

Augmente Reality Developmen of Christian Prayer HYMM

Thatsanan Chutosri^{1*}, Pongsakorn Kingsuwankul², Thanakorn Uiphanit³ Pongpisit Liengyu⁴,
Siriphat Kasat⁵, Busayakorn Dondangpin⁶

^{1,2,3,4,5,6} The Department of Information Sciences, Faculty of Humanities and Social Sciences, Suan Sunandha Rajabhat University, Bangkok, Thailand:

E-mail: ¹thatsanan.ch@ssru.ac.th, ²pongsakorn.ki@ssru.ac.th, ³thanakorn.ui@ssru.ac.th, ⁴pornpisit.li@ssru.ac.th,

⁵S5612306017@ssru.ac.th, ⁶S5612306016@ssru.ac.th

ABSTRACT

The research about development of augmented technology of Christian prayer hymn has the following objectives; 1) To develop a augmented technology application for Christian prayer hymn for primary education students, year 4 of Saint Peter School. 2) To compare the post and pre-learning achievement of primary education students, year 4 of Saint Peter School. 3) To compare a post and pre-learning achievement of primary education students, year 4 of Saint Peter School between a post-learning group adopting augmented technology in Christian prayer hymn and a group not adopting augmented technology in Christian prayer hymn. The population of this research was 38 students in Grade 4 at St. Peter's School. The tools used to gather data consist of 1) Augmented technology media, prayer, Christianity For students in grade 4, St. Peter's School 2) Media quality assessment form for experts 3) Prayer songs knowledge pre- and post-test. The statistical tools used to analyze data are mean, S.D., pair t-test and one-way ANOVA. The results have revealed that 1) Evaluation of the quality of the media, augmented technology, prayer songs for students in grade 4, Saint Peter's School from experts is overall is very good. Considering each aspect individually, it was found that it was at a very good level in terms of system, followed by content and presentation and music, respectively. The results also showed in a good level in terms of pictures, followed by letters and languages, respectively. 2) Academic achievement of 4th grade students, St. Peter's School, before and after class, differed in result with the statistical significance at the .05 level. 3) Academic achievement of 4th grade students, St. Peter's School between the post-study groups using augmented technology, the Christian prayer music and the non-augmented technology media groups, the Christian prayer music in the teaching and learning process were different with statistical significance at the .05 level.

Keywords

Prayer hymn, Christianity, Augmented reality

Introduction

Christianity was first introduced in Thailand by missionaries coming for propagation. They consisted of 2 main sects i.e. the Catholic Church and Protestant Church. As for Catholic missionaries, they were from Portugal and the first group coming to Thailand from B.E. 2110 (1567) in the reign of Phra Maha Dhammarajadhiraj (King Dhammarajadhirah) of Ayutthaya. Afterward, the Catholic missionaries from Spain and France came actively to propagate Christianity in the reign of King Narai. Christians who are the descendants of the Catholic missionaries are called "Kristang" according to a Portuguese accent. As for the Protestant missionaries, they came to Thailand for propagating in B.E.2371 (1828) in the reign of King Nangklo (King Rama III) of Ratanakosin. Protestant Christians are called "Christian" according to an English accent (Phongudom, 2004). Additionally, there are various independent churches in Bangkok Metropolitan Region i.e. The Church of Absolute Holy Prestige, The Holy Christendom and Assembly of God, etc. Selecting songs or melodies are varied from churches to churches; nevertheless, they have the same goal i.e. to worship the God. Music has greatly related to worship since the past to the present time. It is compared to a "wheel" driving worship forward; furthermore, it is His Holy Logos in the celestial language and a witness of transcendence of His Holy Name, the God in the sacrament survival guide. Additionally, music can be a medium helping us to conceive existence of the God even in the deepest mystery of the God himself and it can be an element to help creating a

worshipping atmosphere and warmness of the sound uttering more beautifully. The Christian worship is to respond to holy missions of the God whom conducted them in the past, conducts them at the present time and shall conduct them in the future. Forms of worship may utilize many elements to express a clear meaning; such elements are songs, Logos, prayer, offerings and religious rituals, etc (Chopcheunsuk, 2012). Most hymns to the Lord are sung in churches. In Thailand there are many Christian schools which also inculcate students hymn signing practice to God. This is even inserted as the main learning lesson of the school's syllabus. Most teaching and learning styles are the same and authentic which sometimes may be boring and make students lack of interest.

At the present time, an augmented reality technology is adopted in instruction as a new emerging technology in educational media (Haseeb, Hussain, Slusarczyk, & Jermstittiparsert, 2019; Vujović et al., 2020). Given that, this makes learners to gain an interests and seek for knowledge and be curious. Also, this make them to be interested to learn new things, make novel experience and can have more participations in learning; furthermore, this adoption of new emerging technology can make them to create meaningful output for themselves. By doing so, it creates interaction connecting to classes, brings learners to the augmented reality experience and makes leaners to learn things in conformity with their ability and needs (Misuwan, 2011). As the augmented technology is multimedia consisted of motion pictures, music, it can create interaction with learners (Chopcheunsuk, 2012). Therefore, the technology is

an interesting alternative for utilizing in instruction making them more interested; consequently, the learners will not bore with such learning, be curious and help them gain more interested in study (Wongsripheng, 2011). Young children often fantasize about being swallowed up into the pages of a fairytale and becoming a part of the story. For example, The Magic Book makes this fantasy a reality by using a normal book as the main interface object. People can turn the pages of the book, look at the pictures, and read the text without any additional technology. However, if they look at the pages through a hand held Augmented Reality display, they see three dimensional virtual models appearing out of the pages (Billinghurst, 2002).

Although augmented reality technology is not new, it's potential in education is just beginning to be explored. Unlike other computing technologies, AR interfaces offer seamless interaction between the real and virtual worlds, a tangible interface metaphor and a means for transitioning between real and virtual worlds. Educators should work with researchers in the field to explore how these characteristics can best be applied in a school environment (Billinghurst, 2002). The usage of AR-technology could be inserted in many subjects i.e. math on the lessons about geometry, or with 3D representation of cells in biology, in chemistry displaying molecular structure in PE a team sport simulation can be established. Additionally, any subject can be more colorful, more interesting and interactive (Pasaréti, Hajdin, Matusaka, Jambori, Molnar, & Tucsányi-Szabó, 2011).

In the modern days, the content in physical books can be made to be more interesting using AR technologies. Libraries also have to adapt themselves to become digital libraries to keep up with the modern society (Jomsri, 2014). The AR hymn books can be inserted as for examples of the digital library content.

In this regard, we, researchers, are interested to adopt the augmented technology in developing a book of Christian prayer hymn to be supportive media in instruction of Christianity and for encouraging students to better memorize the prayer hymn. Additionally, they can use media in learning correct melodies and understanding the meaning of the song by themselves helping them to be enjoy in learning; consequently, this will lead to better learning achievement in Christianity further.

Literature Review

Christian Prayer hymn

Dr Henri Pompidor (Rakklang, 2014), Instructor of College of Music Mahidol University said that "At the early Christianity, an ecclesiastical choir was introduced and took part in religious rituals greatly by inheriting customs and traditions from Judaism church. Early Christians chanted Hallelujah (the great song of praise to God) like Jews and in line with Latin poetry". In addition, both Christianity and music originated from the west. They were greatly flourished in the Middle Age which was the golden age of music and the Christianity as well. Given that, it is not surprising that music has a great influence towards Christianity. In the Middle Age, a choir has been evolved and it was deemed as the essential one or remarkable feature in Christianity. Owing to the utilization of music in

Christianity, it is a good medium for communicating with deities and Christians believe that their spirit can connect with Him, the God with a sound of music. Furthermore, music is the medium expressing more emotion than conversing and can make Christian activities more interesting because of its influence towards human minds and the ability to polish human minds resulting in kindness (Rakklang, 2014). Music has greatly related to worship since the past to the present time. It is compared to a "wheel" driving worship forward; furthermore, it is His Holy Logos in the celestial language and a witness of transcendence of His Holy Name, the God in the sacrament survival guide. Additionally, music can be a medium helping us to conceive existence of the God even in the deepest mystery of the God himself and it can be an element to help creating a worshipping atmosphere and warmness of the sound uttering more beautifully (Royal Institute of Thailand (RIT), 2005, p. 156). It can be seen that music is greatly involved in Christianity and, to be said, it cannot be divided from the religion i.e. Christianity (Saengchu & Sunthonthanapol, 2017)

Augmented Reality and Education

Augmented reality is the integration of digital information with the user's environment in real time. Unlike virtual reality, which creates a totally artificial environment, augmented reality uses the existing environment and overlays new information on top of it. Augmented Reality technology is not a new issue. It has been used in fields such as: military; medicine; engineering design; robotic; telerobotic; manufacturing, maintenance and repair applications; consumer design; psychological treatments, etc (Azuma, Baillot, Behringer, Feiner, Julier, & MacIntyre, 2001). Displaying information by using virtual things that the user cannot directly detect with his own senses can enable a person to interact with the real world in ways never before possible. We can change the position, shape, and/or other graphical features of virtual objects with interaction techniques augmented reality supports. Using our fingers or motions of handheld devices such as shake and tilt we have an ability to manipulate virtual objects, as well as to physical objects in the real world (Kasemsap, 2017).

AR technology has matured to the point where it can be applied to a much wider range of application domains, and education is an area where this technology could be especially valuable. The educational experience offered by Augmented Reality is different for a number of reasons, (Billinghurst, 2002) including:

- Support of seamless interaction between real and virtual environments
- The use of a tangible interface metaphor for object manipulation
- The ability to transition smoothly between reality and virtual world.

During the last few decades, many professionals and researchers have been developing pragmatic theories and applications for the adoption of AR into both academic and corporate settings. By virtue of those studies, some innovations of AR have been developed and are being used to enhance the education and training efficiency of students and employees. In addition to that, there are a great number

of studies going on to improve the compatibility and applicability of AR into real life (Billinghurst, 2002). Professionals and researchers have striven to apply AR to classroom-based learning within subjects like chemistry, mathematics, biology, physics, astronomy, and other K-12 education or higher, and to adopt it into augmented books and student guides (Lee, 2012). As an example of the current AR applications in education, Ibáñez, Di Serio, Villarán, & Delgado Kloos (Ibanez, Di Serio, Villarán, & Kloos, 2014) created an AR application for teaching the basic concepts of electromagnetism. In this application students can explore the effects of a magnetic field. For that purpose, the components used in the experiment (cable, magnets, battery, etc.) can be recognized using the camera of a mobile device like a tablet. As a result students can see superimposed information such as the electromagnetic forces or the circuit behavior using the tablet. The results of this research show that AR improved academic achievement and provided instant feedback (Bacca, Baldiris, Fabregat, & Graf, (2014).

Methodology

The sample population used in this research was 38 primary education students, year 4 (grade 4) of Saint Peter School. The research tools used in this research consist of Christian prayer hymns pre- and post-test used to measure academic results in Christian prayer music and books on the Christian prayer hymn with augmented technology built into them. The design process used is based on ADDIE Model. In the data gathering process, the researchers collect data from 38 grade 4 students of St. Peter's school where students perform 15 questions of pre-test regarding the Christian prayer hymns. The lesson is divided into 2 parts; 5 questions on the principles and 10 questions on the hymn lyrics, each contains 1 mark. The sample group has 30 minutes to perform the test. The researcher participated in teaching and learning activities with teachers 3 times for 2 hours each, divided into 2 groups of students; the control group and experiment group. The researcher used the criteria to determine the group from the test scores before studying. Students with a score higher than 5 are in the control group and the students with scores lower than 5 are in the experimental group. Students in the control group study the lesson normally while the ones in the experimental group learn the lesson from AR technology. After that students from both the group take the same test on Christian prayer hymns again to determine the change in results.

Data Analyses

In this research, we, researchers, has conducted a study on the obtained data by utilizing descriptive statistics to describe findings from the research as follows: Mean Standard Deviation Paired Samples t-test and One-way Analysis of Variance.

Discussions and Conclusion

According to the research results, it was found that

5.1 Augmented technology Development of a Prayer hymn

5.1.1 Development of a book of Christian prayer hymn

5.1.2 Augmented technology of the Christian prayer hymn



Figure 1 Sample of Christian hymn with AR: A Song, Soldiers of Christian viewed via an app



Figure 2 Sample of Christian hymn with AR: A hymn, Where You Go I Go viewed via an app



Figure 3 Sample of Christian hymn with AR: A hymn, Step by Step viewed via an app

2. Results of a augmented technology quality of Christian prayer hymn of the primary education students, year 4 (grade 4) of Saint Peter School

Table 1 Conclusions of a augmented technology quality of Christian prayer hymn of the primary education students, year 4 (grade 4) of Saint Peter School

Augmented technology quality of Christian prayer hymn	\bar{X}	S.D.	Definitio n
1. Content and presentation	4.87	2	Excellent
2. Font character and language	4.00	0.58	Good
3. Illustration	4.58	0.52	Good
4. Music	4.66	0.58	Excellent
5. System	5.00	0.00	Excellent
Total	4.62	0.89	Excellent

According to table 1, it concludes that the augmented technology quality of Christian prayer hymn of the primary education students, year 4 (grade 4) of Saint Peter School is excellent in overview ($\bar{x} = 4.62$). When considering in each aspect, it is found that the system ($\bar{x} = 5.00$), the content and presentation ($\bar{x} = 4.87$) and music ($\bar{x} = 4.66$), aspects are in excellent level; as for the aspects of illustration ($\bar{x} = 4.58$), and, secondarily font character and language ($\bar{x} = 4.00$), they are in good level, respectively.

3. Results of scores from the Christian prayer hymn knowledge testing of the primary education students, year 4 (grade 4) of Saint Peter School

Table 2 Conclusions of scores from the Christian prayer hymn knowledge testing of the primary education students, year 4 (grade 4) of Saint Peter School

Learning achievement (s)	Pre-learning score (s)	Post-learning score(s) utilizing media	Post-learning score(s) not utilizing media
Lyric (full marks: 5)	1.79	3.82	4.75
Principle (full marks: 10)	4.39	8.77	9.81
Total	6.18	12.59	14.56

According to table 2, it concludes the scores from the Christian prayer hymn knowledge testing of the primary education students, year 4 (grade 4) of Saint Peter School; overall, the highest average score of post-learning not adopting the media is 14.56 point, secondarily, the post-learning adopting the media has average score at 12.59 points; As for the pre-learning, its average score is 6.18 points, respectively. When considering in each aspect, it is found that the highest average score of lyric of post-learning is 4.75 points, secondarily, the average score of post-learning adopting the media is 3.82 points and the pre-learning one is 1.78 points; in the aspect of principle, its highest average score on post-learning not adopting the media is 9.81, secondarily, the average score on post-learning adopting the media is 8.77 points and the pre-learning one is 4.39 points.

4 Comparison of pre-learning and post-learning achievement of the primary education students, year 4 (grade 4) of Saint Peter School

Table 3 Mean, standard deviation, T-test and statistically significant level in a comparative testing of pre-learning and post-learning achievement of the students

Learning Achievement	Mean	S.D.	T	df	Sig
Pre-learning	6.18	2.30	35.98	37	0.00*
Posting-learning	13.42	1.20			

*Statistically significant level at 0.05.

According to table 3, it is found that the comparison between pre-learning and post-learning achievement of the primary education students, year 4 (grade 4) of Saint Peter School has statistically significant difference at 0.05 level.

5. The learning achievement of the primary education students, year 4 (grade 4) of Saint Peter School between the post-learning group, Post-learning score(s) utilizing media and Post-learning score(s) not utilizing media in the instruction has statistically significant difference at 0.05 level.

Table 4 One way analysis of variance and comparison between the post-learning group, Post-learning score(s) utilizing media and Post-learning score(s) not utilizing media of the primary education students, year (grade 4) of Saint Peter School

ANOVA Source	SS	Df	MS	F	Sig
Between groups	36.01	1	36.01	75.12	0.00*
Within groups	17.26	36	0.48		
Total	53.26	37			

* Statistically significant level at 0.05. level

According to table 4, it is found that the comparison of the learning achievement of the primary education students, grade 4, of Saint Peter School between the post-learning group utilizing media and the one not utilizing media is higher with statistical significant difference at 0.05.

From the research on augmented reality development of Christian prayer hymn of primary education students, year 4 (grade 4) of Saint Peter School: It was found that using AR technology to assist with the lesson of Christian prayer hymn singing. The results have shown that students were able to memorize lyric and principles better than the old, traditional way of teaching with higher overall scores in the pre-test which is consistent with the research by Nuanmeesri, S. (2018, p 203). This research has developed an augmented technology media integrated with the real world for teaching Thai students about the human heart system, it was found that grades after learning with augmented reality received higher scores than before. This is also consistent with the research of Natavee Utakrit and Nawapon Wongwiwatchai (2012) in which it is a research, designed and developed to help teaching A-Z English alphabet using Augmented Reality (AR) technology. It was found that Augmented Reality makes the lessons more interesting, quick and easy to understand, and shows that augmented reality affects learners' learning in a positive manner. It helps explaining the content that is difficult to understand normally enhance the engagement and interaction of the learners and support self-learning. In

addition, the research of Palakawong na Ayutaya, P & Palakawong na Ayutaya, T. (2020, p.27); Yueayai, R (2019) have studied and found that AR technology has been used widely in the education and has shown tremendous potential as followed 1) increase efficiency of students' academic achievement. 2) promote learners to acquire observation and classification skills. 3) build the satisfaction of learners with teaching materials using augmented reality. 4) increase interest in learners and 5) able to explain things that are difficult to understand and abstract in a more concrete form.

References

- [1] Azuma, R., Baillot, Y., Behringer, R., Feiner, S., Julier, S., & MacIntyre, B. (2001). Recent advances in augmented reality. *IEEE computer graphics and applications*, 21(6), 34-47.
- [2] Bacca, J., Baldiris, S., Fabregat, R., Graf, S., & Kinshuk. (2014). Augmented Reality Trends in Education: A Systematic Review of Research and Applications. *Educational Technology & Society*, 17 (4), 133–149.
- [3] Billingham, M. (2002). Augmented reality in education. *New horizons for learning*, p. 12.
- [4] Chopcheunsuk, P. (2012). A study on musical cultures in Roman Catholic Church: a case study of Holy Rosary Church. *Journal of Fine and Applied Arts*, Khon Kaen University, 6(2), pp. 195-208.
- [5] Haseeb, M., Hussain, H., Slusarczyk, B., & Jermisittiparsert, K. (2019). Industry 4.0: A Solution towards Technology Challenges of Sustainable Business Performance. *Social Sciences*, 8(5), 184. DOI: 10.3390/socsci8050154.
- [6] Ibáñez, M. B., Di Serio, Á., Villarán, D., and Kloos, C. D. (2014). Experimenting with electromagnetism using augmented reality: Impact on flow student experience and educational effectiveness. *Computers & Education*, 7(1), 1-13.
- [7] Jomsri, P. (2014). Book recommendation system for digital library based on user profiles by using association rule. In Fourth edition of the International Conference on the Innovative Computing Technology (INTECH 2014) IEEE, 130-134.
- [8] Kaewcharoen, P and Thirathanphiyasuporn, W. (2016). The development of augmented technology in a pamphlet medium: a computer technology. *Journal of BTU*, 5(1), 68-81.
- [9] Kasemsap, K. (2017). The importance of teacher education in global education. In *Teacher education for ethical professional practice in the 21st century* IGI Global, 307-333.
- [10] Lee, K. (2012). Augmented reality in education and training. *TechTrends*, 56(2), 13-21.
- [11] Misuwat, W. (2011). Learning by augmented reality. *Journal of Education Naresuan University*, 13(2), pp. 119-128.
- [12] Nuanmeesri, S. (2018). The augmented reality for teaching Thai students about the human heart. *International Journal of Emerging Technologies in Learning (iJET)*, 13(06), 203-213.
- [13] Nuanmisri, S, Ketmethi, P and Phumhirat, L. (2016). developed the virtual media for the royal style Thai dresses. *Science and Technology RMUTT Journal*, 5(2), 74-84.
- [14] Palakawong na Ayutaya, P and Palakawong na Ayutaya, T. (2020). E-Learning with Augmented Reality as the new solution of Education. *Rajabhat Maha Sarakham University Journal*, 14(1), 17-31.
- [15] Pasaréti, O., Hajdin, H., Matusaka, T., Jambori, A., Molnar, I., & Tucsányi-Szabó, M. (2011). Augmented Reality in education. *INFODIDACT 2011 Informatika Szakmódszertani Konferencia*.
- [16] Phongudom, P. (2004). 175 years Backtrack Missionary-Protestant in Thailand by Nunthachai Meechuthon, the editor of 175 years of Protestant Christian mission in Thailand (1828-2003). Bangkok: Prachumthong printing.
- [17] Rakklang, S. (2014). Outcomes of the campaign of utilization of a Christian worship song towards self-appreciation in drug addicts. Retrieved on 13th November 2016. <http://www.theology.ac.th/wp->

content/uploads/2015/10/บทความวิชาการ-
ลักษณะ-เสาวรส.pdf

- [18] Saengchu, N and Sunthonthanapol, N. (2017). A study on music in religious media in Our Lady of Lourdes Catholic Church, Bangsaen. Research and Development Journal, an issue of Humanities and Social Science, 9 (2), 74.
- [19] Thayai, T. (2014). The learning achievement of virtual supplementary books of mantras via I-pad for secondary education students, year 1 (grade 7). Master of Education (Technology and communication). The Graduate School, Kasetsart University.
- [20] Utakrit, N. and Wongwiwatchai, N. (202). Applying augmented reality to Help to teach The English alphabet A-Z. Department of Information Technology Management: King Mongkut's University of Technology North Bangkok.
- [21] Vujović, V., Denić, N., Stevanović, V., Stevanović, M., Stojanović, J., Cao, Y., Alhamadi, Y., Jermisittiparsert, K., Le, H., Wakil, K., & Radojkovic, I. (2020). Project planning and risk management as a success factor for IT projects in agricultural schools in Serbia. *Technology in Society*, 63, 101371. DOI: 10.1016/j.techsoc.2020.101371.
- [22] Withuwanit, W and Saenrat, J. (2016). The development of virtual multimedia instruction on Ayutthaya architecture history: a case study of Wat Phra Ram. *Journal of Humanities and Social Science*, Rajapruk University, 2(3), p. 96
- [23] Wongsripheng, S. (2011). The Technique of Applying Virtual Reality for Teaching Thai consonants. Bangkok: Master of Science thesis King Mongkut's University of Technology North Bangkok.
- [24] Yueayai, R (2019). Augmented Reality: The Challenges for Teaching and Learning Development for Thailand in 21st Century. *Journal Humanities*, 25(2), 127-140.