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Science Teaching and Learning Activities at Jincheng Junior High School to Support Students' Scientific Literacy

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Abstract

Scientific literacy is an ability to integrate science knowledge with relevant context and encourage people to behave scientifically. This case study describes the teaching and learning activities at Jincheng Junior High School, Tainan, Taiwan in supporting students' scientific literacy. This study was a qualitative descriptive study that describes teaching and learning activities in supporting students' scientific literacy as written in the narrative text. The data was collected by using observation, interview, and documentation. The data was then analyzed through five stages of qualitative data analyses by Nowell et al. (2017). The result shows that there were some key activities conducted at Jincheng Junior High involving laboratory, teaching, assessing, and learning activities. However, there were some limitations of the frequency of conducting laboratory activities and developing students' inquiry. It can be concluded that teaching and learning activities at Jincheng Junior High School could support students' scientific literacy.

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INTRODUCTION

Scientific literacy is an ability expected from citizens in well developed countries. It is crucial for their science and technology development. One of the tests that can measure it is PISA assessment. In PISA assessment, the test questions offered are mostly linking scientific knowledge with its application in everyday life. The type of test questions are correlated in accordance with scientific literacy as seen in its definition. Based on many definitions on scientific literacy, there are three main ideas to picture scientific literacy, they are knowledge, context, and behavior. Scientific literacy focus on how knowledge is being applied to certain condition to take some actions and decisions toward the recent phenomenon (Dragos & Mih 2015). Scientific literacy focus on students to implement their knowledge in certain condition or context that is happening around them. It is necessary to drive their behavior or attitude in making decision of a problem in their daily life. Knowledge base is very important to each student to make any decision of their life (Roberts & Bybee, 2018: 545–558).

PISA (2015) strengthen the importance of scientific literacy by stating that scientific literacy is the ability to understand the characteristics of science and its significance in modern world, to apply scientific knowledge, identify issues, describe scientific phenomena, draw conclusions based on evidence, and the willingness to reflect on and engage with scientific ideas and subjects. Conceptually, scientific literacy is a process in which some scientific activities happened in response to everyday issues. Operationally, scientific literacy is an ability to apply scientific knowledge and understanding in certain context, and take an action. According to American Association for the Advancement of Science (AAAS), scientific literacy should be taught the way scientists do, starting from presenting a question or a problem, stating hypothesis, until form or revise a theory (1993). Scientific literacy cannot be taught or explained in a book, it is a collective responsibility and consciousness of society in order to act scientifically that can save our planet for being more threatened. In other words, scientific literacy must be lived-in (Roth & Barton, 2004). Thus, education is the main way to change scientific literacy as community responsibility into collective responsibility. However, it is not a guarantee that educated ones will possess the very good level of scientific literacy. Crowell and Schunn (2015) found that science course taking and applied scientific literacy have a very week relationship. The level of scientific literacy can be seen in the quality of science education rather than the quantity of science course.

There are several characteristics of scientifically literate person that able to (1) explain phenomena scientifically, means that students must be able to recognize, offer, and evaluate explanations; (2) evaluate and design scientific inquiry, means that students must be able to describe, offer ways to address scientific questions, and assess scientific investigations; and (3) interpret data and evidence scientifically (OECD, 2016:23).

Taiwan is a country with well – developed education. Taiwan ranked 4 in Programme for International Student Assessment (PISA) 2015. It was scored 532 in science, from 493 score average. The reason behind its good rank is their education goal. As written in the First National Science Education Conference (2002), Taiwan goal is enabling their citizens to take delight in learning science and understand its application, also be curious about the profoundness of science, and appreciate the beauty of science.

One of the schools in Taiwan is Jincheng Junior High School (Jincheng JHS). The school has good facility to support its teaching and learning activities. Their science teaching and learning is divided into 3 grades. For grade 7, students learn biology. On grade 8, they learn physics. On grade 9, they learn chemistry and reviews of biology and physics also to prepare their final examinations.

Satisfying result of PISA test in Taiwan makes it important to explore its science teaching and learning activities. From this background, it emerges a question of how Jincheng Junior High School held teaching and learning activities in supporting students' scientific literacy.

Thus, this study aimed to describe Jincheng Junior High School science teaching and learning activities in supporting students' scientific literacy as investigated as its lesson content, the method of teaching, the assessment process, and the learning process students performing.

RESEARCH METHOD

The research used qualitative case study research method with narrative research design. The population used was seventh and ninth grade students of Jincheng Junior High School, Tainan, Taiwan at academic year 2018/2019. Tbe research sample was taken by purposive sampling technique in some classes. They are 701, 901, and 911. The procedures of this research: (1) Initial observation from literature study; (2) Determining the population and sample with purposive sampling technique; (3) Data collection from grade 7 and 9 at odd semester in Jincheng Junior High School, Tainan, Taiwan; (4) Analyzing the data by using thematic analysis. It was done by reviewing the observation, interview, and documentation data, group it into several themes, and creating the whole story; (5) Describing the results and discussion of the research.

RESULTS AND DISCUSSION

To describe topics or materials presented by science teachers, data were collected by observation, interview, and documentation. Based on the result of the observation, there were one question presented. The question was if the teachers taught scientific literacy in particular or were teaching scientific literacy skills through biology topics. The teachers' answers were that they taught scientific literacy skills through the topics presented in biology classes. The documentation was done by using students' textbook and supplementary hand out. From those books, it could also be seen that in each topic discussed at the class contain graphics and tables. This result confirmed that the skills taught by teachers were supported by the textbook and supplementary hand out.

Based on the data collected, it can be concluded that there were some tendencies:

- Each topics taught by teachers contain materials to support students' scientific literacy skills.
- Scientific literacy was taught through biological topics in the classroom.
- Interpreting data from graphics and tables and explaining daily phenomena scientifically that often be done, could support students' scientific literacy.

In one of their meetings in a semester, students observed the microorganisms through microscope. They got the microorganisms from the school pond. In this activity, they learned how to use microscope and observed the organism. One of the students, Molly, got curious on how her hair looks like under the microscope. To satisfy her curiosity, she observed it after she had done observe microorganism from the pond. In Jincheng biology class, students are allowed to do another activity related to the observation after they had done the main observation. To elaborate it with their lesson, the teachers use questions on the book. After the activity had been done, teachers discuss the questions with students. It gives rooms for students' curiosity and train them how to satisfy it. Teachers' role are to guide them to connect what they got with how exactly it is.

During laboratory activities, students used simulation for experiment in weather. They used a bottle and water. The principal of this activity is that if there is water vapor, the weather is not hot. The more it is, the colder the weather. The use of technology, either simple or complicated technology is helping and cannot be separated. Technology helps scientists do research and prove their findings. That is why Science, Technology, Engineering, and Math (STEM) method is suited to develop a scientifically literate individual, that able to integrate science and technology in their daily lives. Inter-disciplinary lessons, especially science and technology in this biology class develop students' scientific literacy skills (Lawless & Brown, 2015).

Laboratory activities sometimes can be held in the classroom, for example in observing parts of flower. Based on the interview result, students prefer to do hands-on activities than only listening to teachers'

explanation. Hands-on activities actively involve students in learning for seeking knowledge. Teachers has to help them especially in guiding and coordinating learning activities. In this observation and other experiment like they did in weather bottle, teachers applied process skills approach. Process skills approach has positive effect in improving students' scientific literacy and students' scientific attitude which is important for their scientific literacy skills (Suryanti, et al., 2018).

From interviews, it can be known that scientific literacy is taught through biology. There is no particular chapters or time allocated to improve students' scientific literacy. It proves that education through science supports students' scientific literacy. Teachers educate students to be scientifically literate using biology as their tools. There are some characteristics of education through science as mentioned in Holbrook & Rannikmae (2007): (i) Learn knowledge and concepts of science to understand and handle socio-scientific issues in society, (ii) doing investigatory scientific problem-solving, (iii) appreciate the nature of science from societal point of view, (iv) Express scientific ideas in symbolic/tabular/graphical formats, and (v) improve social values to be a responsible citizen and undertake science-related job.

From those characteristics, biology laboratory activity in Jincheng JHS can support students' scientific literacy by giving students room to investigate something they are curious about or according to certain problems and help them to integrate science and technology.

To describe teaching processes in the classroom and laboratory, data were collected by interview, observation and documentation. Based on the data collected, it can be concluded that there were some tendencies:

- The learning media used to explain phenomena scientifically can be from daily events, the books and related videos.
- The key steps of teaching and learning in explaining phenomena scientifically were asking students questions related to the topics, teaching lessons by delivering stories and connecting one simple concept to a complex one.
- The learning media used to evaluate and design scientific inquiry can be from daily events, the books and related videos.
- The key steps of teaching and learning in evaluating and designing scientific inquiry were guiding students to understand a concept by asking questions and presented students with lab work guidance but still giving some space for them to explore.
- The learning media used to interpret data and evidence scientifically can be from daily events and books.
- The key steps of interpreting data and evidence scientifically were presenting students with problems, tables, and graphics and help them explain it.

Based on the data, teaching activities can be discussed into three key components, they are learning media, steps of teaching and learning, and teachers' roles.

Learning media that is used in Jincheng JHS are mainly the text book and supplementary handout to support the book. Both text book and supplementary handout contains lessons, pictures, questions, tables, and graphs. A suitable textbook for teaching scientific literacy must have these criteria: (1) considering the relationships between science, technology, society, and environment; (2) focus on scientific and technological achievements; (3) conform logical reasoning; and (4) discusses controversial issues (Calado et al., 2015). Questions in the book can represent 2 out of 5 instructional and curricular features to support students' literacy. The features are (1) connecting multiple representations and (2) engage students with science discourses (Krajcik & Sutherland, 2010). The first feature is represented with a question in the textbook, as shown below.

As shown in figure below, 3 test tubes of A, B, and C were added with 3 ml of starch solution and 3 ml of saliva, and placed in water at 0ºC, 37ºC, 90ºC respectively. At regular intervals, the same amount of liquid is taken from each of the 3 test tubes. After cooling, the iodine solution is dripped. Which of the test tube liquids no longer has a blue-black reaction?

Students are asked to analyze about starch test and also connecting the concepts of temperature with the enzyme. The second feature is represented with questions in the text book. In those questions, students are presented with articles or data to analyze and interpret it. In PISA 2015, one competency that students must have in order to be scientifically literate is interpret data and evidence scientifically (OECD, 2016:20). Students in Jincheng JHS are used to interpret graphics and tables so that it will be easier for them to be familiar to these data. From both features, it can help students in improving their critical thinking to develop their scientific literacy. On the other hand, tables and graphs also help students for being critical and teachers for being creative. Being familiar in interpreting table and graph is one of the key factors in having satisfying score of scientific literacy. However, most students are more able to interpret complex texts rather than tables and graphics (Finneran, 2017). Thus, teachers take roles in developing students' critical thinking. Based on this description, it can be concluded that the key learning media to support students' scientific literacy are pictures, tables, and graphs.

The text book also contains laboratory instructions that present in video format, so that teachers can play it in the classroom. The teachers said that it helps students to visualize what and how they are going to do. Besides, students are also familiar with watching documentaries and videos of science to satisfy their curiosity. Students often ask about the videos to teachers. Teachers play role to teach students to think critically about it and have an ability of media literacy. Media literacy is important because the exposure of media towards people are more frequent than any other sources, including teachers and schools. Without media literacy, students may believe in what they listen and read to the most. Media literacy is important to scientific literacy because many popular science topics are not accommodated enough in the classrooms to discuss. Science education must be able to provide students with media literacy skills in order to identify misunderstandings and confusions about the news (Cooper, 2011: 235).

The key activity in steps of teaching and learning to support students' scientific literacy in Jincheng JHS is questioning. Teachers presented questions to students often. In those questions, teachers were more likely to ask contextual questions which required students to think based on their knowledge and make a logical answer. It will help the students to understand better about the impact of science issues in daily life that they are discussing. In teaching scientific literacy, it is very important to make science relevant to students (Anelli, 2011). Teachers need to pay more attention that focuses on the right concepts for students, strengthens confidence, and increases the link between environmental context with teaching and learning (Udompong & Wongwanich, 2014). Questions are used to make a challenging and problem-solving class design. The design is crucial because problem-solving is one of the scientific skills students need to have (Suryanti, et al., 2018). To make it simple, teachers use daily life phenomena. Besides, based on the observation, students seem to have no doubt when they are about to deliver questions to teachers. These

feedback from students show that the communication between teachers and students go well with no meaningful boundaries.

The second important thing in teaching activity is storytelling and hands-on activity. Storytelling is told by teachers to deliver lesson in the classroom. Teachers use pictures in the text book to visualize the story. This way is easily accepted by students since the language is easily understood and the concept is delivered in the easiest way. Combining hands on activities and storytelling support students to engage children with the lesson and create meaning to the lesson (Walan, 2017: 10).

It can be seen that the role of teachers in correlating the topic of the lessons to real situations is very significant to support students' scientific literacy by appreciating and understanding the impact of science and technology on everyday life. Students can connect their lessons in science class with the phenomena in their daily life. It is supported with Holbrook and Rannikmae findings (2009) that the key component of teaching in view of scientific literacy is relevancy. Furthermore, this activity is very meaningful for students' scientific literacy according to their young age and limited science knowledge. They need guidance from teachers on how to use their limited knowledge and broaden their knowledge at the same time. Only in that way they can be scientifically literate since age 12.

To enhance scientific literacy, it emphasizes on appreciations of the nature of science, the development of personal attributes, and the acquisition of socio-scientific skills and values (Holbrook & Rannikmae, 2009). Nature of science does not have an exact definition. However, there are 7 issues of nature of science (NOS): tentativeness, observations, scientific methods, theories and laws, use of imagination, validation of scientific knowledge, and subjectivity and objectivity (Chen, 2006). Understanding of NOS and scientific inquiry are critical and essential of scientific literacy (Lederman, et al., 2013).

The scientific literacy characteristics that teachers develop is encouraging students to take their own decisions about science issues. Teachers inform them with familiar issues, for example health, environment, and disaster, one issue in each hour. Although it is not mentioned in their lesson plan in detail, but it helps students to be well informed and dare to take their personal decisions.

Along the lessons, as students are already encouraged for asking and well informed of science issues, they will be more likely involved in science issues discussions confidently at class. Based on the observations, there were many questions and opinions students deliver as the teachers teach that sometimes teachers need to limit the discussions. However, it does not stop them from asking since they can talk to the teacher after class or even contact them via social media.

In giving instructions both in the classroom and in the laboratory activity, teachers play major role. Based on the observation, it means that teachers are the main source of the instructions. However, students can be creative along the lesson to try something new, for example observing hair through the microscope. In science education, give instructions for children is a need for teachers but also for students practice their speaking and listening skills (Daw, 2013). In giving experimental instructions, students will pay attention to teachers by listening to it carefully and speak their questions. This way is also possible to know how well students interpret procedures and do it. It helps their scientific literacy skill that is communication.

As teachers, they need some trainings to develop their ability in teaching, especially to have scientifically literate teaching. Jincheng JHS and the government provide them with trainings at least once in a semester. One of the training should aims to design programs of scientific literacy depending on socio-cultural characteristics of the students (Dragos & Mih, 2015). It means that teachers need to design a biology lesson materials and activities to improve particular characteristics students must have to be literate.

From the discussion provided, there are some key activities to support students' scientific literacy:

Table 1. Key activities in teaching to support students' scientific literacy.

Teaching activities in supporting students' scientific literacy	
Learning media	Pictures, tables, and graphs
Teaching and learning activities	Questioning activity by students and teachers
Teachers' roles	Correlating the topic of the lessons to real situations

To describe the assessment processes presented by science teachers, data were collected by observation, interview, and documentation. From the questions in interviews, there were some answers presented. Teachers use paper test to assess students in every unit. A teacher, Ms. Melody, held a weekly test to check on how well students understood. The test paper was made by teachers or sometimes they use the ones that the school already purchased from some publishers. These test paper could only be purchased by the teachers or the school. There were three publishers who made the test paper, Han Ling, Kan Sheng, and Nan Yi. Teachers also observe to assess students. They would likely to offer students with some questions either from the textbook, workbook, or from their surroundings. If some students were able to answers, the teachers would record it on their books. The questions presented on the paper test were multiple choice. It was the most common form of questions in paper tests in Taiwan. Besides, the weekly test presented in fill-in-the-blank and multiple choice, alternately. The scores students got were various. For some students, especially the ones who wanted to go to high school, they would study hard and got good scores, at least 80. However, for them who did not like to study and did not want to go to high school, they would likely to get lower scores.

The documentation was done by using students' textbook and supplementary hand out. From those books, it could also be seen the multiple choice and fill-in-the-blank quizzes for each chapter. In the textbook, most reviews were presented by evaluating the scientists' experiment. Some questions were written there to help students evaluate the experiments.

Based on the data collected, it can be concluded that there were some tendencies:

- Multiple choice and fill-in-the-blank questions could support students' scientific literacy.
- Paper tests could assess students' understandings and could support their scientific literacy.
- Evaluating scientists' experiment could encourage students to do science method and supporting their analyzing skills toward concluding some experiments.

Assessment of scientific literacy based on PISA 2015, must assess 3 competencies: (1) explain phenomena scientifically, (2) evaluate and design scientific inquiry, and (3) interpret data and evidence scientifically (OECD, 2016:23). In other words, questions provided by teachers for the assessment, must test students with those 3 competencies. In the textbook, at the end of chapter 1-3 contains at least 1 question of phenomena that are demanded to be explained scientifically. Moreover, interpreting data scientifically also present in each chapter. Besides, questions from teachers that are used for formative assessment are more likely to explain phenomena or to interpret data. It helps students to improve their critical thinking.

Biology teachers in Jincheng JHS use formative and summative assessment. Formative assessment be done throughout the lessons both in classroom and laboratory. Teachers assess students by observing students and make notes. Teachers will observe students by their eyes to see if they are on task during the class. Teachers take note of the name of students who were asking questions while she taught. Teachers did not know all the students' name, but they use the seating plan that is put on the teachers' table. Summative assessment conducted once in a week and once in every 3 months. Biology quizzes will be held on every Thursday. In those quizzes, there are only about 3 sub chapters to be tested. The big test is held once in 3 months, that requires students to study 3 chapters.

Teachers do not conduct particular assessment for students' scientific literacy. However, they present the students with scientifically literate questions in form of multiple choice or fill in the blank. The questions of the assessment are about science discourse and connecting multiple representations. Had the students get good scores, it could be concluded that their scientific literacy was as expected.

The key feature in assessing students to support students' scientific literacy is providing them with science discourse to help them explain and understand phenomena scientifically and with connecting multiple representations to support them in developing their abilities to interpret data scientifically.

In students' point of view, there were some data provided from interviews, observations, and documentations. Based on the data collected, it can be concluded that there were some tendencies:

- Learning how to explain phenomena scientifically can be trained from teachers and from answering questions in the books.
- To be aware of their ocean, teachers helped them explaining its condition scientifically.
- Learning how to explain phenomena scientifically can be trained by teachers and from answering questions in the books.
- The question words why and how could help students learning to explain phenomena scientifically.
- For students to be able to interpret data and evidence scientifically, they need some guidance from teachers during teaching and learning activities.
- Familiarizing students with tables and graphs helped them able to interpret data and evidence scientifically.

Students are also able to take their own decisions based on the informations they have. Based on 10 interviews conducted in this research, 9 out of 10 students could answer of how they should behave in accordance with global warming. On one hand, most of them will answer that they will eat less meat, turn off the air conditioner when it is not too hot, and walk or take bicycles to school. On the other hand, the teachers have not delivered completely yet about what is global warming. It implies that students are well informed of science issues that are happening now even if the lessons are not yet conducted.

In relation with the second characteristic, evaluate and design scientific enquiry, students are gaining their own knowledge by watching documentaries or videos instead. They do so as they need to satisfy their curiosity. By doing so, they will be able and used to describe scientific investigations done by somebody else. The collaboration of students and teachers in supporting students' scientific literacy can be seen here as students enrich their own knowledge and teachers help them in connecting it with previous or upcoming concepts they are going to study.

Students were learning to be scientifically literate since they are in elementary school. It is known from the interview with the teachers that in elementary school, teachers encourage them to ask anything the students want to know. From this encouragement, they do not hesitate to be curious and to ask it out loud and be involved confidently in discussions. Some students prefer to ask both teachers and parents, especially if their parents are capable of what they were being curious with. For example, a student was curious of a car, she will ask her dad about it. The number of questions students ask can be seen as students' willingness to engage with science (Roberts & Bybee, 2014). To make students confident in science issues discussions, they need to have interests and self – efficacy. Since elementary school, they had been educated with interest in science and self-efficacy. To promote interest and self-efficacy, teachers need to introduce students about the benefits of science (Juan et al., 2018). A student said that science helps her to study technology. It was initiated by the teacher when she introduced laser technology to the class. Technology is one of the benefits of science. In this case, the collaboration between teachers in various grade can be seen clearly.

To enhance learning process in view of scientific literacy, there are 3 components: researching, reasoning, and reflecting (Techakosit & Wannapiroon, 2015). Researching can be done by reading a book or watch a documentary video. Videos can encourage students to be curious and help teachers for developing students' scientific literacy (Higgins & Moeed, 2017). For Jincheng JHS students, those ways are popular for researching. After they do research, teachers will help them to make reasoning. In reasoning, students learn to correlate the concepts they already mind with the phenomena they saw. It also develops their problem-solving skills. After reasoning, they will get knowledges on what they search by reflecting. These

processes are related to characteristic of scientifically literate person that he can use their knowledge in science and other information from evidence in which helping them decide.

In Jincheng JHS, biology class is only for grade 7. Biology lessons is a valuable resource and carrier to improve students' scientific literacy (Wei & Xia, 2016). It is a brilliant idea to put biology as students' foundation in improving their scientific literacy. The school continuing the work of elementary school teachers. Scientific literacy skills can be delivered through biology teaching and learning activity, especially the laboratory activities. A student cut her hair because she was curious of how it looks under the microscope. Unconsciously, that student took scientific method to answer her curiosity. From the experiment that conducted by scientific method, it leads students to improve their inquiry skills. Developed inquiry skills improve scientific literacy skills (Widowati, et al., 2017).

One of scientif literacy characteristics is interpreting data and evidence scientifically. Learning activities in the classroom filled with doing exercises from both textbooks and supplementary handout. In those exercises, pictures, tables, and graphs present. In a chapter, at least one table is presented to deliver content and questions. Interpreting data in the table only can be done by one who has sufficient level of literacy (In & Lee, 2017). While students learn science, they also learn literacy. As their knowledge in science increasing, their literacy skills also improved. Besides table, visualization in forms of pictures are also popular in students' textbooks. Integrated pictures with texts help students understand the concept of biology teachers deliver. To interpret pictures, students need assistant from teachers. Pictures also help students to see how connected science to their daily life is. It leads them for questioning.

Aside from teaching and learning activities, there was an external factor supporting students' scientific literacy. The factor was their parents. Parents' job and expectation towards school played important roles. Students with higher educated parents, for example Molly, whose parents are engineer and furniture designer, showed different curiosity towards science teaching and learning. She were curious about how her hair looks like under the microscope and did an observation. However, students whose parents have lower level of education, showed less interest in science teaching and learning. On the other hand, parents' expectation towards the school demanded a high academic standards and make sure that students achieved it (Alivernini & Manganelli, 2015). It means that it can influenced the quality of teaching and learning at school. It was known from an interview with Ms. Melody that she stated parents were more likely to pay attention to the score students get.

Another factor in scientific literacy is sex (Yang et al., 2012: 45-52). Between males and females, it was known that females have better attitude or behavior in case of scientific literacy. However, in this study, it was not obvious the difference of behavior between those two. Moreover, males are said to have better science knowledge base. Based on the observation in classrooms, it was obvious that males are more interactive during teaching and learning activities. They are more communicative and brave to deliver their argumentations related to the topic they discussed about.

The important inquiry this study is teachers' competencies in teaching. In Jincheng JHS, both biology teachers are able to compile their own supplementary handout or summary. It requires an ability to visualize concepts in pictures, tables, and graphs to help students study more easily. By providing students with pictures, tables, and graphs, it will support students' scientific literacy. The second ability is relevancy of teaching to students' daily life. It can encourage students to like and be curious about science and its phenomena around their life. Students will bring the questions they got to the classroom and discuss it with teachers. The topic of this questions and answers session is the most important thing since teachers can improve students' ability to connect their knowledge base with the reality so that they can be scientifically literate. As the feedback, students do not hesitate to have a little debate with teachers about what they know and believe because they have self-efficacy towards their science ability. From this activity, it can be known that students in Jincheng JHS are engaged with science-issues and be the reflective citizens. As stated by PISA, they are already called as scientifically literate students. On the other hand, another inquiry from

students are their hard work in studying. As they study from supportive books and teachers, their scientific literacy ability is improving.

Overall, in supporting students' scientific literacy, all components of school were working. School's curriculum must provide teachers and students to improve their abilities. Teachers must provide students with relevancy and sufficient learning media and activities. Students must work hard for their knowledge base, aware of science phenomena, be curious about it, and questioning the phenomena.

CONCLUSION

According to the discussion of teaching and learning in Jincheng JHS, there are some key activities to support students' scientific literacy, as follows: (1) giving students a room to investigate and satisfy their curiosity in laboratory activities; (2) the use of pictures, tables, and graphs as learning media, questioning activity, and correlating the topic of the lessons to real situations in teaching activities; (3) provide students with science discourse and connecting representation (pictures, tables, graphs) in assessing activities; (4) students are curious about certain phenomena, doing research, and having exercises of interpreting pictures, tables, and graphs to make them questioning so that teachers can guide them to cope with the answers and curiosity in learning activities.

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