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The Elements of Science Learning; Classroom Learning,science Literacy and Availability of Supporting Materials and the Differences Based on Students' Demography and Gender

Erman Har
Fakultas Keguruan Dan Ilmu Pendidikan, Universitas Bung Hatta, Padang-Indonesia

Abstract: The aims of this study are to examine the elements of science learning; classroom learning, sciences literacy and availability of supporting materials and to figure out the level of students'achievement on high school students based on students' demography and gender in West Sumatra. This study focuses on science students' (students who are majoring Science) achievement in conjunction withclassroom learning, science literacy and availability of supporting materials. Further analysis was employed to find out whether students' demography affects the attainments. The survey was conducted by randomly selecting 248 high school students in West Sumatra to administer the questionnaires. Both qualitative and quantitative data analyses were used. The research found that science students'performance is at a high point wherever the tree elements of science learning are implied. Furthermore, based on students' demography, rural students show higher performance compared with urban and suburb students, although sciences literacy and supporting materials availability are greater in urban and suburb areas. Another finding figured that gender significantly affects the result, when scientific literacy, classroom learning and supporting materials availability are relatively indifference. It shows that women' sciences literacy is higher than men. The implications of this research are; the requirement of science learning's supporting materials in all urban, suburb and rural areas, andequal classroom learning experiences. Moreover, the quality of science teacher needs to be improved at all areas.

Key words: Elements of science learning, classroom learning, science literacy, availability of supporting materials, Indonesia

INTRODUCTION

Science as a subject learning has been introduced for centuries. It exists in primary to university curricula. Ogunniyi *et al*. (1995), provoked that cultural background brought by teachers and studentshave meaningful contextual and greatly influence classroom learning atmosphere and teaching activities, especially during science learning process. Whereas, Harqualitative research finding Park (2015) explained how and why students in rural areas acquired science-based technology skills in the agricultural activities. The finding suggested the emphasis should be given to the importance of learning process, both in the classroom and the laboratory in order to enhance students' science-based technology skills while academic motivation, parents and peers' support should not be ignored. Furthermore, Mihajlovich and Nikolaevich (2015) stated that in laboratory, students do not get adequate opportunity to try and create their own understanding of phenomenon under investigation.

Then, according to Yasin *et al*. (2013), there are 16 elements in enhancing the sustainable development. They are creativity, innovation, network and partnership, industrial relation,internship program, staff development, teaching method, management commitment, generic skills, counseling, entrepreneurial, information technology and communication skills, interest, recognition, knowledge-based competency training and articulation. The result displayed that the students were satisfied with the implementation of the quality management pertaining to quality, quality objectives and work instructions that support academic management programs. Based on that research, academic program improvement is proposed in-line with the requirements of ISO. In addition, the path analyses figured that fulfillment of basic psychological needs and intrinsic motivations have positive impact on academic achievement. While uncertainty avoidance and distance power have negative impact on fulfillment of psychology needs. However, the influence of femininity on this variable is positive. Yet collectivism does not have significant effect on it.

In general, the finding demonstrated that when school culture provokes students' autonomy, the students experience fulfillment of basic psychological needs and attain higher intrinsic motivation and academic

achievements. Herein after, Noorullah *et al.* (2015) empirical investigation, particularly the application of Pearson coefficient correlation test, indicated a positive relationship between the abolition of corporal punishment and teachers' motivation. This study, therefore, recommends the use of alternative interaction techniques that contribute greater learners'understanding such as giving advice and perquisite. Curtailing their allowance rather than applying conventional punitive measures.

In Daud *et al.* (2012) study,described psychological readiness method for professional activity. The formation addressed higher educational institution graduates' problems by taking example of psychological students. This method is constructed based on practical discipline "Psychological Research Methodology" and directed student self-process as subject of professional training course. According to this method, profession (occupation) assumes as personal communication between teacher and student in sustaining training creativity. This method corresponds to competence based approach which direct to ability to integrate theoretical knowledge into practice.

Science literacy: On Bawden (2001) research, about concept of literacy related to information literacy. Information literacy is associated to other types of literacy. However, it is expected to separate it from information technology, media, digital, internet and computer literacy. Meanwhile, Chamber English Dictionary explains that in educational principal of language, literacy is commonly about learning; reading, writing and ability to proceed numbers. Though the principles of literacy in most communities are in formal as well as informal circumstances, sometimes it admits to community centers. Generally, an attempt to defining information literacy has been done for years. There are more similarities than differences relate to this definition among librarian and professional library science (Ansah, 2003).

In PISA, reading literacy is defined as the ability to use written information to factual situation and life. The ability to manage thought and skills, reflect and read all situations, destination and adding the development of students' skills and knowledge in the society.

Supporting materials availability: On Jungho (2015) research study, an educational system that accelerates interactive learning activities has been developed. It provokes sharing and collaboration. Teachers utilize the developed platform to establish and operate system that is suitable for activities they wish to conduct easily.

Regarding to the students, they use the system to share the solution of their tasks to their peers and collaborate for further progress. Additionally, the system can be activated in diverse IT devices such as Smartphone in order to enhance its accessibility. The assessment on 10 teachers about utilityand performance of this system showed a positive result. According to Sergeev (2014), education portal at universities is very useful in conveying information. It is used for various purposes, such as administrative information processing and teaching materials delivery. It is also beneficial for institution development.

Classroom learning: (Nico) Btha (2015) study, conducted in South Africa said that the qualitative inquiry-based learning can improve learning outcomes. Further research conducted by Noorullah *et al.* (2015), opposed the theoretical investigation. It revealed that the abolition of physical punishment would probably lead to the decrease of teachers' motivation. The empirical investigation; particularly the application of the Pearson coefficient correlation test, indicated a positive relationship between the abolition of corporal punishment and teachers' motivation. This study, therefore, recommends the use of alternative interaction techniques that contribute greater learners' understanding such as giving advice and perquisite. Curtailing their allowance rather than applying conventional punitive measures.

On Mukaddes research study where the participants were teachers who work at four different private schools at primary and secondary levels,the descriptive and correlation analyses of the responses showed that there are proportional increasesof the internet use in teaching. The highest correlated variables regarding to internet use in teaching are, firstly, self-perception of teachersconcerning their internet skills and, secondly, the ages of teachers.

Adeyemo and Torubeli (2008) research on self-concept and its relations to the improvement of learning outcomes, indicated that three variables were significantly effective on predicting students academic performance. So did each of these variables. Findings suggested that school psychologists counseling should assist students in transition period oftheir self-efficacy, self-concept and positive peers' relationship developments show in Fig. 1.

This concept was adapted from the Stoner and Wankel Management Model. This model considers a school as a system consists of several components that are interrelatedeach other. An organization need to be viewed as entire components. It means that each of component activity influence other components within

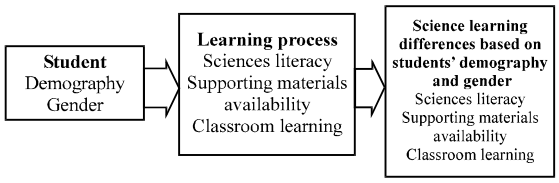

Fig. 1: Adapted from Stoner and Winkel Management Model (1985)

the organization. There are three core components in this model; input, process and output. In terms of input, in this model, it refers to environmental factors that influence the process. Even though the preliminary study investigated several other factors, this study merely focuses on demography and gender. In terms of the process, this study addresses science classroom learning, sciences literacy and supporting materials availability. Yet again, the preliminary of this study examined more than these factors. Lastly, the output barely discusses about the science-learning differences based on inhabitation and sex. All of these three components are interrelated and influence each other in terms of the outcomes.

Purposes: The aims of this study is to observe the stage of science learning and examines the different elements of science learning based on inhabitation and sex of high school students in West Sumatra. And their correlation to science learning process such as classroom learning, sciences literacy and supporting materials availability. Specifically the objectives of this study are:

- Determining the level of learning process, science student in senior high school such as classroom learning, sciences literacy and supporting material availability
- Determining the differences of science learning process by classroom learning, sciences literacy and supporting material availability based on their residency
- Determining the differences of science learning process by classroom learning, sciences literacy and support materials availability based on gender

MATERIALS AND METHODS

This study, employeda questionnaire with 5 Liker's scale to collect the data. The samples of this study are grade 12 science classes' high school students from selected schools in West Sumatera, Indonesia. Qualitative data was collected in order to obtain understanding onparticular results in the quantitative data. Thus, four selected number of teachers and students were interviewed. The number of samples wasdrawn on proportional sampling method based on zones. Overall 238 grade 12 students from the sciences classes were randomly chosen. Derived from the pilot study of Cronbach Alpha value of learning science elements was 0.72 and the Cronbach Alpha value of technology skills was 0.68. Descriptive data analysis (means and standard of deviation) and inference analysis such as one way ANOVA and t-test analysis was applied.

Table 1: The stage of science learning process on senior high school students and its interpretation

Science learning process	Mean	SD	Interpretation
Classroom learning	4.81	0.47	High
Laboratory learning	3.23	0.45	Fair
Science literacy	4.02	0.45	High
Supporting materials availability	4.75	0.67	High
Teachers' guidance	3.06	0.40	Fair
Parents' support	3.44	0.47	Fair
Academic motivation	3.56	0.41	Fair

RESULTS AND DISCUSSION

Results of the research showed that learning stage of science in senior high school students are in high level. There are tree science learning process presented at the stage; classroom learning (mean = 4.81, SD = 0.47) and learning support materials availability (mean = 4.75, SD = 0.67). And sciences literacy (mean = 4.02, SD = 0.45) as described at Table 1.

Furthermore, the decision of one way ANOVA test showed that there were significant differences between elements of classroom learning, scientific literacy, supporting material obtainment, based on students residency as shown in Table 2. There are also considerably differences between students from rural school and students from urban school. In terms of classroom learning; student learning outcomes in rural schools were higher compared with students in urban school while urban students' science literacy was higher than rural students. It indicated that when supporting materials availability are considerably difference, science learning outcomes among rural, suburb, urban students are also significantly difference where urban students are higher than rural and suburbs students.

Generally, boys and girls are different in classroom learning, scientific literacy and learning support materials availability. Female students are higher on learning stage compared with male students. It shows at Table 3. Referencing to the second research question and qualitative data analysis illustrated that students have already have classroom learning, literacy and science learning supporting materials which were proven by interviewed data from three boys and three girl students:

Table 2: Analysis of differences high school students' Science classroom'slearning, science literacy, supporting materials availability based on students' demography

Learning process variable	Sources	df	CD	MR	F-values	Sig. p
Science learning in the classroom	Inter Group	4	2.024	0.506	2.242	0.042
	In a Group	234	100.209	0.226		
	Total	238	102.233			
Science literacy	Inter Group	4	0.394	0.098	0.474	0.031
	In a Group	234	92.132	0.208		
	Total	238	92.525			
supporting materials availability	Inter Group	4	2.124	0.531	1.171	0.043
	In a Group	234	201.376	0.454		
	Total	238	203.500			

Significant to the formulation of $p<0.050$

Table 3: The differences ofscience learning process: classroomlearning, literacy and science learning supporting materials based on gender

Learning process variable	Gender (N)	Mean	SD	t-test Sig. p
Science learning in the classroom	L = 88	3.53	0.53	0.036
	P = 150	3.83	0.51	
Science Literacy	L = 88	3.57	0.91	0.027
	P = 150	3.94	0.90	
Supporting materials availability	L = 88	3.72	0.70	0.031
	P = 150	3.87	0.76	

Significance of the research $p<0.050$

"According to male students, learning in the classroom is rather tedious, because teachers direct conventional teaching methods (male students 1). "I often go out of the classroom to eliminate boredom (male students 2)".

"If I sit away from the teacher, I barely hear and understand the lesson (male students 3)" "according to female students, classroom learning is not boring for me, because the teacher is able motivate me and use good teaching method (girls students 4)". "I stayed in the classroom to relieve boredom, I also tried to ask questions to the teacher (girls students 5)".

"I keep quiet, though put forwardimportant notes from teachers' explanation. In addition I listento the teacher;however,there is a few that can understand (girl's students 6). Classroom learning for female students are more enjoyable while male fellless interesting. Boys prefer to leave the class when girls said classroom learning is fun.

Teacher observations were conducted during classroom learning. It is easier managing female students compared to male students. Then, learning outcomes were also higher in female students compared to male students (teacher 1). The students' data were triangulated with their teachers' data as the following: "I prefer reading the lessons rather than reading others such as newspapers or magazines (girl's students 6).

"I do not like reading both teaching materials and magazines but I like reading a daily newspaper (girl's students 7). The differences of science learning process based on school location reveals that classroom learning of urban students and rural students are because of students in urban obtain adequate facilities. In contrast, rural students get somewhat limited facilities. In addition, the school management in cities is relatively well managed. Scientific literacy demonstrated a difference too. While urban school meets the standards of reading material and rural schools are barely have. On gender point related to science learning, both men and women in classroom learning, science literacy and learning support materials, women show higher-level of science learning compared to men (Erdem, 2008).

CONCLUSION

The result show that based on students demography and gender, there are considerably different when those three elements are existed. Mansour (2007) argued that religion is one of powerful factors that influence teachers' success in classroom learning. Derived from that point of view, Nasser (2007) engaged teachers in some activities, namely; discussing issues related to science, technology and society. They chose teacher-student interaction teaching method.

The result also proved that there is moderately different between rural school students and urban school students. In term of classroom learning, rural students' learning outcomes are higher than urban students. Yet urban students' science literacy is higher compared to rural students. Obviously, supporting material availability affects students' science literacy. On gender point where the three elements are existed, the result demonstrated that female students' learning is higher than male students. Contrasting to Johnson (2002) argumentation, emphasizing on learning action or experiences provide students opportunity to feel their though about the outside world. Direct physical activity saves information longer in their memory. When students receive information solely from their teachers, they are not attempt to find it and then information will quickly onwards. Besides that Crawford (2001), confirmed the approach can be through laboratory experiences, problem-solving and project activities. Crawford (2001) also stated that engagement and contextual

experiences are two strategies that provoke students' achievement in learning new concepts. In addition, Kolb (1994) argued that learning through experience helps students to develop their knowledge. In laboratory activities, where students undergo their experience, it also boosts their learning interest. Furthermore, Blank and Harwell (2001) stated that when students work on laboratory, at home or in group, they are not only build understanding and tolerance but also learn from each other.

This study result indicated that there are considerably differences on science literacy among students who attend school in urban areas compared with students who join the school in other areas of living. Har (2015) whose revealed the significant differences about science literacy activities related to their schools' demography. Science literacy of students who live outside urban areas is higher in comparisonwiththe urban one. Besides that supporting material and teacher supervisory are different too. In general, science teacher in West Sumatra Senior High Schools are adequately experienced in presenting various learning activities. However, urban school students' science learning activities are moderately different with students from other areas of living. Therefore, attention needs to be addressed to equalization of facilities such as laboratories, books and other academic supporting facilities.

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