

A Comparison of High School Students' Knowledge and Satisfactions Regarding Basic Science and Halal Science Literacy Training Course

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Abstract

In the modern era, training in technology and science that integrates content with the learner's way of life is essential for promoting the development of learning skills in the twenty-first century. Therefore, the researchers conducted a research study with the objective of examining the outcomes of Basic Science and Halal Science Literacy (BHL) training program and evaluating the students' satisfaction with learning management among high school students studying in private religious schools in the southern border provinces of Thailand. The sample group in the study consisted of 97 students with pretest and posttest training assessment (the one-group pretest-posttest design). Analysis of the data was conducted using mean, standard deviation, and paired T-test with a confidence interval of 95%. The findings indicated that after training, participants' understanding of Basic Science and Halal Science Literacy (BHL) improved statistically significant. In addition, it was revealed that the participants had a high degree of satisfaction with the training's holistic overview, with an average satisfaction level of 4.36 and a standard deviation of 0.7.

Keywords: *Training program, halal science literacy, High school student, 21st centuries skill*



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INTRODUCTION

In the modern era, science and technology have a major impact on how the world's societies are developing. Due to the fact that science is the fundamental knowledge that contributes to the development of human potential in terms of both logical and creative critical thinking, these are referred to as the essential skills for the 21st century, which will be used to drive the economy utilizing technology and innovation derived from scientific knowledge. The Thai government has the vision to push the country toward the development of Technology 4.0 (Buasuwan, 2018) in an effort to break out of the middle-income trap and move toward becoming a high-income nation by promoting innovation and producing highly skilled human resources.

Scientific learning management does not just concentrate on the study of science courses only, it is also necessary to integrate knowledge from other fields by applying them in daily life (Waehama, Songmuang, & Assalihee, 2021) and to equip students with the skills necessary to approach problems systematically and to make decisions based on reliable information. Since the majority of people (more than 70%) in the southern border provinces are Muslims (Scupin, 2021) and follow a religious lifestyle, studying a subject area known as "Halal Science Technology" will enable students to use their knowledge to create innovations that will successfully advance the Halal economy (Dahlan, Santiworakun, & Sukswan, 2018).

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Consequently, the academic service and research unit of the Halal Science Center, Chulalongkorn University (HSC-CU) based in Pattani office, sought to improve students' potential by bringing basic science and halal science technology in line with the way of life of people in the southern border provinces. This was carried out with the assistance of a short on-site training course for high school students attending private religious schools. According to this, the researchers provided the curriculum to high school students with the following objectives:

1. To compare the academic achievement of students who have completed the basic science and halal science literacy training program.
2. To study the satisfaction of students trained in the basic science and halal science literacy training program towards learning management instruction they received.

LITERATURE REVIEW

Science is a foundational discipline that studies nature or phenomena by systematic processes and methods for acquiring knowledge (King & Hicks, 2021) through observation, experimentation, and logical analysis. The development of the skills required for the 21st century is supported by scientific skills and knowledge. (Hurd, 2000) The following are significant aspects of the comprehensive science learning process: Learning science is necessary to understand science's fundamental theories; learning about science is necessary to understand the nature and history of science; and most importantly, doing science that is congruent with the context of life (engaging in sociopolitical action) to incorporate scientific knowledge into the resolution of social, economic, and environmental issues that are related to the region's problems. (McFarlane, 2013)

Enhancing learning effectiveness requires placing scientific knowledge in context. The scientific and technology curricula are integrated to create capacity for problem-solving, research, and the development of new innovations in the present. In the modern era, there is an integrated science application study in the fields of biology (Hajeekhadae, Portjanatanti, & Rorbkorb, 2017), physics, and chemistry (Tuan, Hanh, & Ninh, 2020) as well as merging them with crucial life skills where social media has a significant impact on students' lives (Pimpala & Seechaliao, 2018). In order to help students, improve their 21st century abilities, the study of vocational skills development linked with science that takes future skill development encourages learning that is matched to students' interests (Kholid Yusuf Eryandi, 2020). Furthermore, teaching students the fundamentals of science in a way that respects their religious convictions will encourage them to take an increased interest in science. (Aflalo, 2018), (Clough, 2018) Although basic science education is applied to integrate with other sciences (Suriyabutr, & Williams, 2021), (Nguyen, Hoang, & Nguyen, 2021), there are still limited access to education for students that incorporate religious and scientific knowledge.

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RESEARCH METHOD

Figure 1 showed the research process. The questionnaire was developed prior to the study, and its validity with an index of item objective congruence (IOC) and Cronbach's alpha coefficient method were used to evaluate its reliability. Then conduct short training courses in the form of lectures.

The 97 students from Islamic private schools in southern Thailand participated in a three-hour on-site training program. The training programs focused on three topics: Science in the Islamic world and innovation, Halal definition and Halal certification of Thailand, and Halal science and modern food processing, shown in Table 1.

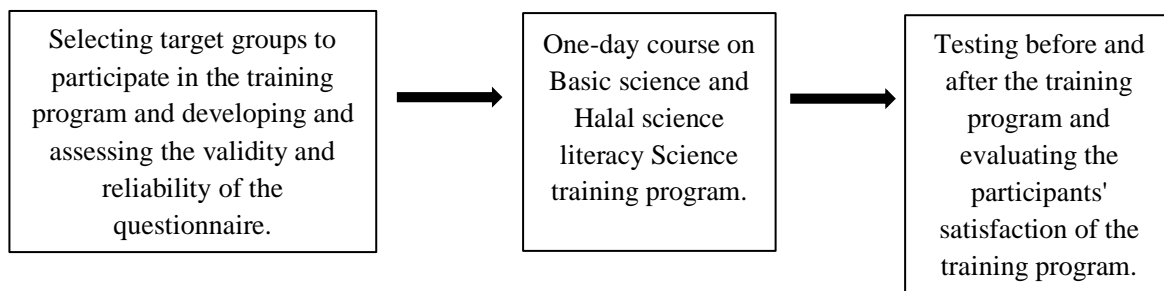


Figure 1. Research Process

The researchers evaluated the participants immediately after training was completed using the same questionnaire to measure their prior knowledge. The researchers also allowed participants to rate their post-training satisfaction with the program. Hence, an examination of the variation in science knowledge between before and after training applying descriptive statistics, frequency, percentage, and standard deviation using a Paired t-test with a confidence level of 0.05.

Table 1. Module details and objectives of the activity.

Module	Objective
Science in the Islamic world and innovation	<ul style="list-style-type: none"> To enable students to learn about innovative Islamic developments in the Islamic world while also learning science by connecting knowledge from the Holy Quran—Allah's word, and Hadith, which serves as an example of the Prophet's conduct. To enable students to learn how science and art were transmitted during the Islamic world's golden age of science, which lasted from the seventh to the fifteenth century and is a crucial

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	<p>period for the continuation of the arts and sciences today.</p> <ul style="list-style-type: none">• To enable students to observe the successes of prominent Muslim scientists during the pinnacle of the Islamic world and learn lessons from their successes.
Halal definition and Halal certification of Thailand	<ul style="list-style-type: none">• To enable students to learn the basic knowledge of Halal and Haram in daily life.• To enable students to learn the Halal standard process according to international Halal standards.• To enable students to learn the Thai Halal certification procedure by bringing together a number of organizations with the vision statement "affirmed by religion, supported by science".
Halal science and modern food processing	<ul style="list-style-type: none">• To enable students to learn the food production process and raw material control that may contaminate non-halal raw materials into the production process from the complex production process.• To enable students to learn how to operate the Halal Science Center Laboratory at Chulalongkorn University to verify the halal status of Halal Forensic Science products that are important for consumer protection and the prevention of contamination of raw materials entering the food production process.

FINDINGS AND DISCUSSION

There were 97 participants in the training program, and all of them were high school students. 59 participants were female, which was 60 percent. 90 participants studied in the science-mathematics program. 74 participants attended religious education studies at the Sanawayah level. 42 participants were residents of Songkhla Province, 37 participants were in Satun Province, and 18 participants were in other provinces of southern Thailand, accounting for 43, 38, and 19 percent, respectively, as shown in Table 2.

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Table 2. Participants sociodemographic characteristics ($n = 97$).

Variables	n	(%)
Gender		
Male	38	39.2
Female	59	60.8
Education		
Science-Math	90	92.8
Other	7	7.2
Educational Religion level		
Sanaweyah	74	76.3
Other	23	23.8
Residents		
Songkhla	42	43.3
Satun	37	38.1
Others	18	18.6

Table 3 shows the scores before and after the training when the knowledge acquired during the course was assessed using a 14-question test. The results showed that the participants' knowledge had a mean before the training of 9.80 and a standard deviation of 1.67, and a mean after the training of 10.22 and a standard deviation of 1.87. By training with a basic knowledge of Halal science and technology, high school students' knowledge increased statistically significant with a confidence interval of 95%. Students' abilities to think critically, apply their knowledge, and use their skills in the workplace were developed as a result of the training program in Basic Science and Halal Science Literacy, making them equipped to deal with the changes in the new era.

The aforementioned training revealed that students had acquired more knowledge. The efficiency of learning could be improved by integrating learning that was applicable to real-life situations. This was consistent with the research on the integrated science education of high school students in the province of Pattani (Hajeekhadæ, 2017). While content that was in line with what students were learning led to improving learning effectiveness which was consistent with the research on how integrating religious instruction with Islamic history improved learning effectiveness (Safkolam, Khumwong, & Pruekpramool 2021). However, enhancing the teaching and learning process to encourage students' creative expression would have an impact on their attitudes and behaviors. The use of social media in science education and instruction would have an impact on how people learn science (Pimpala & Seechaliao, 2018). It was discovered that integrated science learning not only improved learning effectiveness but also gave students a platform to express their creativity as a result of learning more effectively.

Table 3. The table of pretest-posttest of 97 participants, overall knowledge score (full score 14)

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Group	mean	S.D.	t-value	p-value
Pre-test	9.804	1.566	-2.5294	0.01305
Post-test	10.216	1.872		

According to a self-reported evaluation at the end of the workshop, as shown in Table 4, the total course satisfaction was scored on average with 4.36, 0.70, being on the “satisfied” level. From the highest level of satisfaction to the lowest level, from “the application of knowledge”, “the overall aspect of the training”, “The terms of content and order of training topics”, “the benefits in the field of the study”, and “the service processes” with an average of 4.53, 4.41, 4.33, 4.29, 4.23 respectively. Satisfaction with the learning method and science content contributed to learners' ability to apply such skills and knowledge in accordance with their own interests. These would foster and strengthen skills that were important for continuously pursuing new knowledge based on the interests of the learners (self-literate skill), which was a key element for creating life-long learning skills.

The application of scientific knowledge was rated as having the highest level of satisfaction in this short training program, which was consistent with the study (Pimpala & Seechaliao, 2018) (Hajeekhadae, 2017) that assessed students satisfaction following instruction in integrated science that allowed them to apply their knowledge successfully.

Table 4. showing results of training satisfaction

No.	Assessment details	Satisfaction			
		Mean	S.D.	Level	Order
1	The benefits in the field of the study	4.29	0.75	Satisfied	4
2	The terms of content and order of training topics.	4.33	0.70	Satisfied	3
3	The application of knowledge.	4.53	0.67	Very Satisfied	1
	The service processes.	4.23	0.72	Satisfied	5
5	The overall aspect of the training	4.41	0.66	Satisfied	2
Total		4.36	0.70	Satisfied	

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CONCLUSION AND FURTHER RESEARCH

In this study, we discovered that the training program on basic science and halal science literacy curriculum can significantly improve high school students' understanding while also providing a very high degree of satisfaction. Therefore, integrating the BHL curriculum within the Ministry of Education's core curriculum can effectively encourage high school students to learn science. The effectiveness of learning will be improved in the future, by developing instructional strategies and learning materials that are appropriate for the region.

In addition to conduct future research, the researchers would develop a new educational approach that would allow students to express their scientific ideas while also measuring learners' creativity through attitude and behavior to meet the requirements of learner development.

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