INTERACTION DESIGN FOR E-LEARNING WEBSITE

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ABSTRACT

This study is focus on improve the interaction design and interface design for an existed E-learning website. New website will take use of the home-based game devices Kinect and Wii-mote to offer users an embodied interactive activity in their learning progress. The aim is to improve the E-learning efficiency of users, who are in elementary school.

INTRODUCTION

Interactive design plays a significant role to websites, especially for E-learning websites. Interactive design, which includes interface design, information design and interactivity, not only affects the usability of the websites, but also has an impact on the users' efficiency in understanding its information. Although the number of homeschooling students highly increases in recent decade, parents are still not the professional experts in teaching their kids. Especially in today, they need the assistance from different kinds of learning websites. The aim of this study is to build a game-based learning system, which take interactive design, interface design and information design into consideration, to help the homeschooling students and parents improve their learning progress, avoid the existed defect.

Interactivity is frequently considered to be beneficial in the context of computer-based learning. For example, Drave (2000) suggests that the quality of interactivity is more important than content for the success of learning; Sim (1997) believes that interactivity plays a crucial role in knowledge acquisition and the development of cognitive skills. However, the existed online websites did not do a satisfactory job as much as we expected, most of the existed websites for homeschool are only using mouse click and pictures during the learning progress, and they are lack of interactivity. Besides, the interface of these websites did not take children psychology into consideration. Therefore, students from homeschooling complained many problems when they were learning through these websites. For example, they felt they have less opportunity to communicate with teachers. Others said they couldn't concentrate their attentions for a long time, because of diverse online attractions.

JUSTIFICATION & SIGNIFICANCE

By the middle of the year in 2009, 1.5 million children were learning at home, an increase of 75 percent since 1999. What's more, the Department of Education's National Center for Education Statistics reported the population of homeschooling has risen by 36 percent from 2005 to 2009. "There's no reason to believe it would not keep going up." NCES statistician Gail Mulligan told USA Today. However, compared with teachers, the experts in educational area, will the parents do teaching

as well as the teachers? Could the parents direct or manage the curriculums appropriate for learning or could they provide their children with comprehensive knowledge as in class? Could they respect the kids' own willing in learning or guide them step by step to their wish?
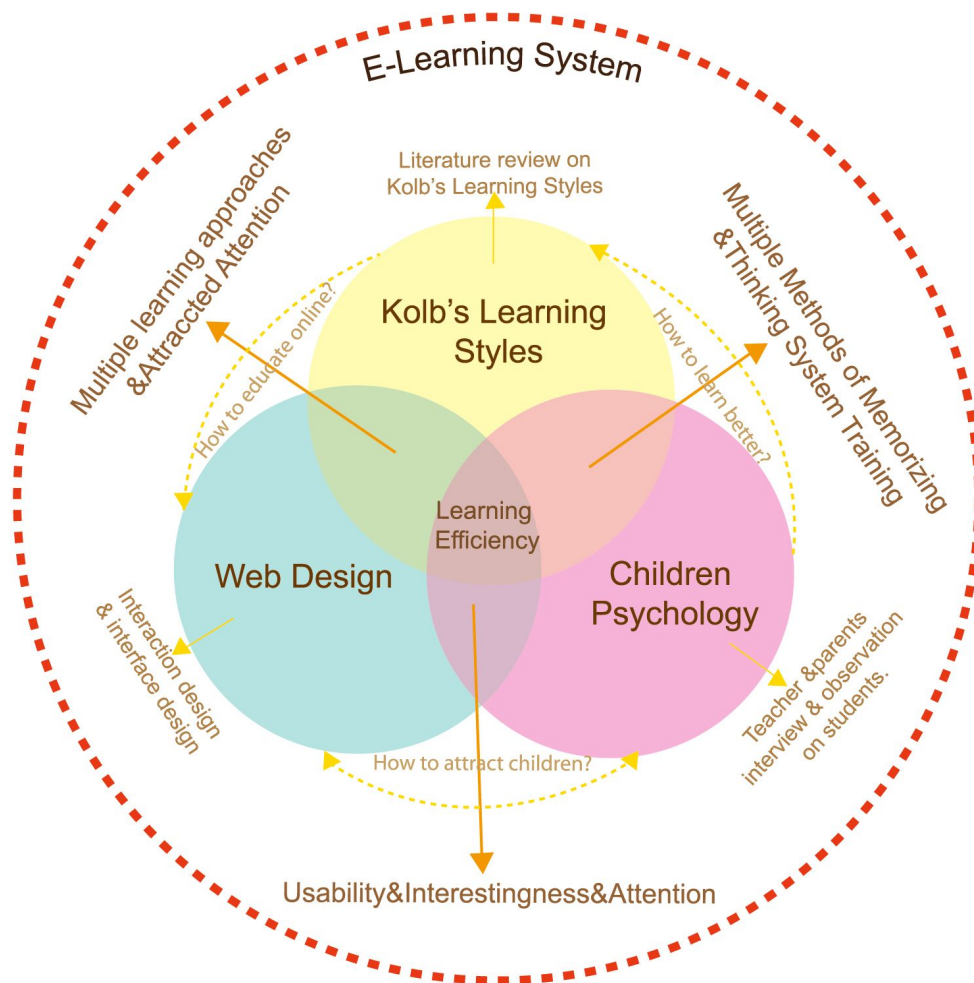
Unfortunately, the answers to those questions are not so positive. So most of the homeschooling parents are turn to online learning websites for assistance. Although online learning was growing rapidly today, the effect of it was not yet satisfactory. On one hand, studies which focus on learning system interaction design might only focus on the interface of the website, and the interaction part in their study is mainly focus on playing teaching animation. On the other hand, some of the learning systems are really gam-based, however, games in those websites have little connection with the learning content, instead, they are more like game websites.

With concerns above, this study will focus on building a game-based learning system which includes interactivity. However, it is no more only contains animation and mouse clicks, it will use the home-based game hardware like Wii-mote and Kinect. These existed tools will help the students learn from an embodied interaction system, thus they could improve the learning efficiency, what's more, they could also build their interest through this learning system.

SCOPE& LIMITATIONS

This study will improve the usability of existed website (http://www.ixl.com/) through investigating the effect of embodied interaction design and interface design on E-learning, and then use result to improve this website. This study will only focus on the interface of the website，and take use of the hardware like Wii-mote and Kinect to offer the students the experience of embodiment interactivity in learning progress. Even though, there might be better devices for this study, due to the universality of Wii-mote and Kinect in general families, other hardware will not be used. With the time limitation, the study will only focus on 200 elementary students，their teachers and their parents. Quantitative research will be conducted via an Internet survey sent out from every local elementary school district through United States. At the same time, qualitative research will be conducted through observation and interview in main cities of Arizona. The major limitation is due to the IRB requirement research method on children could only be observation. Although the website is for elementary students throughout United States, interviews only conducted in Arizona due to the limited budget.

CONCEPTUAL FRAMEWORK

Literature review on
Kolb's Learning Styles

Kolb's Learning
Styles

Multiple learning approaches
&Attraccted Attention

How to educate online?

Multiple Methods of Memorizing
&Thinking System Training

How to learn better?

Learning
Efficiency

Web Design

Children
Psychology

Interaction design
& interface design

Teacher &parents
interview & observation
on students.

How to attract children?

Usability&Interestingness&Attention

E-Learning System

CONCEPTUAL FRAMEWORK ▼▼▼▼▼

RESEARCH TOPICS & QUESTIONS

Topic 1：Web Design

• How much degree does interface design affect the usability of the learning website?

• What kind of interface design does elementary student prefer?

• How do they use the website for daily learning?

Topic 2：Kolb's Learning Styles

• What learning habits do they have?

• How many kinds of learning style could be used in interactive learning part?

• How do the styles combine will be more attractive to students?

Topic 3：Children Psychology

• Which kind of learning methods are the most popular one among elementary students?

• Who do they prefer to learn with?

• How do they remember the knowledge?

RESEARCH QUESTIONS

Topic 1：Web Design

• **How much degree does interface design affect the usability of the learning website?**

Rational：The visual design of the interface therefore affects the impression that the user gets from the interface. It also affects how the learner understands the interface, and his or her desire to use it (Mayes, 1992).

• **What kind of interface design does elementary student prefer?**

Rational：According to (George & Gnanayutham, 1987) the personalized interface offered a better success rate than the group interface. For example, different kind of

colors or character type will make them feel relaxed and even attract their attention for a longer time.

• How do they learn through the website daily?

Rational：Through this question, we could see how the student learns in his or her usual study. Besides, we could find whom they would like to learn with when they are learning knowledge.

Topic 2：Kolb's Learning Styles

• What learning habits do they have?

Rational: How do they learn in their class? What are the common learning habits for elementary students? New website especially the interaction part should follow their learning habits, thus it will be much easier for them to use and follow.

• How many kinds of learning style could be used in interactive learning part?

Rational：According to Kolb's learning theory, the more learning styles will be used the better outcome will be. Since the embodied interaction design could involve voice, motion as input, it could also give out the output in audio or video. Therefore, depends on different subjects, different interaction design should be built.

• How do the learning styles combine together will be more attractive to students?

Rational：Different people like to use different learning styles, so what will the best combination for elementary school students?

Topic 3：Children Psychology

• Which kind of learning methods are the most popular one among elementary students?

Rational：From the view of children psychology, they like to imitate what they had seen. It might be useful when the learning process give them an example which they could imitate it. What other helpful psychology do they have? Could they be used into the learning system?

• Who do they prefer to learn with?

Rational：Who will be the best partner for these children? Or do they prefer to study alone? Which mode do they like? It could only be told after the study is conducted.

• How do they remember the knowledge?

Rational：The aim of the website is to improve the usability and the efficiency of study. If the new system does not follow their remember law, it is hard enough to make them enjoyed.

REVIEW OF THE LITERATURE

Literature review is focus on three areas, interaction design study, interface design research, learning system design and user-centered design. As interaction design and interface design is the main area in this study, focus on the existed research could help

me understand how to conduct this research step by step. Besides, learning system is the carrier of this study, literature review on this area will help a lot in understanding the important learning elements and psychology of elementary students. Last, all the design research or project should be user-centered. Therefore literature review on this area could help to lead this research to human centered instead of a subjective design.

As Wilce and Garbe (2011) argues the differences in context of different families has an influence on our target group, considerations on the different background or living level of families should be taken into account, when we choose the devices for home-based web design. Besides, cultural element could also affect the research. For example, research with African American and Latino families suggests that factors such as economic constraints, cultural norms, level of acculturation, and religious practices strongly influence parental beliefs about play and how parents encourage play for their children. (Fogle. & Mendez, 2006; Fuller. & Garcia Coll, 2010; Garcia Coll et al., 1996; Slaughter-Defoe, 1995). In turn, parental beliefs influence the opportunities for interactive peer play experiences they provide children during early childhood that can serve as potential protective mechanisms for learning. Similarly, McWayne and Cheung (2009) found that for a sample of 168 urban, primarily African American students, preschool social and learning competence (including interactive peer play skills) mediated the relation between preschool problem behavior and children's first-grade social and academic adjustment.

What's more, social interactions within the home are integral to early learning and are precursors to play behavior in school (Bronfenbrenner &Morris, 1998). Fantuzzo and McWayne (2002) examined parental reports of children's interactive peer play competencies at home and found that they were associated with a range of teacher reported and independently observed behaviors in preschool. This research consistently identifies children who play effectively and cooperatively with peers as resilient, highly engaged in classroom learning activities, and leaders among their peers (Coolahan, Fantuzzo, Mendez, &McDermott, 2000; Fantuzzo, Manz, Atkins, & Meyers, 2005;Mendez, Fantuzzo, & Cicchetti, 2002).

Besides, user-centered design research should be taken in to consideration in all kinds of design. As they mentioned, the user needs should be considered as early as possible, before and during the concept generation phase. (Bruseberg, A., & McDinagh-Philp, D., 2000).

METHODOLOGY

Methodologies under this research will include literature review, IRB application, data collection, data analysis, draw a conclusion, project prototype, prototype test.

During the process of data collection, multiple methods will be used. Only observation will be used to elementary school student. Observation will carried out for their learning habits in class, their social interactive activity with their peers, parents and teachers. Besides, observation also should cover their habit of using website. Interviews will be taken only for student's parents and their teachers. Additionally, survey through internet is also needed for participant outside Arizona but in United States.

RESEARCH DESIGN

Research participants and sampling: 100 Arizona elementary school students, their parents and teachers. Besides, 200 online surveys throughout the United State are also needed.

No. of participants (Gender/Age): 100 interviews through elementary school students and 200 online surveys for students' parents or teachers. .

Sampling technique: Random sampling and snowball sampling.

Equipments: Audio record.

Methods used for data collection and analysis: Qualitative and quantitative methods.

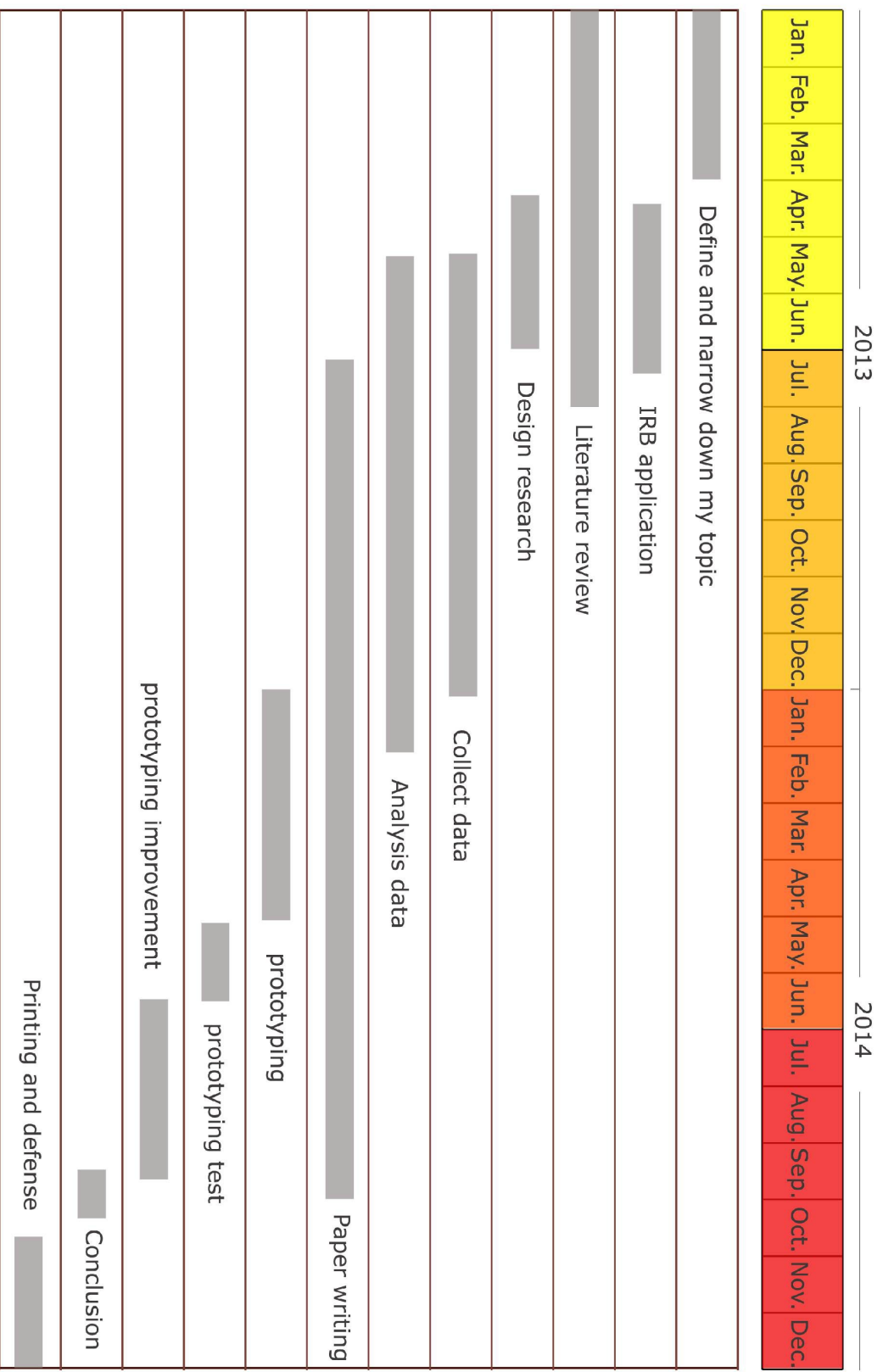| Research Question	Research Method	Justification/Rationale

How much degree does interface design affect the usability of the learning website?	Online Survey	Only through online survey we could acquire a larger number of participants throughout the United States in a short time, other method will not.
What kind of interface design does elementary student prefer?	Interview with parents	Participants will give a more detailed answer and more relevant information when they are interviewed.
How do they use the website for daily learning?	Observation	In order to protect the children, observation is the best method, besides researcher could catch the important information through observation.
What learning habits do they have?	Observation	In order to protect the children, observation is the best method, besides researcher could catch the important information through observation.
How many kinds of learning style could be used in interactive learning part?	Interview with teachers	Participants will give a more detailed answer and more relevant information when they are interviewed.
How will the learning styles combine be more attractive to students?	Semi-Structured Interview	Due to the academic question, semi-structured interview could help

		participants answer the questions.
Which kind of learning methods are the most popular one among elementary students?	Interview with teachers	Participants will give a more detailed answer and more relevant information when they are interviewed.
Who do they prefer to learn with?	Observation	In order to protect the children, observation is the best method, besides researcher could catch the important information through observation.
How do they remember the knowledge?	Literature review	Literature review of current articles and medical textbooks will provide generalizable data on elementary students' learning memory.

PROVISIONAL WORK SCHEDULE

Provisional Timeline | December 2014 Defense

Yanfei Wang

	2013			2014	
Jan. Feb. Mar. Apr. May. Jun.	Jul. Aug. Sep. Oct. Nov. Dec.	Jan. Feb. Mar. Apr. May. Jun.	Jul. Aug. Sep. Oct. Nov. Dec.

Define and narrow down my topic

IRB application

Literature review

Design research

Collect data

Analysis data

prototyping

prototyping test

prototyping improvement

Paper writing

Conclusion

Printing and defense

RESOURCE REQUIREMENTS

Committee Chair: Kyle Larkin (The Design School)

His focus area is about web design and interaction design.

Committee members: James Gee (Mary Lou Fulton Teachers College)

He is an expert on education, especially on teaching and learning with science.

Committee members: Daragh Byrne (School of Arts Media and Engineering)

He is a faculty in Arts Media and Engineering School, and also his concentration is focus on the web design in programming techniques .

REFERENCES

Bulotsky-Shearer, Rebecca. J., Manz, P. H., Mendez, J.L., McWayne, C.M., Sekino, Y. & Fantuzzo, J. W. (2012). Peer Play Interactions and Readiness to Learn:A Protective Influence for African American Preschool Children From Low-Income Households. *Child Development Perspectives, 6*(3), 225-231.

Mitchell, G., Clarke, A., & Villas, E(2011). Capturing and visualising playground games and performance: a Wii and Kinect based motion capture system. *EVA'11 Proceedings of the 2011 international conference on Electronic Visualisation and the Arts*,218-225.

Lu, H., Jia, L., Gong, S. H., & Clark, B. (2007). The relationship of Kolb learning styles, online learning behaviors and learning outcomes. *JOURNAL OF EDUCATIONAL TECHNOLOGYAND SOCIETY, 10*(4), 187-196.

George, J.& Gnanayutham, P. (2010). Developing multimedia interfaces for speech therapy. *Universal Access in the Information Society, 9*(2), 153-167.

Passig, D., & Levin, H. (2001). The Interaction between Gender, Age, and Multimedia Interface Design. *Education and Information Technologies, 6*(4), 241-250.

Jagne, J., Smith, S. G., Duncker, E., & Curzon, P. (2004). Cross-cultural Interface Design Strategy.

Francese, R., Passero, I., & Tortora, G. (2012, May). Wiimote and Kinect: gestural user interfaces add a natural third dimension to HCI. *In Proceedings of the International Working Conference on Advanced Visual Interfaces. ACM.,116-123.*

Dourish, P. (2004). *Where the action is: the foundations of embodied interaction. MIT press*. 14-23.

Bruseberg, A., & McDinagh-Philp, D.(2000). User-centred design research methods:

the designer's perspective. Department of Design and Technology, Loughborough University.