# Development of Digital Instruction for Environment for Global Warming Alleviation

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## ABSTRACT

Technological education and instruction are widely used in the present education trend. Using of digital instruction for environmental subject can encourage students in learning and raise their awareness and attitude on environmental issues. The purposes of this research were: 1) to construct and develop the digital instruction for environment for global warming alleviation, 2) to compare the difference of the student' achievement scores earned before and after using the digital instruction, and 3) to study the students' satisfaction towards the digital instruction for environment for global warming alleviation. The research samples consisted of 40 students in grade 6 collected by purposive sampling technique. The instruments used in this research were the digital instruction for environment for global warming alleviation and satisfied evaluated questionnaire. The frequency, percentage, mean, standard deviation, and t-test were used to analyze the data. The findings indicated that: 1) the digital instruction for environment for global warming alleviation comprised of five environmental topics, 2) the students' achievement scores after using the digital instruction increased with statistical significance ($p < 0.01$), and 3) students' satisfaction in knowledge receiving was at good level and the overall satisfaction of students in digital instruction was at high level.

## INTRODUCTION

Presently, technology has played an important role and influenced in education sector. Use of technology and technological tools has become common in the learning process. Al-rahmi, et al. (2015: 625) stated that in the last decade, academic institution has required to develop and implement the e-learning, because e-learning is fast and easy way of teaching and learning through network technologies (Naresh and Bhanu Sree Reddy, 2015: 484). The development of technological tools and instructions aims at students' learning achievement. The efficient and effective use of technology and interaction affect learning outcome and learning achievement. Increasingly, instructors use educational technology as instruction tools in learning in order to stimulate interaction among students and between instructor and students. The students have good attitude toward learning and feel happy in learning (Sher, 2009: 116; Ariratana, 2010: 26; Jittisak and Jinwan, 2015: 121).

Technology is currently being used to help students and teachers in learning and teaching. Nowadays education sector in Thailand applies technology and technological media to contribute and facilitate leaning and education process, to stimulate students' attention, and to enhance their knowledge (Praneetham, 2015: 334). Teaching and instructional process has been improved to encourage students to know how to think analytically. They can search the information from various sources of knowledge by themselves and learn from real life experience and a more real practice (Ariratana, 2010: 26). Education technology leads to improve students' achievement. Education process always device a way of generating and collecting evidence of achievement (Ilechukwu, 2014: 35).

Environmental issues in the world are becoming severe. Global warming, caused by human activities and human's way of living adding carbon dioxide, has a direct impact on climate change and affects on environmental and social changes. Rising temperature and rainfall variability are leading the climate change, which affects the fundamental Earth systems and environmental degradation (Jahi et al, 2009: 258; Thiengkamol, 2011: 22; Adam et al., 2015: 52; Praneetham, 2015: 333, Praneetham and Leekancha, 2015: 453). Raising environmental awareness of people can ensure effective environmental improvement and protection. Hence, environmental education of the younger generation is very important (Xu, et al., 2013; Vinokurova et al, 2015: 315; Praneetham and Thathong, 2012: 6). Many researchers mentioned that education is an affective process and very important driver for sustainable environmental conservation. It can help increase knowledge and raise people's awareness regarding environmental problems. (Stapp and Dorothy, 1981: 1; Chunkao, K. 1993: 715; Thiengkamol, 2011: 25; Praneetham and Thathong, 2012: 10; Praneetham and Leekancha, 2015:

458). Therefore, teachers are more aware of the importance of teaching and learning by using appropriate technological education, tools and instruction for environmental subject (Praneetham, 2015: 338). Rational knowledge of human can reflect their thinking between their behavior and the natural environment (Xu, et al., 2013: 1285). Effective education process and approach can help people increase their knowledge and understand about environmental problems, as well as raise their awareness and foster their attitude on environmental conservation. Using of digital media instruction, multimedia, graphics, and video with sound can attract the students' attention. The learners have fun and enjoy learning. At the same time, they can develop their potential continuously. The digital instruction makes it easier to understand the content. Moreover, the learners can learn by themselves at their convenience and needs (Pasawano, 2013: 160). Therefore, the researcher is interested in construct the digital instruction for environment for global warming alleviation which will help students gain sufficient knowledge about global warming, energy and energy conservation. This instruction can be an effective tool for raising awareness of learners regarding environmental problems.

**THE PURPOSES OF THE RESEARCH**
The objectives of this research were:
1. To construct and develop the digital instruction for environment for global warming alleviation.
2. To compare the difference of the student' achievement scores earned before and after using the digital instruction for environment for global warming alleviation.
3. To study the students' opinion towards the digital instruction for environment for global warming alleviation.

**RESEARCH METHODOLOGY**
The research design was implemented in steps by step as follows:
1. Population was students in grade 6 of Wat Pho Nimitr school, Surat Thani province. The research samples consisted of 40 students in grade 6 collected by purposive sampling technique. The research was conducted within the first semester of the academic year 2015.
2. The instruments used for gathering data were:
      2.1 The digital instruction for environment for global warming alleviation. The digital instruction consisted of 5 topics which were: 1) energy and electricity equipment used in everyday life, 2) changes in weather and global warming, 3) use of vehicles and use of renewable energy, 4) energy conservation for global warming alleviation, and 5) activities in daily life and saving energy.
      2.2 Pre-test and post-test of each topic and a questionnaires with a five-level rating scales on opinion towards the digital instruction for environment for global warming alleviation.
The content and structural validity were determined by Item Objective Congruent (IOC) with 3 experts in the aspects of technology education, sciences, psychology, social research methodology and environmental education.
3. The frequency, percentage, mean ($\bar{x}$), standard deviation (SD), and t-test were used to analyze the data.

**RESULTS AND DISCUSION**
The sampled respondents of this study were 40 students in grad 6 of Wat Pho Nimitr school in Surat Thani province, Thailand. The samples consisted of 20 female students and 20 male students. The ages were 11 years old with 22.5 % and 12 years old with 77.5 %.

The results of the study are shown in Tables 1- 4 below.

Table 1: Student' achievement scores from pre-test and post-test using the digital instruction for environment for global warming alleviation

| Topics | Scores | Pre-test | | Post-test | |
|---|---|---|---|---|---|
| | | ($\bar{x}$) | Percentage | ($\bar{x}$) | Percentage |
| Topic 1 | 5 | 3.58 | 71.50 | 4.80 | 96.00 |
| Topic 2 | 5 | 2.95 | 59.00 | 4.45 | 89.00 |
| Topic 3 | 5 | 3.50 | 70.00 | 4.68 | 93.50 |
| Topic 4 | 5 | 3.40 | 68.00 | 4.63 | 92.50 |
| Topic 5 | 5 | 4.58 | 91.50 | 5.00 | 100.00 |
| Total | 25 | 18.01 | 72.00 | 23.56 | 94.20 |

*Topics: 1) energy and electricity equipment used in everyday life, 2) changes in weather and global warming, 3) use of vehicles and use of renewable energy, 4) energy conservation for global warming alleviation, and 5) activities in daily life and saving energy.*

Table 1 shows mean score of students' achievement in pre-test and post-test of each topic. Each topic has 5 questions for pre-test and 5 questions for post-test. The five topics of digital instruction comprised of topic 1) energy and electricity equipment used in everyday life, topic 2) changes in weather and global warming, topic 3) use of vehicles and use of renewable energy, topic 4) energy conservation for global warming alleviation, and topic 5) activities in daily life and saving energy.

The results indicate that the overall mean score of students' achievement in pre-test was 18.01 out of 25 with the percentage of 72.00. The overall mean score of students' achievement in post-test was 23.56 out of 25 with the percentage of 94.20.

Table 2: Comparison between pre-test and post-test of students using the digital instruction for environment for global warming alleviation

| | No. of Students | Full scores | ($\bar{x}$) | SD | t-value | p-value |
|---|---|---|---|---|---|---|
| Pre-test | 40 | 25 | 18.01 | 2.16 | -23.93 | .000** |
| Post-test | 40 | 25 | 23.56 | 1.28 | | |

The finding reveals that there was a statistically significant difference (at the level of 0.01) between the achievements of students in pre-test (mean = 18.01, SD = 2.16) and post-test (mean = 23.56, SD = 1.28) by using the digital instruction for environment for global warming alleviation in learning process. In other words, the students' achievement scores earned from the post-test scores were higher than from pre-test scores. Saenggaew, et al. (2011: 47) examined student's achievement scores after learning via the Computer Assisted Instruction (CAI) lesson entitled Earth and Space Science. It was found that the achievement scores after learning via the CAI lesson were significantly higher than that before using the learning the CAI lesson (p<0.05). Manisri (2011: 48) and Grajadthong (2012) also mentioned that after using the Computer-Assisted Instruction in learning process students' post-test scores were significantly higher than their pre-test scores.

Table 3: Students' satisfaction towards knowledge gained from the digital instruction for environment for global warming alleviation

| Topics | ($\bar{x}$) | SD |
|---|---|---|
| 1. Students recognize energy and electric appliances on a daily basis. | 4.45 | 0.60 |
| 2. Students know the cause of global warming. | 4.48 | 0.60 |
| 3. Students know how to use the vehicles and the use of renewable energy. | 4.20 | 0.72 |
| 4. Students know the effects of global warming. | 4.50 | 0.64 |
| 5. Students know how to help reduce global warming. | 4.55 | 0.60 |
| Total | 4.44 | 0.46 |

Table 3 indicates that, overall, the students' satisfaction on knowledge gained was at "good" level (Mean = 4.44, SD = 0.46). Based on data analysis, the students' satisfaction on know how to help reduce global warming was at the highest level (mean = 4.55, SD = 0.60), followed by they know the effects of global warming (mean = 4.50, SD = 0.64), know the cause of global warming (mean = 4.48, SD = 0.60), recognize energy and electric appliances on a daily basis (mean = 4.45, SD = 0.60), and lastly know how to use the vehicles and the use of renewable energy (mean = 4.20, SD = 0.72).

Table 4: Students' satisfaction towards the digital instruction for environment for global warming alleviation

| Topics | ($\bar{x}$) | SD |
|---|---|---|
| 1. Students like cartoon characters. | 4.45 | 0.75 |
| 2. Students like scenes and color of cartoon. | 4.53 | 0.55 |
| 3. Students like the storyline of a cartoon. | 4.43 | 0.71 |
| 4. Students like speech and music of cartoon. | 4.45 | 0.68 |
| 5. Students are happy and have fun to watch cartoon. | 4.58 | 0.59 |
| 6. Students can learn in a limited time. | 4.43 | 0.71 |
| 7. Cartoon helps students understand the subjects. | 4.43 | 0.68 |
| 8. Cartoon encourages students to be more interested in learning. | 4.60 | 0.63 |
| 9. It is easy and not complicated to access to each cartoon story. | 4.65 | 0.62 |
| 10. Use menu is readable. | 4.60 | 0.50 |
| Total | 4.51 | 0.44 |

Table 4 reveals that, overall, the students' satisfaction with digital instruction was at "high" level (Mean = 4.51, SD = 0.44). From the result above, the students found that the digital instruction for environment for global warming alleviation is easy and not complicated to access to each cartoon story, and  was at the highest level (Mean = 4.65, SD = 0.62), followed by cartoon encourages students to be more interested in learning (mean = 4.60, SD = 0.63), use menu is readable (mean = 4.60, SD = 0.50), students are happy and have fun to watch cartoon (mean = 4.58, SD = 0.59), students like scenes and color of cartoon (mean = 4.53, SD = 0.55), students like cartoon characters (mean = 4.45, SD = 0.75), students like speech and music of cartoon (mean = 4.45, SD = 0.68), students like the storyline of a cartoon (mean = 4.43, SD = 0.71), students can learn in a limited time (mean = 4.43, SD = 0.71), and lastly cartoon helps students understand the subjects (mean = 4.43, SD = 0.68).

Multimedia learning leads to strong communication process and innovative methods of learning and teaching process (Naresh and Bhanu Sree Reddy, 2015: 485). In light of above finding, most students currently learn more from media which helps them perceive actual information, understand, and develop knowledge and good attitude (Ruengwanich, 2012: 42). Naresh and Bhanu Sree Reddy (2015: 489) mentioned in his research on current trends in e-learning and future scenario that the learners were satisfied with the e-learning process. Because the enhancement of technology helps e-learning simpler and the users have more choice. Panchan (2012: 14) also found that learning instruction reflects the potential and the readiness of teaching and learning. This is consistent with research of Saenggaew, et al. (2011: 47) which found that students showed satisfaction in the CAI lesson entitle: Earth and Space Science at high level. Manisri (2011: 48) and Grajadthong (2012) stated that using the CIA in learning process could stimulate learners' motivation and self-learning. They had fun and enjoyed learning.

## CONCLUSION
The result from the study reveals that the digital instruction for environment for global warming alleviation stimulates students' attention and enhances their knowledge on environmental issues. Using of digital instruction encourages students in learning, helps them gain sufficient knowledge about energy conservation and the seriousness of environmental problems, increase their understanding regarding to energy and power, and raise their awareness and attitude on environmental issues and global warming alleviation, which will contribute to energy conservation and environmental behavior. This suggests that the digital instruction for environment for global warming alleviation should be widely published in schools and on e-learning. Teachers can use the digital instruction for teaching. Moreover, students can use the digital instruction for learning anytime and anywhere they want.

It is also recommended that digital instruction in the context of environment and environmental conservation for learners in different ages should be developed. Effective digital instruction can improve students' achievement, motivate and encourage learners' motivation and a self-learning effectively. Therefore, digital instruction should be created and developed as instruction tools for others subjects as well.

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