Science in Classroom and Knowledge Transfer to the Muslim Way of Life*

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Abstract

There is a relation between science and people's everyday life, especially the Muslim way of life which is related to the application of science. For example, the direction to determine for bedding, praying, bathing, and burial. That's called the Qibla. The aims of this learning organization are that the learners can apply the knowledge gained from the class to solve problems in life. Therefore, learning experience in accordance with the actual life in order to link what they have learned in daily life context must be provided by instructors.

In this article, the author proposes a Science learning management in the primary education classroom about shadows and directions for Muslim students to apply on a daily life basis. This is a learning experience that is similar in real context to foster the students' knowledge transfer and science process skills for Muslim way of life of prayer.

Key words: Science Learning, Knowledge Transfer, Muslim way of life, 3 southern border

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บทคัดย่อ

วิทยาศาสตร์เกี่ยวข้องกับการดำเนินชีวิตประจำวันของทุกคน โดยเฉพาะวิถีชีวิตมุสลิมที่มีความสัมพันธ์กับการนำความรู้ทางวิทยาศาสตร์มาใช้ เช่น การนำความรู้เรื่องทิศเพื่อระบุทิศ ๆ หนึ่งที่เรียกว่าทิศกิบลัต มากำหนดทิศของการนอน การละหมาด การเข้าห้องน้ำ และการฝังศพ เป็นต้น จุดมุ่งหมายสำคัญในการจัดการเรียนรู้ คือการที่ผู้เรียนสามารถนำความรู้ที่ได้รับจากชั้นเรียนไปใช้แก้ปัญหาในชีวิตประจำวันได้ ดังนั้น ครูจึงต้องจัดประสบการณ์การเรียนรู้ให้สอดคล้องกับชีวิตจริงของผู้เรียน เพื่อให้เชื่อมโยงสิ่งที่ได้เรียนรู้สู่บริบทในชีวิตประจำวัน

บทความนี้ ผู้เขียนได้เสนอแนวทางการจัดการเรียนรู้วิทยาศาสตร์ในชั้นเรียนระดับประถมศึกษา เพื่อให้นักเรียนมุสลิมสามารถนำความรู้ เรื่องเงา และทิศในชีวิตประจำวัน ไปประยุกต์ใช้ในชีวิตประจำวัน ซึ่งเป็นการจัดประสบการณ์การเรียนรู้ที่มีลักษณะใกล้เคียงกับชีวิตจริง เพื่อให้ผู้เรียนถ่ายโอนความรู้และทักษะกระบวนการทางวิทยาศาสตร์มาใช้กับวิถีชีวิตมุสลิมสำหรับปฏิบัติศาสนกิจการละหมาด

คำสำคัญ : การเรียนรู้วิทยาศาสตร์, การถ่ายโอนความรู้, วิถีชีวิตมุสลิม, ชายแดนภาคใต้

Introduction

The context of the three southern border provinces of Thailand is a society which is remarkable in religion, language, and culture. The majority people are Muslim (2013, The National Statistical Office Thailand: online). As a result, education in that area focuses on religion in parallel with normal education without an integration of disciplinary. This is not the answer to proper education which requires integration of all aspects to learners' way of life. According to Islamic, there must be an integration of religious academic with normal academic in education (secular). Muslims must study the Holy Quran and other subjects along with Islamic disciplines.

Islam encourages human to study, which appears from the text in the first five Ayah (verse) in the Quran which Allah (S.W.T)[1] (God) has given. That is human to read because reading is considered as a process of seeking knowledge (Ibrahem Narongraksaket, 2008: 110). The science that appears in the Quran is in the fields of science, such as Astronomy, Geography, Geology, Marine science, Atmospheric science, Biology and Physics, etc. (Salleh, 2009: 9-10). A chapter in the Quran of the shadow and direction revealed in Surah Al-Furqan is that "Have you not seen how your Lord spread the shadow. If He willed, He could have made

[1] Allah (S.W.T) [1] Subhanahu wa ta'ala is an Islamic Arabic phrase meaning, "glorious and exalted is Allah." The phrase (often abbreviated to "S.W.T") appears after the name of Allah in Islamic texts. Saying this phrase is seen as an act of reverence and devotion towards Allah among Muslims.

it still then we have made the sun its guide [i.e. after the sunrise, it (the shadow) squeezes and vanishes at mid noon and then again appears in the afternoon with the decline of the sun, and had there been no sunlight, there would have been no shadow]. Then we withdraw it to us a gradual concealed withdrawal." (Surah Al-Furqan, 25: 45-46) [2] and in Surah Al-Kahf is " And you might have seen the sun, when it rose, declining to the right from their cave, and when it set, turning away from them to the left, while they lay in the midst of the cave. That is one of the Ayat (proofs, evidence, signs) of Allah. He whom Allah guides, is rightly guided; but he whom He sends astray, for him you will find no Wali (guiding friend) to lead him (to the right Path)." (Surah Al-Kahf, 18: 17)[3] From this sentence, Ayah expanding further that shadow occurred in daylight. It changes each time based on the position of the sun. In the morning, we see shadows stretching westwards. Shadow is shorter and shorter until the shortest day at noon. Then, the shadow will stretch eastward steadily until this afternoon shadows stretched long before the sun will return to the West.

The Quran teaches human being to think and consider things that by searching correct information with the logic of thinking to support or oppose and compare the testaments to assess the arguments for the conclusion of truth.

This is consistent with learning science which relies on the rationality in scientific thinking. This shows that the Quran does not contradict with science learning at all. It is also consistent with the principles of learning science, students should be encouraged to question and questioning things around them as well as used to be tools for inquiry. (Somkiat Phornphisutthimas, 2008: 58).

Kuntaree Petchtaweeporndech et al, (2009: 21) has also proposed guidelines to manage a variety of learning science which linked the main concept of a universal content, but be flexibly corresponds to real-life needs and interests of students, just like a research of Mansour (2010: 281-390) which proposes learning organization of Science which must be standard, and stimulates learners in asking facts of nature. Multicultural science must be considered by providing learning contexts which are related to learners' cultures and societies. In addition teachers have to find out the way of students' development in any kinds of situations. (Chaiyos Paiwithayasiritham, 2014: 34)

[2] Surah Al-Furqan[2] Surah Al-Furqan is chapter 25, verse 45-46 of the Holy Quran

[3] Surah Al-Kahf[3] Surah Al-Kahf is chapter 18, verse 17 of the Holy Quran

The relationship is consistent with the culture and society of student, and learning core of science learning at the elementary school level. Students should be stimulated to question the things around, leading to research with the quest to find knowledge. This is one way to learn by using the survey process that leads to questioning and researching to get knowledge. This is a teaching based on the theory of constructivism that students have to search, explore, examine the various ways for understanding and store information in the brain in the long term memory for recall when there are circumstances. This is the learning cycles of 7E Model which promotes learning and knowledge transfer. According to the concept of Eisenkraft, there are 7 Phase in the model as follows (2003: 57-59): 1) Elicitation Phase, a phrase that teachers ask students questions in order to encourage students to present their background knowledge. This will contribute to planning the curriculum appropriately. 2) Engagement Phase, a phrase that creates interest and encourages students to doubts. It can be presented or situation to motivate the students to ask questions, determine the issues be investigated to find out. 3) Exploration Phase, a phrase that students conducted a survey to check assumptions, search for, and gather information from various sources. 4) Explanation Phase, a phrase that the result data were analyzed, discussed, interpreted and presented in various forms, such as summarizing, making models, drawing tables, graphs, diagrams, and etc. by students 5) Elaboration Phase, a phrase that the knowledge happening is associated with prior knowledge that have been studied to explain the situations, events and things more widely. 6) Evaluation Phase is a phase of an assessment in learning. This is to assess students' abilities that will lead to applications in other areas. 7) Extension Phase, is a phrase that allows students to apply what they have learned for the benefits in their daily lives, or apply the knowledge gained to create new knowledge. Learning Cycle will give students the knowledge, skills, critical thinking and expand the knowledge gained from one situation to a similar situation for problem solving in everyday life.

Transfer knowledge has provided the means of transferring knowledge which concluded that the transfer of knowledge caused by brain processes, the relationship between the similarity of the things that are abstract or to induce what are the similarities. (Perkins, 1992: Online; Haskell, 2001: 26; Surang Kowtrakul, 2010: 280) This is the capable application of prior knowledge or the form of the existing solutions to other contexts which might be similar or different from the original knowledge, as well as knowledge and skills from one situation to another situation to resolve problems. The students gain knowledge at school and applied to different situations outside the school, and learn what is new from the existing arrangement with a learning experience that is similar to real life that helps students to transfer knowledge.

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As occurred in the research of Gilbert, Bulte and Pilot (2011), of learning science based on the context of promoting concepts and knowledge transfer, and transferring knowledge using the mind map, it was found that the mind mapping helps students to understand the context more deeply the laboratory and tasks solutions.

Perkins (1992: Online), Haskell (2001: 26) offers theory of Knowledge Transfer as follows: 1) Identical-Elements Theory by Thorndike believes that the transfer of knowledge is due to the similarity of the various elements that are specific facts and circumstances of the particular skills and new situations after learning the facts, and then dispersed, students will be able to solve the problem is the fact that at the same time. 2) Generalization Theory by Judd believes that when students learn the principles of something already evident to promote learning on the job, following similar principles so that students can make the tasks more effectively than students who do not understand. 3) The Similarity of Information Processing Theory is learning from the cognitive process and strategies of two pieces of tasks that are similar. The first task is to promote learning in the work, which there four characteristics: 1) The recall of factual information, concepts, and principles of the first task 2) The use of the special abilities received from learning or practice in the first task. 3) The use of general ability received from the first work to promote learning in tasks that follow. 4) The knowledge gained from tasks that follow. Therefore, when the students understand the principles or concepts of tasks and take action to finish successfully, then students can go further. The students will use the knowledge from the first task to do second task that may contain differences.

In summary, the concepts of knowledge transfer is from the belief that resembles of situations, tasks, and concepts, of prior knowledge lead to problem solving and application in new contexts. Therefore, the learning organization that is similar to daily basis would allow students to apply the knowledge, the skills and experience gained from the school to new situations and problem solving outside schools.

Learning to transfer knowledge

Perkins and Salomon (1988: 22-32) has proposed a strategy for learning to transfer knowledge into two broad approaches: 1) hugging is creating a situation where the learner has the opportunity to apply the knowledge that most of the students are eager to take action and apply the knowledge intently and 2) bridging as the learner can apply conceptions to different circumstances.

Learning strategies to achieve knowledge transfer are as follows: 1) Setting expectations is the students can apply the knowledge directly from what they have learned. 2) Matching is to help the students learn to adjust to with similar experiences and can apply most of the knowledge. 3) Simulating is to use real situation to help students apply the knowledge such as situational roleplay. 4) Modeling is to give students clear pictures such as a demonstration with illustration. 5) Problem-based learning is to allow students to gain knowledge through solutions that focus on the real problem. That is the medium of learning by using knowledge from practice to help the students connect their prior knowledge and new knowledge. 6) Anticipating Applications are allowing students to apply their knowledge to solve problems in new situations. 7) Generalizing Concepts is to allow students to use the concept and rules the learning experience has been applied to solve problems in new situations. 8) Using Analogies is to allow students to expand their knowledge by learning from the new ideas that are similar to the original situation. 9) Parallel Problem Solving is a new situation that has a similar structure but with different content to enable students to evaluate and apply knowledge to solve problems in new situations and similar conflicts. 10) Metacognitive Reflection is to prepare and support students in planning, monitoring and evaluating of knowledge and ideas to enhance their knowledge or problem-solving tasks as well as learning in the following situations. Therefore, the arrangement of several learning experiences aligned with the social context of the students, former lesson with a new lesson learned in parallel, as well as the students' reflection of learning would lead to the achievement of knowledge transfer (see figure 1):

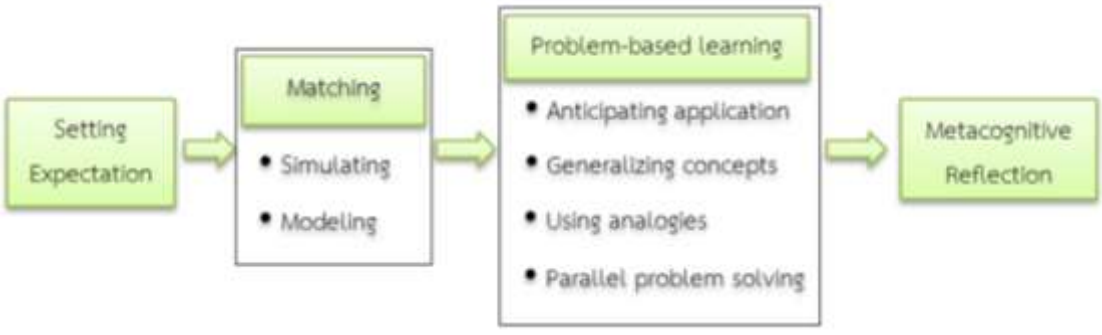

Figure 1 Model of Learning strategies to achieve knowledge transfer
Applied from Perkins, D. & Salomon, G. (1988: 22-32)

Science and Muslim Way of Life

The science concerned with the everyday life. Specifically, Muslims are unique in the lifestyle that is anchored by moral concept from the Prophet Muhammad (S.A.W)[4] called the Muslim way of life which includes in many occupations such as in agriculture, in fisheries and etc. Muslims believed that these resources are from Allah. Muslims followed and did operations under Islamic financial system, consumed halal food (Food permissible according to religious principles), did the Prayers, Fasting, Paying Zakat (a charity), and etc.

The scientific relationship with the Muslim way of life was inevitable, particularly, the consumption of halal food, which requires knowledge of the chemical synthetic substances, contaminants, and food additives. Another example was using the knowledge of astronomy, using the appearance of the moon to define the start date of the Fasting month. In addition, using science since the start of the day with access to the bathroom, prayers, go the bed and etc., these activities were the science of using directions.

Prophet Muhammad (S.A.W) [4] Sallallahu 'Alaihe wa Sallam (S.A.W.) "May the peace and blessings of Allah be upon him." This is said whenever the name of prophet Muhammad (S.A.W.) is mentioned or read. The equivalent English phrase is usually abbreviated as P.B.U.H. (peace be upon him)

Science Approach to learning in the classroom to the Muslim way of life.

This article, the authors offer guidelines on management of science learning in the classroom for Muslim students in primary levels into the lives of the Muslim about shadow and direction in everyday life by using the knowledge transfer strategies of Perkins and Salomon (1988: 22-32) with integrated scientific knowledge in relation to the way of life of the students. The contents and a learning experiences were close to real life to use. The knowledge in the classroom could be applied to the Muslim way of life for religious activities as shown in the diagram.

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[4] Prophet Muhammad (S.A.W) [4] Sallallahu 'Alaihe wa Sallam (S.A.W.) "May the peace and blessings of Allah be upon him." This is said whenever the name of prophet Muhammad (S.A.W.) is mentioned or read. The equivalent English phrase is usually abbreviated as P.B.U.H. (peace be upon him)

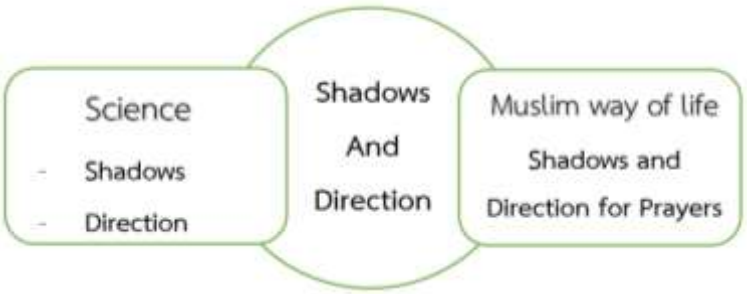

Figure 2 Integration of Science and Muslim Way of Life

Examples of class management in science learning for Muslim students in primary levels in the topic of shadow and direction in everyday life were as followed.

Stage 1 Setting expectations, students can observe, ask questions, search information, collect information, make discussion and explain the principles of the shadows and direction. This was the transfer knowledge of the Muslim way of life by observing the direction of the shadows to know and to apply in finding direction for prayers correctly.

Stage 2 Matching, teacher set up appropriate experience by assigning the relevant theme and transformed the learning experience related to the Muslim way of life about shadows and direction in everyday life. At this stage, the teacher will have to select a learning experience by simulating or modeling. An example of simulating, students do activity outside the classroom in the in the morning by standing in the playground. Teacher allows student to observe what happens. Then ask

- How does the direction of the shadows occur?
- How does the shadows occur?
- When does the shadow occur?
- Why does different times reflect in different shadow positions?

For example, the teacher can make demonstration by using simple materials such as a model, flashlight, and a background to show how light occurs in a room or a suitable place.

Stage 3 Problem-based learning, the learning experience for knowledge transfer. The teacher assigns activities to help the students achieve the conception and scientific principles about shadows and direction. The Teachers divide students into small groups of 3-4 people by using a cooperative learning model (Learning Together) that everyone in the group helping each other in learning with a piece of a mutual agreement of the members. Everyone in the group will have the same score. Learning Together (LT) with the following steps:

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Step 1 teachers and students review the relevant and basic knowledge.

Step 2 teachers prepared media and materials.

Step 3 teachers assign responsibility of each student. One student reads the instructions and implementation. The second student listens and gather information. The third student reads the questions and finds the answer. The fourth student checks their answer.

Step 4 students do the activities of the shadow experiments with teacher's consultation.

Step 5 students record and discuss the results.

Step 6 teachers lead students to discuss the results.

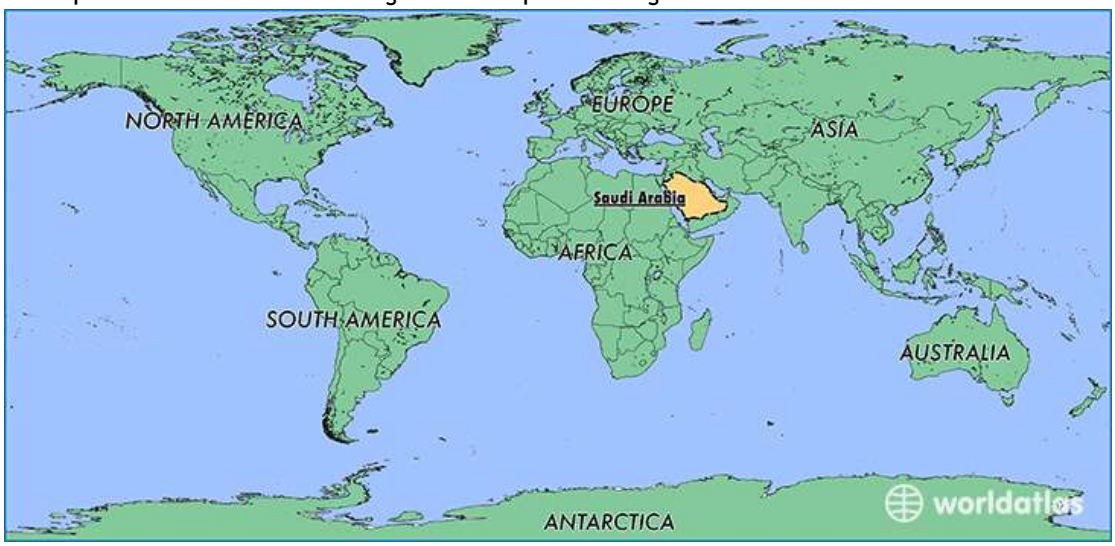
To summarize the concepts and principles of the subject to be studied, the study should be concluded that shadow related to the shape of the object, the light does not penetrate through causing a shadow of object. Directions are fixed from the position of the visible sun, where it rises from the horizon and where the sun goes down. The sun rises in the east and reaches its highest position in midday. Then gently goes down to the horizon in the opposite. The sun goes below the horizon in the West. We can determine the direction by observing the phenomenon of the sunrise and the sunset. If we stand and outstretched left hand to the east. The right-hand side is the West. The front of us is the south and back of us is the north. Therefore, we can determine direction by observing phenomenon of the sunrise and sunset. Teacher may design experiments of the shadows that allow students to use the scientific process. The problem-based learning in Step 3, the teacher may use a form of knowledge transfer or may use any other forms to help students apply their knowledge in new situations. The study concluded that using concepts and scientific principles of directions and shadow could be applied to solve problems in new situations. After that, teachers may take the form of a new scenario similar to the original to make the students expand their knowledge. The idea is to link and transfer knowledge to solve problems in new situations in the future.

Example of anticipating applications, students can learn to search information, analyze of data from other scenario of the Muslim way of life. For example, they study from Media or visual image that teacher provide and then answer the questions.

Examples of scenario

Muslims' life is related to the scientific knowledge of identifying direction, which called the Qibla. This is to determine the direction of bedding, praying, and bathing. Muslims all praying towards the same point is traditionally considered to symbolize the unity of the Ummah. The direction mentioned is to the city of Mecca, Saudi Arabia called the Qibla. The countries around the world will have different directions to Qibla. For Thailand, the Qibla direction is to the northwest of 15 degrees.

Examples Media or visual image to use questioning



http://www.worldatlas.com/saudi-arabia-locator-map

1. When we draw a line from Europe to the Qibla direction. Which direction do you think the Muslims who live in Europe will be facing for prayers?

2. In which direction that Muslim who live in the North America must be facing for prayers to Qibla direction?

The sample of the generalizing concepts is allowing students to use science concepts and scientific principles of shadows and direction from their learning experience to apply and solve problems in new situations.

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Examples of scenario

During the first semester of each academic year. Grade 4-6 students will go on a field trip to the aquarium. When the time closes to the noon, the teachers take students to lunch at Samila Beach. Then the Students have to go to prayers, although everyone knows about facing the Qibla but this place is a place where students are unfamiliar. Fadel is suspected to pray facing in any direction? He faces the sea, then the shadow of pine trees stretches toward the back of him, which at that time was approximately 12:30 p.m.

The circumstances set out above, the teachers can encourage students to transfer scientific knowledge to use in a Muslim way of life by questioning the students to express themselves in a scientific process, allowing students to define problems, make hypothesis, parameters and the research. Examples of such questions

- How to find the North geographically?
- How to know which direction is the West?
- If we arrive at Samila Beach about 15:00 p.m., in which direction would the shadows of the pines stretches to?

For example, using analogies that the students are expanding their knowledge by learning from the idea of the new situation that is similar to the situations with the tasks in the second story concept mapping out. Then, perform the activity sheet. Then discuss the results with the scientific principles. The shadows and direction, then be analyzed the relationship in relation to the Muslim way of life of the students. Then presentations from the discussion of their group. The teacher may determine the format of the presentation or the students selected to present their needs, as proposed in the concept mapping and table formats and so on.

Examples of scenario and questions

Muslims all praying towards the same point is traditionally considered to symbolize the unity of the Ummah, or all Muslims worldwide, under Sharia (Law of God). While Muslims from Thailand, the Qibla direction is to the northwest of 15 degrees. The Muslims who live in the southern states of United States of America are praying facing east. The Muslims in the middle of China are praying headed west. All Muslim in the world must be prayer, facing the city of Mecca, which is the location of The Holy Kaaba is a building at the center of Islam's most sacred mosque, Al-Masjid al-Haram. Mr. Dawud, Mr. Adil, Mr. Adam and Ms. Fatima are the fourth Muslim's student who has an exchange student to study in the following countries: the countries of Europe, Mr. Dawud went to study in France, Mr. Adil in Spain, Mr. Adam to China and Ms. Fatima to the United States.

1. In which direction that 4 student must be facing for prayers to Qibla direction?

2. Who must be facing for prayers to the northwest?

3. Write the correct answer to the table format the four Muslim students who need prayer facing the Qibla.

No.	Name	Qibla direction	Countries
1			
2			
3			
4			

For example the parallel problem solving, teachers assigned parallel situations with the workload in the appearance of the task by presenting a new scenario that resembles a similar structure but with different content so that students can evaluate and apply knowledge to solve problems in new situations in a similar manner and the conflict of students.

Stage 4 Metacognitive Reflection, the metacognitive reflection is to prepare and support students in planning, monitoring and assess the knowledge and ideas of their own to increase knowledge and understanding the lessons learned from the situation or problem-solving tasks as well as learning the following scenario. In this process, the teachers evaluate the results from an activity and the tasks arising from the work of members of the group to answer a few questions to verify understanding overview. A summary of knowledge, science concepts and scientific principles of learning in each student's book to verify understanding the

individual or they may ask questions that demonstrate scientific knowledge transfer into the lives of the Muslim such as students can apply the knowledge of the scientific principles which used in finding the Qibla direction.

Conclusion

Management in learning science links the scientific knowledge that is universal with the life of Muslim students in the three southern border provinces, teachers must take into consideration the integration by selecting and arranging the contents in the learning experience. Create a context of learning science in associated with the lives of our students. Learning strategies to transfer knowledge to be able to link their knowledge in science concepts, the scientific principle as well as scientific process skills of learning in school into the lives of Muslim students. A knowledge transfer has occurred between them appropriately, they can finally put these knowledge to use in daily life, according to the Muslim way of life.

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