Faculty of Cognitive Sciences and Human Development

DEVELOPMENT AND EVALUATION OF A MOBILE-BASED MICROLEARNING APPLICATION ON MARINE CONSERVATION

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BF
311
S588
2019

Bachelor of Science with Honours
(Cognitive Science)
2019

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DEVELOPMENT AND EVALUATION OF A MOBILE-BASED MICROLEARNING APPLICATION ON MARINE CONSERVATION

KELLY SIM KAI NIE

This project is submitted
in partial fulfilment of the requirements for a
Bachelor of Science with Honours
(Cognitive Science)

Faculty of Cognitive Sciences and Human Development
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The project entitled 'Development and Evaluation of a Mobile-Based Microlearning Application on Marine Conservation' was prepared by Kelly Sim Kai Nie and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

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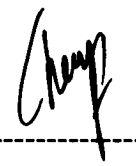

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ACKNOWLEDGEMENT

I would like to express sincere gratitude, warmth and appreciation to everyone who provide help and guidance that made my research successful and achieve my goal.

I would also like to show special thanks whole-heartedly to my supervisor, Prof. Dr. Chen Chwen Jen for the advice that proved to be a landmark effort towards the success of my research.

Finally, I would like to acknowledge with gratitude, the support and love of my family – my parents and my brother whom assist me financially and provide continuous emotional support.

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TABLE OF CONTENTS

LIST OF TABLES vii

LIST OF FIGURES viii

ABSTRACT x

CHAPTER ONE INTRODUCTION 1

CHAPTER TWO LITERATURE REVIEW 10

CHAPTER THREE METHODOLOGY 15

CHAPTER FOUR RESULTS AND DISCUSSION 18

CHAPTER FIVE CONCLUSION 38

REFERENCES 44

LIST OF TABLES

Table 1 Categories of Formative Evaluation 14

LIST OF FIGURES

Figure 1 Figure 1. Kemp Design Model 7
Figure 2. Screenshot of APPYPIE application development interface 18
Figure 3. Customize mobile application background image 19
Figure 4. Setting up the content design 19
Figure 5. Application development for Sliding Side Menu 20
Figure 6. Home page development 20
Figure 7. Home page development 21
Figure 8. Development of Topic page 21
Figure 9. Quiz page development 22
Figure 10. Quiz backend system 22
Figure 11. Quiz backend setting 23
Figure 12. Backend system for managing quiz 23
Figure 13. Setting up coupons in the Redemption page 24
Figure 14. Store E-Donation development 24
Figure 15. E-Wallet development 25
Figure 16. Setting up E-Wallet in Stripe 25
Figure 17. E-Wallet backend setting 26
Figure 18. E-Wallet backend system 26
Figure 19. Development platform for Forum page 26
Figure 20. About Us page development 27
Figure 21. Application dashboard 27
Figure 22. System email notification for admin 27
Figure 23. Application's dashboard for admin to manage users 28
Figure 24. Email template setting in the backend system 28
Figure 25. Dashboard in Forum 28
Figure 26. Prototype login page 29
Figure 27. Mobile application login page 29
Figure 28. Prototype Sign Up Page 30
Figure 29. Mobile application Sign Up Page 30
Figure 30. Prototype Sliding Side Menu 31
Figure 31. Mobile application Sliding Side Menu 31

Figure 32. Prototype Home Page 32
Figure 33 Mobile Application Home Page 32
Figure 34. Prototype All Topic page 33
Figure 35. Mobile application Topic page 33
Figure 36. Prototype Quiz page 34
Figure 37. Mobile application Quiz page 34
Figure 38. Prototype Quiz Redemption Page 34
Figure 39. Mobile application Quiz Redemption Page 34
Figure 40. Prototype Store 35
Figure 41. Mobile application Store 35
Figure 42. Prototype Store Donation 36
Figure 43. Mobile application Store E-Donation 36
Figure 44. Prototype Shopping Cart page 36
Figure 45. Prototype Chat Forum page 37
Figure 46. Mobile application Forum page 37
Figure 47. Prototype About Us page 37
Figure 48. Mobile application About Us page 37
Figure 49. Prototype Help page 38
Figure 50. Mobile application Help page 38
Figure 51. Home page 39
Figure 52. Topic page (Infographic) 40
Figure 53. Topic page (Video and Link) 40
Figure 54. Sliding side menu 40
Figure 55. Quiz page 41
Figure 56. Redemption page 41
Figure 57. Store 42
Figure 58. E-Wallet 42
Figure 59. Help page 43
Figure 60. About Us 43

ABSTRACT

The purpose of this study is to raise awareness for marine conservation to the public through a mobile-based microlearning application. Microlearning is used as an approach in this study to produce a non-conventional type of learning resource on marine conservation. Up to 80% of marine pollution is from land-based activities which include oil spills, fertilizers, garbage, sewage disposal and many others that eventually flows into the ocean. Marine pollution is one of the global issues thus marine conservation education for young adults is important. Marine conservation has been conventionally delivered via online courses exhibitions, workshops and events to the general public. This study uses the Kemp Design Model as the instructional design model to guide the design, development and evaluation of the application. Cooperative evaluation has been employed in the formative evaluation process to ensure usability problems are correctly identified and to conduct reviews to test effectiveness of prototype thus a semi-interview after the usability testing process where user completed the given task. As a result, this mobile application is designed in hopes to raise awareness for marine conservation via a different learning approach was successfully developed including the evaluation of prototype.

Keywords: microlearning, marine conservation, young adults, cooperative evaluation, marine pollution

CHAPTER ONE

INTRODUCTION

Microlearning employs microcontent delivery which allows learners to comprehend the content without information overload. The purpose of this study is to raise awareness on marine conservation to the public through microlearning application. This chapter overall discusses the background of the study, problem statement, objectives of the study, contribution of the study, conceptual framework, definitions of terms and scope of the study.

With changing times in our life and technologies, the desire for fast learning turns into a significant factor for improving ones' life (Gassler, Hug, & Glahn, 2004). Microlearning is a learning method that uses tiny learning units and short-term focused activities (Hug et al., 2006; Lindner, 2007). Microlearning allows users to learn without information overloading by employing micro-content delivery with an order of micro-interactions to enable better retention that will lead to better learning. Microlearning focuses on a precise concept or skill, short in duration, typically intended for and delivered on a smartphone thus consists of a variety of content including infographics, video, audio, texts, and interactive games (Talentcards, n.d.). The first conference on microlearning was held in Innsbruck, Austria in 2005, organized by Research Studio eLearning Environments and the Institute of Educational Sciences at the University of Innsbruck (Hug et al., 2006). The concepts and groundwork of microlearning thus what was implemented in higher education and corporate training were widely discussed in the conference. Today, micro-learning is getting a boost in its applications and daily uses (Maestro, 2017).

A recent study conducted by ATD Research in 2017 discovered that 92% of learning professionals predict microlearning to rise within the year in which the technique involves selecting tiny pieces of information and deliver it through various formats (Learning &

Development, 2017). The factors for the rise and popularity of bite-sized learning are diverse and connected to each other. The main contributors are the demand in mobile learning, the growing number of millennials in the workforce and the constant pressure companies faced to minimize cost. According to Docebo (2014), there is an overwhelming annual growth rate of 18.2% between 2012 to 2017 with the prediction of the mobile learning market will reach $12.2bm in 2017. Many studies show that people are hard to concentrate more than 20 minutes on course material at one time, but it can be overcome by implementing useful information in nuggets form to the learners. According to the findings of the Learning and Development professionals survey, in comparison to traditional time-consuming eLearning courses, 94% prefer microlearning (Chartered Institute of Personal and Development, 2015). Modern learners demand that training should be customized to their needs, informal and on-demand where microlearning fits those demands perfectly. It also proved to be a successful alternative to the traditional eLearning course allows learners to grasp things effectively, multitasking to enable subject to be better retained in a more digestible format (Gutierrez, 2018). Microlearning can be easily integrated into daily activities, therefore, allows a more pliable model of learning reflecting the requirements of mobile users (Buchem & Henrike, 2010).

Technology plays a major role in efficient content delivery as learning information in small chunks has constantly been used where microlearning thrives on digital-age realities which differ from traditional methods (Goel, 2017). According to Deloitte, corporate learners unlock their smartphones almost 9 times per hour, so it is possible to deliver micro-courses on a device they favor to use. Therefore, it is beneficial to combine microlearning with mobile learning to improve engagement, retention, involvement and completion rates (Talentcards, n.d.). Microlearning is a new approach related to e-Learning. According to Axonify (n.d.), there are few components for an ideal Microlearning Platform. These include

employing retention techniques, supporting multiple content formats for various learning needs, providing personalized and adaptive learning techniques for customizing learning, employing gamification for higher engagement, offering modern social elements for collaborative learning and supporting multiple devices. Ideal microlearning platform should apply grounded neuroscience techniques that have an impact on knowledge learn thus retain over time. The techniques could include The Spacing effect which refers to the repetition process of information with specific time gaps results in longer retention of knowledge. Retrieval Practice that uses the concept of quick learning, involving recall, refreshing the knowledge test again for recall, and Confidence-Based Learning which acknowledges a type of learning that uses a combination of knowledge and confidence to help boost appropriate behavior and act.

Marine Pollution

Annually, billions of pounds of waste and other pollutants flow into the ocean where some are eaten by marine animals that mistook it for food (National Oceanic and Atmosphere Administration, 2018). A dead sperm whale that been washed ashore consumed 115 drinking cups, plastic bags, plastic bottles, 2 flip-flops and a bag containing pieces of string (Parker, 2018). According to WWF (2015), presented in the marine Living Planet Index (LPI), 52 percent decrease invertebrate populations since 1970 which roughly in step with the global LPI. Between 1970 and 2012, marine vertebrate populations decrease 49 percent while 29 percent of marine fisheries are overfished. Up to 80% of marine pollution is from land-based activities which include oil spills, fertilizers, garbage, sewage disposal and many others that eventually flows into the ocean (WWF, n.d.). This indicates that marine pollution is one of the global issues. Thus, education in marine conservation for young adults is important.

Marine conservation has been integrated into online courses, exhibitions, workshops as well as events to educate the general public. Various educational programs have been

organized for all age groups, includes workshops, lectures and Science Days. Since 2003, Dolphin Research Courses are organized to offer experience with dolphins and sea turtles research and protection. Several events such as Dolphin Day, Dolphin Night, film evenings, exhibition have been organized to raise awareness on the importance of marine conservation (Morigenos, n.d.).

Marine and coastal ecosystems are in severe condition thus the pressures remain to escalate where hundreds of millions of individuals well-being and lifestyle, local and global economies, also future generations implications will be affected if no action is being put into practice. There are opportunities and solutions for governments, business and industry, and society to confront the challenge and put effort together to protect our ocean (WWF, 2015). As stated by National Geographic (2018), there are things that can be done to save the ocean such as to reduce climate change effects through awareness of own carbon footprint and conscious of energy consumption, choose a safe, sustainable seafood, decrease the use of plastic products, avoid supporting of items that exploit marine life, support ocean protection organizations, induce transformation in our community and educate ourselves regarding oceans and marine life.

Problem Statement

Organizations have delivered marine conservation education via online courses, exhibitions, workshops as well as events (Morigenos, n.d.). WWF-Malaysia conducted marine conservation programme covers the Peninsular Malaysia Seas Programme and the Sulu-Sulawesi Marine Ecoregion (SSME) Programme where both fall within the area of the Coral Triangle Initiative and support the Malaysian Coral Triangle National Plan of Action as well as Sulu-Sulawesi Marine Ecoregion Tri-national Conservation Plan (WWF, n.d.). The Peninsular Malaysia Seas Programme consists of various projects that differ from each state

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that involved. Projects in Terengganu focus on green turtles and painted terrapins at Ma'Daerah and Setiu sites while projects in Malacca concentrate on hawksbill turtles for nesting beaches. The Sulu-Sulawesi Marine Ecoregion (SSME) Programme is based in Kota Kinabalu which comprises field projects that work together with local communities, local and state government agencies as well as the private sector to protect endangered ecosystems and species management (WWF, n.d.). World Oceans Day (WOD) 2018 was held in Kuala Lumpur, Publika by The Marine Group with exhibition, workshops, talks and games held in the two-day event to raise awareness about ocean health and the importance of coral reefs, seagrass, and sharks. There are also courses provided by the University of Tasmania on Introduction to Marine Conservation to understand conservation values, genetic, economic and social aspects of marine and coastal conservation (University of Tasmania, n.d.). Marine conservation education has been delivered via courses, exhibitions, workshops as well as but has not been applied in microlearning. This study introduces microlearning in marine conservation as a mobile-based application that will be developed and evaluated.

Research Objectives

General objective:

To produce a mobile-based microlearning application on marine conservation for young adults

Specific objectives:

1. To develop a mobile-based microlearning application on marine conservation
2. To evaluate the usability of the microlearning application on marine conservation

Definition of Terms

Microlearning. Microlearning refers to small quantities of learning (Behringer, 2013). It focuses on an outcome or a learning goal in online education microlearning (elearnhub, n.d.).

Marine Life Protection. Marine life protection is to maintain marine ecosystem diversity and conserve its population (Kirlin et al., 2013).

Young Adult. Young adults are individuals that are aged from 18 to 35 years (Church of the Nazarene, n.d.).

Mobile learning. Mobile learning allows learners not longer to spaced out time for learning or to prepare but in control of the learning process as the device is personal (Alexander, 2004).

Microcontent. Microcontent learning is learning that uses the various method of media in brief forms as micro media such as video, audio, text and interactive element (Zhang & Ren, 2011).

Conceptual Framework

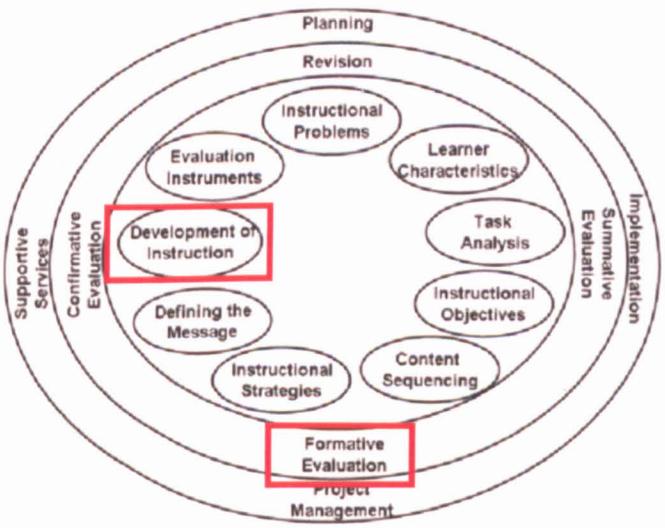

Figure 1. Kemp Design Model

This study employs the Kemp Design Model ((Kemp, Morrison & Ross, 2013) to guide the design, development and evaluation of the application.

Development of the Instruction

This part of the process includes integrating all information and parts to develop instructional materials. This process also includes the development of evaluation materials to measure and assess. Evaluation materials developed should be suitable for measuring and assessing learners' progress towards accomplishing objectives.

Formative Evaluation

This process of evaluation is conducted before the learning application is employed for actual use to ensure all crucial problems are identified and rectified. The goal is to improve the design and performance of the application.

Significance of the Study

This study has produced a mobile-based microlearning application for young adults. Malaysia approximately consists of 12 million of 15-34 years age group (Population Quick Info, n.d.). Only three percent of the world ocean is protected. Nevertheless, young adults remain part of the largest unexploited resources for expanding the global marine conservation agenda. Involving youth communities enable them to use obtained knowledge to care for the environment and sustainable living for the next generation (Reef Doctor, n.d.). This study introduces a new learning method which is microlearning in marine conservation to educate young adults about marine conservation. It allows young adults to be developed as resources to expand the global marine conservation agenda. In addition, compared to traditional training, microlearning is less costly and less time consuming (Asavari, 2017).

Scope of the Study

In this study, a marine conservation microlearning application has been developed and evaluated.

Topics that are covered about Marine Conservation in the mobile application include (National Geographic, 2010):

1. Aware of your Carbon Footprint and Reduce Energy Consumption

Conscious of energy use at home and work to reduce the effects of climate change on the ocean. For example, using compact fluorescent light bulb, taking stairs and encouraging the use of fans to avoid oversetting thermostat.

2. Make Safe, Sustainable Seafood Choices

Global fish populations are rapidly reduced due to demand, habitat loss and untenable fishing practices. Individuals should choose sustainable seafood when shopping or dining out to help decrease the demand for overexploited species.

3. Reduce the use of Plastic Products

Plastics entangle and kill tens of thousands of marine animals each year which contributes to habitat destruction. Individuals should limit the use of plastic by using reusable water bottle, non-disposable containers, reusable bag when shopping and encourage the habit of recycling.

4. Protect Our Beach

Clean up our own rubbish before leaving, explore without interfering wildlife or removing rocks and coral. Encourage others to respect the marine environment including support local beach cleanups.

5. Do Not Support Items That Exploit Marine Life

Avoid support of products that contribute harming of the fragile marine population by not supporting purchasing products such as tortoise shell hair accessories products made from hawksbill turtles, coral jewelry and shark products.

6. Support Marine Conservation Organization

Support organizations that are protecting ocean habitats and marine wildlife. Participate in volunteering activities, encourage others to participate or give financial support.

The targeted group for this study is young adults with age from18 to 35 years. Only five users are involved in the study usability testing to test the prototype before developing the fully functioning mobile application. In the mobile application, infographics, quiz, and short videos are used as the content delivery.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents an overview of related literature for this study which emphasized on microlearning, marine conservation and instructional design model using Kemp Design Model.

Microlearning

Microlearning has been discussed by many scholars of its practical implication and theoretical underpinning. Advances in technology make demands of education easier but executing a new learning model is not simple. Microlearning is a recent learning method that uses micro-content and micro-media in the recent media network (Lindner, 2007). Microlearning slices huge learning chunks into bite-sized, manageable contents (Westermann, 2018).

Microlearning also has been implemented by many organizations in recent years. According to Axonify (2018), Walmart is one of the largest distribution networks in the world which corporate with Axonify to develop a microlearning program that would improve employee knowledge and retention about safety practices. Employees logging on to Axonify platform will spend 3 to 5 minutes playing a game by answering safety questions. This not only allows more voluntary participation rate averaging 91% but also decrease recordable safety incidents up to 54% and raise an employee's knowledge about safety topic for about 15% (Axonify, 2018). Bloomingdale also uses microlearning by delivering training in 3-5-minute sessions on a broad range of topics for their employee safety training. With Axonify's participating with the gamified approach, it enhances 90% of voluntary employee participation rates, 86.6% employees job confidence thus prevent 83% of accidents which means a decrease of 41% of safety claims (Axonify, 2018).

Marine Conservation

In the past, there are many projects done to raise awareness about marine conservation. The National Geographic's Ocean Education Program is an event planned to engage and cooperate with the marine recreation community. It aims to raise public awareness about marine conservation thus also to motivate people to take part in protecting the resources that provided by the ocean. With the support of Oracle, National Geographic also created ocean recreation community workshops for community to share current marine science and conservation science as ways to educate and inspire the public to guarantee the future of marine conservation (Sengupta, 2013).

Reef Check Malaysia (RCM) organized several small beaches cleaning across Malaysia such as Coast of Selangor, Tioman Island, Sibu Island, Mantanani Island, Kota Kinabalu, Mabul Island, Perhentian Island, Pangkor Laut, Tanjong Jara, Gara Island, Miri, and Lankayan Island. The goal of beach cleaning is to highlight the problem of marine debris which represents a major threat towards the marine ecosystem, particularly plastic waste. RCM also conducts education and awareness programmes for local communities, organization, and schools. To celebrate World Ocean Day, World Ocean Day Opening Ceremony was launched on June 8, 2014 at the National Science in Damansara, Kuala Lumpur. Kids Scuba conducted talks on Marine Awareness for kids and young adults alongside an Underwater Image Gallery during the World Ocean Day exhibition (Jenkins, 2014). Adidas and Parley also announce the return of the project Run for the Ocean which is a global running movement that uses the power of sports to raise awareness for the threat of marine plastic pollution. Adidas introduced the first Parley material thread shoe in 2015 and revealed that more footwear will be launched with fusing performance-oriented footwear technology which re-claimed plastics as each pair reduce approximately 11 plastic bottles (B&T Magazine, 2018). The Ocean Institute, Connected Camps and Connected Learning

Alliance organize Minecraft social media activation for young people on World Ocean Day as an effort to raise awareness of marine conservation (Cruz, 2018).

Environmental awareness is important as it helps the public to understand our environment vulnerability and the significance. There are various resources to help promote environmental awareness such as group learning, seminars, environmental books and brochures (Pachamama Alliance, n.d.).

Instructional Design Models

An instructional design model offers guidelines to organize suitable instructive scenarios to achieve instructional goals. The instructional design goal is choosing effective strategies for teaching and learning, selecting suitable technologies, classifying educational media as well as evaluating performance (Branch & Kopcha, 2014). Instructional design models commonly applied are ADDIE, Cathy Moore's Action Mapping, Dick and Carey Model, Kemp Design Model, Merrill's First Principles of Instruction, SAM and Rapid prototyping (Association for Talent Developer, n.d.).

There are nine core elements of the Kemp model which viewed as an independent circularity. The framework for systematic instructional planning consisted of four fundamental components which are learners, objectives, methods, and evaluation. These components are interconnected and could possibly comprise a complete instructional design plan.

The nine core elements of Kemp Instructional Design Model consist of (Kemp, Morrison & Ross, 2013):

Instructional Problems. Identify the need for user or problem user wants to solve.

Learner and Context. Identify user characteristics such as background knowledge and language competency.

Task Analysis. Determine what knowledge and procedure need to be included for the user to master the objective.

Instructional Objectives. Specify what the user must master according to the objectives.

Content Sequencing. Order of the information presented to allows the learner to understand thus comprehend the information.

Instructional Strategies. Define ways to present the information to users.

Designing the Message. Design pattern thus the arrangement of words and pictures to be delivered to the learner.

Development of Instruction. The development process of the instructional instrument.

Evaluation Instruments. Identify evaluation instruments which are used to access the learner's mastery of the objectives.

Formative evaluation is a process to ensure problem being clearly identified and conduct a review of the draft or prototype to test the effectiveness. The evaluation is conducted before or during a project's operation whose goal is to improve the design and performance. Formative evaluation consists different types of categories that can be conducted in different period with different goals (Evaluation Toolbox, n.d.).

Table 1

Categories of Formative Evaluation