applied to mobile application to ensure its effective use as a learning material. Ultimately, it is important to integrate appropriate learning approach according to learner's need and ability.

Author Keywords

Multisensory learning; mobile application; dyslexic student.

ACM Classification Keywords

H.4.m. **Information System Application:**
Miscellaneous;

L.3.6.Methodology/Tools/Technology: Technology Enhanced Learning.

Introduction

Focus of this paper is to highlight the need of applying multi-sensory learning in mobile application development for dyslexic student. It can be realized by developing relevant mobile application with such approach embedded. Mobile application nowadays have been recognized as a type of learning materials. Variety of learning materials can be used in assisting student's learning, not forgetting student with learning disability. Several studies showed that mobile learning has been asserted as an alternative learning tool to assist students with special needs [1].

Student with learning disability (SLD) in this study is specifically for dyslexic students, in average from 6 years old to 15 years old. Why dyslexic? Dyslexic, suffered from dyslexia is usually having problem with reading or writing words or sentences. Dyslexia as defined by [2] was a neurobiological learning disability creating problems with word recognition, spelling and decoding. One thing in common, deficit in working memory usually give impact to the ability in retaining details competently and recalling stored information rapidly, and this has led to inaccuracy during remembering specific order of content or long thread of instruction [3].

In order to educate mobile application developer, the process of developing mobile application should be exclusively infused with considering dyslexic learning approach in mind, regardless variety of topic and variety of target user. According to [4], multisensory teaching is an effective approach to teach dyslexic

children, who often do not learn well through sight and sound alone. [4] believed that they need to experience multiple sensations simultaneously. Therefore, learning process should be aligned with the teaching process.

Multisensory Learning

Learning using human sensory is a usual process that every human does since they were born. Normal human being is granted with five (5) basic senses: sight, hearing, smell, taste and touch. Researchers such as [5], [6] and [7] agreed multisensory technique, which integrates visual, auditory, tactile (touch) and kinesthetic (movement) learning elements, suits to be used by children with learning disabilities or special need. For a mean time,[8] believed learning can be in a multi-sensory way, that can make people accomplish learning process in the modals of hearing, speaking, reading, and writing.

Study by [5] shown that multisensory teaching method is the most effective teaching method for children with difficulties in learning to read. Meanwhile [6] highlighted that teaching methods for students with any form of learning disabilities should be adapted to the individual needs of the student. In addition, [7] emphasized on spelling challenges of learners with auditory processing disorder (APD) which can benefit from multi-sensory learning strategies.

Argument: Precise use of multisensory learning

Mobile application, either from smart phone or tablet is basically developed for learning purpose for specific learner. However, not many mobile application developers had equipped themselves with correct domain knowledge of dyslexia feature. Therefore,

development of mobile application should consider the need and ability of dyslexic student.

Studies had shown that in order to enhance memory and learning, one of the most useful practice is multisensory method that have to be done simultaneously. For example, [5] drew attention to the function of multisensory teaching techniques and strategies, which stimulate learning by engaging students on multiple levels.[5] believed in using a multisensory teaching technique to assist a child in learning through more than one sense. The difficulty of learning can be solved by integrating the use of more of the child's senses, especially the use of touch (tactile) and movement (kinetic).

Prior to this, it is vital for teachers to use appropriate strategies that teach the connection between the pronunciation and spelling of a word, since the cause of dyslexia is a phonological processing disorder. Moreover, some educationists theorize that when students are taught using techniques consistent with their learning styles, they learn more easily and faster than before.

Conclusion

As a conclusion, multisensory learning provides more ways for understanding new information, more ways to remember it and more ways to recall it later[9]. Multisensory teaching techniques help break down barriers to learning by making the abstract more concrete, turning lists or sequences into movements, sights and sounds. In addition, teachers who implement multisensory approaches in their teaching process, according to [3] usually give their support to academic

growth by increasing their students' ability to maintain connections between and among concepts.

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