

Mobile Learning Contains Nature of Science (NOS) to Promote Healthy Food in Junior High Schools

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Abstract-- 21st century skills are needed so that students have knowledge and can apply their knowledge to solve problems in real life so as to create a society with scientific literacy. One aspect of measuring scientific literacy is knowledge of science related to the nature of science (NOS). The goal of national development is to form quality human resources, one of which is in the field of food. But in reality, students have a tendency to pay less attention to their personal health. Many students prefer fast food because it is cheap, easy to get, and tastes good. Even though students need to pay attention to their nutrition to maintain health, support growth, and as energy for their activities. Mobile learning facilitates students to be able to learn anywhere and at any time so that there will be an independent learning process and can be a solution to promote healthy food to students by inserting aspects of NOS that can support students with scientific literacy.

Keywords-- 21st Century Skills, Scientific Literacy, Nature of Science, Mobile Learning Skills, Healthy Food.

I. INTRODUCTION

Science Education is field of science related to an effort to systematically understand various natural phenomena. Science education not only emphasizes the mastery of number of knowledges as products, but also provides sufficient space for the growth of scientific attitudes, practicing problem solving and applying it in daily life. The challenges of the 21st century are marked by the rapid development of technology applied in various fields of life in society. Therefore, we need skills that can prepare students to

have literacy for science and technology, and be able to think comprehensively in solving real-life problems. In enGauge 21st Century Skills, initiated by the North Central Regional Educational Laboratory (NCREL) & Metiri Group, 21st century skills that students should master include digital era literacy, creative thinking, effective communication and high productivity. It should be noted that the domain of literacy in the digital era is supported by several skills, one of which is scientific literacy [1].

Science literacy is the ability to use scientific knowledge and attitudes, not only to understand phenomena or problems but also to be involved in solving problems based on knowledge [2]. Recognizing the importance of scientific literacy for students, countries that are members of the Organization for Economic Cooperation and Development (OECD) hold an assessment called PISA. PISA (Program for International Student Assessment) is an international standard assessment to assess the knowledge and skills of 15 years old students (third grade junior high school and / or high school class I) in reading, mathematics and science. Mastery of science content measured in PISA covers two aspects, namely science knowledge related to facts, concepts, principles, laws and theories in science and knowledge of science related to the nature of science or Nature of Science (NOS) [3]. But the facts on the ground show that in general science textbooks present more about the theory and law of science (67%) and do not present the components of the nature of science such as empirical science, socio-cultural inherent in science, creativity and imagination of science, scientific methods and properties. tentative science [4]. McComas stated that the application of NOS in learning can increase knowledge of science content, understanding science, interest in science, decision making and learning processes.

Therefore, educators need to facilities learning optimally so that students have good scientific literacy [5].

In addition, one of the goals of national development is to form quality human resources. Teenager are human resources for development in the future. To improve the quality of human resources, many factors that must be considered include factors of education, food (nutritional elements), health, information, technology and others. Choosing a healthy food theme is one of the contexts that is close to the daily life of students so that students are expected to be more selective in choosing and consuming food. Based on the consideration of the importance of promoting healthy food in accordance with the objectives of science learning in the 2013 curriculum and the demands of competencies that must be possessed in the 21st century, as well as the importance of mobile learning that can activate and maximize student learning, the authors draw several questions that can be an outline of the entire writing, namely;

1. Why is knowledge about healthy food important for students?
2. What happens if students do not have knowledge about healthy food?
3. What solutions can be given to overcome the lack of students' knowledge about healthy food?

II. DISCUSSION

Healthy food is food that contains substances needed by the body, such as carbohydrates, fats, proteins, vitamins, minerals, and water. Food pyramid is a nutritional guide that can be used to plan a healthy diet, through the types and sizes of healthy food portions in pyramid form as Figure 1. There are four levels of food pyramids that each level provides several types of food and we need it all to meet daily nutrition. The higher the amount you have to eat the less, the lower the amount you have to eat more.



Figure 1. Food pyramid

The basis of healthy food is the consumption of daily food must contain nutrients in the type and amount (portion) that suits

the needs of each person or age group. In consuming healthy food, we must also pay attention to physical activity, clean living behavior and weight control, aside from regulating our food. The following is a nutritional recommendation table 1 for adolescents [6].

TABLE 1. NUTRITION RECOMMENDATIONS FOR ADOLESCENTS

| Nutrient | Age 9-13 years | Age 14-18 years |
|-------------|--------------------------------------|---|
| Carbohydrat | 130 g/day | 130 g/day |
| Fat | Boys=86g/day Girls=72g/day | Boys=107g/day Girls=82g/day |
| Protein | 0.95 g/kg body weight per day | 0.85 g/kg body weight per day |
| Vitamin A | 600 µg/day | Boys = 900 µg/day Girls = 700 µg/day |
| Vitamin C | 45 mg/day | Boys = 75 mg/day Girls = 65 mg/day |
| Vitamin E | 11 mg/day | 15 mg/day |
| Calcium | 1300 mg/day | 1300 mg/day |
| Iron | 8 mg/day | Boys = 11 mg/hari Girls=15 mg/day |
| Zinc | 8 mg/day | Boys = 11 mg/day Girls =9 mg/day |
| Fluid | Boys = 2.4 L/day Girls =2.1 L/day | Boys = 3.3 L/day Girls = 2.3 L/day |

(The science of nutrition second edition, page 669)

Nutrient recommendations for adolescents are needed to maintain health, support growth, and as energy for their activities. Adolescent carbohydrate needs are 130 g / day, which is about 45% to 65% of total daily energy intake. Fat needs for teenagers are 25% to 35% of the total energy from fat. Protein requirements for teenagers are 0.85-0.95 g of protein per kilogram of body weight per day. This amount is assumed to be sufficient to support health and support growth and development during the teenage stage. Growth acceleration occurs during the transition phases before adolescence. Teenagers who consume less fruits and vegetables every day can experience deficiencies in vitamins A, C, and E. Adolescent calcium needs are among the highest in life, reaching 1300 mg / day. Iron and zinc are needs in adolescents are relatively high because it is needed to replace blood loss during menstruation in girls and to support the growth of muscle mass in boys. Adolescent fluid needs are higher than children because they have higher levels of physical activity, growth and development. Men are generally more active than girls and have more muscle tissue. As such, they need a higher fluid intake to maintain body fluid balance. Facts on the ground, teenagers have a tendency to pay less attention to their personal health.

Many teenagers prefer fast food because it's cheap, easy to get, and tastes good. Another consequence of teenagers in

school is that without anyone monitoring what they eat, children do not always consume enough food. The presence of schools should be able to influence children to choose healthy foods. But many schools still provide vending machines filled with snacks that are rich in sugar and fat. This is based on the survey results in the form of questionnaires given by the author to students at one of the schools in Palembang regarding food and drinks available in the school canteen. Students tend to choose foods such as fried foods, crackers, sausages, grilled meatballs, sweets, and various brands of preserved drinks.

The main problem that will occur as a result of unhealthy eating behavior is obesity or obesity and potential nutritional deficiencies. This is due to eating and drinking too many calories but moving too little. In addition, sweet foods including candy, jelly and caramel that stick to the teeth continuously without brushing teeth regularly will cause dental caries or cavities. Other bad habits, such as not having enough breakfast can cause students to not be able to concentrate or pay attention to the teacher well in school. Other disorders of nutritional deficiencies can blunt the immune response of adolescents, making them more susceptible to disease. Furthermore, if inadequate calcium intake during adolescence, will cause bad bone health and the potential for osteoporosis in later years [7].

The solution that can be done to promote healthy food in schools is mobile learning by inserting NOS. Mobile learning allows students to learn anywhere and anytime so that there will be an independent learning process. Considering the use of android is mostly used to play games and social media by students, which is shown by Moba Market survey that the types of mobile applications that are most widely used by users are games that reach 43.71% and social media 12.02%, of course this is the solution so that the use of Android becomes effective and directed [8].

MOBILE LEARNING

Mobile learning is a learning design that utilizes information and communication technology. Mobile learning allows students to interact directly with smartphones individually, so that it will create a different experience that is seen as easier to overcome the gap between place and time. There are three functions of mobile learning in classroom learning activities, as follows [9]:

1. Supplements (additional)

Mobile learning functions as a supplement (additional), namely: students have the freedom to choose whether to use mobile learning material or not. In this case, there is no obligation / obligation for students to access mobile learning material. Even if it is optional, students who use it will certainly have additional knowledge or insight.

2. Complement

Mobile learning functions as a complement, namely: the material is programmed to complement the learning material that students receive in the classroom. This means that the material of mobile learning is programmed to become

reinforcement or remedial material for students in following conventional learning activities.

3. Substitution

Some universities in developed countries provide several alternative models of learning activities to their students. The aim is that students can flexibly manage their lecture activities according to the time and daily activities of students.

According to Wilson and Bolliger mobile learning in principle aims to facilitate learning learners anywhere and anytime according to the time they have. Mobile learning also provides sharing content for each user by using the same content and allows instant feedback [10].

NATURE OF SCIENCE (NOS)

Nature of Science (NOS) or the essence of science is a knowledge of how science works. NOS is knowledge about the epistemology (method) of science, the process of the occurrence of science, or the inherent values and beliefs to develop science. Even Mullis and Jenkins that understanding good NOS can provide the intellectual abilities needed by someone to develop science and technology. McComas stated that the application of NOS in learning can increase knowledge of science content, understanding science, interest in science, decision making and learning processes [11] [12] [13]. NOS is divided into eight aspects, namely [14]:

TABLE 2. DESCRIPTION OF NOS ASPECTS

| No. | Aspect | Description |
|-----|--------------------|---|
| 1 | Tentative | Scientific knowledge can change with new observations and by reinterpretation of existing observations. All other aspects of NOS provide a rationale for the temporality of scientific knowledge. |
| 2 | Based on empirical | Scientific knowledge is based on and / or comes from natural observations. |
| 3 | Creativity | Scientific knowledge is created from human imagination and logical reasoning. This creation is based on natural observations and conclusions. |
| 4 | Law and theory | Law and theory are various types of scientific knowledge. The law describes relationships, observations or perceptions of natural phenomena. The theory is concluded for the explanation of natural phenomena and the mechanism of the relationship between natural phenomena. The hypothesis in science can lead to law or theory with the accumulation of substantial |

| No. | Aspect | Description |
|-----|---------------------------|---|
| | | supporting evidence and acceptance in the scientific community. Law and theory in its development do not join with each other, in a hierarchical sense, because law and theory are clear and functional in various types of knowledge. |
| 5 | Observation and inference | Science is based on observations and conclusions. Observations are collected through human senses or extensions of the five senses. Conclusions are interpretations of these observations. Various perspectives contribute to strengthening some interpretations of observations. |
| 6 | Subjectivity | Science is influenced and encouraged when scientific theories and laws are accepted. Question development, investigation and interpretation of filtered data through the theoretical glasses currently in effect. Subjectivity in this case is unavoidable which allows science to develop and remain consistent, but also contributes to scientific change when previous evidence is tested from the perspective of new knowledge. Personal subjectivity is also unavoidable. Personal values, agendas and prior experience dictate what and how scientists do their work. |
| 7 | Socio-cultural planting | Science is a human endeavor and is influenced by society and culture where science is practiced. Cultural values determine what and how science is carried out, interpreted, accepted and utilized. |
| 8 | Aspects interdependence | Among aspects there is a relationship of interdependence, in which one aspect is influenced by another aspect. For example, tentative scientific knowledge comes from the creation of knowledge through empirical observation and inference. Each activity is influenced by culture and society where science is practiced as well as the theoretical framework and personal subjectivity of scientists. As new |

| No. | Aspect | Description |
|-----|--------|--|
| | | data is considered and existing data is reconsidered, conclusions (made in certain contexts) can cause changes in existing scientific knowledge. |

(Schwartz, Lederman & Crawford, 2004)

Teaching NOS can be done to elementary students to high school students. But the way to teach NOS to students is adjusted to the level of school. Mobile learning with NOS aspects for junior high school students includes aspects of socio-cultural planting, aspects of observation and inference, aspects of subjectivity and aspects of creativity. This is based on the consideration of the cognitive conditions of junior high school students and in terms of healthy food material. The following is an example of the insertion of NOS aspects in mobile learning applications:



Figure 2. Insertion of NOS aspects (a) observations and conclusions, (b) creativity, socio-cultural planting, and (d) subjectivity.

III. CONCLUSION

Healthy food is food that contains substances needed by the body, such as carbohydrates, fats, proteins, vitamins, minerals, and water. The basis of healthy food is the consumption of daily food must contain nutrients in the type and amount (portion) that suits the needs of each person or age group. In consuming healthy food, we must also pay attention to physical activity, clean living behavior and weight control, aside from regulating our food. Facts on the ground, teenagers have a tendency to pay less attention to their personal health. Many teenagers prefer fast food because it's cheap, easy to get, and tastes good. The consequences of choosing unhealthy foods are obesity, dental caries, weak immune response, osteoporosis potential, and so on. One solution that can be done to promote healthy food in schools is mobile learning by inserting NOS.

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