



Tersedia online di EDUSAINS  
Website: <http://journal.uinjkt.ac.id/index.php/edusains>  
EDUSAINS, 10(1), 2018, 147-159



### Research Artikel

## THE INFLUENCE OF SCIENCE LEARNING QUALITY IN THE SCHOOL THROUGH SCIENCE LEARNING OUTCOME INDONESIAN STUDENTS BASED ON PISA STUDIES 2015

### *PENGARUH KUALITAS PEMBELAJARAN SAINS DI SEKOLAH MELALUI CAPAIAN PEMBELAJARAN SAINS SISWA INDONESIA BERDASARKAN PISA STUDI 2015*

**Purwo Susongko**

Pancasakti University, Indonesia  
[purwosusongko@upstegal.ac.id](mailto:purwosusongko@upstegal.ac.id)

#### Abstract

This research aims to understand: (1) factors for indicators in science learning outcome of Indonesian students based on PISA studies in 2015, (2) factors for indicators of science learning quality Indonesian students based on PISA studies 2015, (3) the influence of learning quality through science learning outcome Indonesian students based on grade achievement school. This study uses ex-post facto research method. Data analyze technique uses Structural Equation Modelling (SEM). There are 6,425 student they are 1,208 student from high grade achievement school, 4,005 student from intermediete grade achievement school and 1,212 student from low grade achievement school. Research result shows: (1) Environment awareness, Enjoyment of science, Instrumental motivation, Science Self-Efficacy, Epistemological beliefs, and Science Achievement are valid indicators from science learning outcome Indonesian students based on PISA survey in 2015, (2) Teacher support in a science classes of students choice, Inquiry-based instruction in science lesson, Teacher-directed science instruction and Perceived Feedback are valid indicators from science learning quality Indonesian students based on PISA studies 2015, (3) In high grade achievement school, the quality of learning had 0.31 influences to science learning outcome Indonesian students with determination level of 10%, (4) In intermediete grade achievement school, the quality of learning had 1 influences to science learning outcome Indonesian students with determination level of 100%, (5) In low grade achievement school, the quality of learning had 0.51 influences to science learning outcome Indonesian students with determination level of 26%.

**Keywords:** science learning quality; science learning outcome; indonesian students

#### Abstrak

Penelitian ini bertujuan untuk memahami: (1) faktor indikator hasil belajar sains siswa Indonesia berdasarkan studi PISA tahun 2015, (2) faktor indikator kualitas pembelajaran sains siswa Indonesia berdasarkan studi PISA tahun 2015, (3) Pengaruh kualitas pembelajaran terhadap capaian pembelajaran sains siswa Indonesia berdasarkan tingkat prestasi belajarnya. Penelitian ini menggunakan metode penelitian ex-post facto. Teknik analisis data menggunakan Structural Equation Modeling (SEM). Ada 6.425 siswa yang terdiri 1.208 siswa dari sekolah prestasi tingkat tinggi, 4.005 siswa dari sekolah pencapaian kelas menengah dan 1.212 siswa dari sekolah prestasi kelas rendah. Hasil penelitian menunjukkan: (1) *Environment awareness, enjoyment of Science, Instrumental motivation, Science Self-Efficacy, Epistemological beliefs, dan Science Achievement* merupakan indikator yang valid dari capaian pembelajaran sains siswa Indonesia berdasarkan survei PISA 2015, (2) *Teacher support in a science classes of students choice, Inquiry-based instruction in science lesson, Teacher-directed science instruction dan Perceived Feedback* merupakan indikator yang valid dari kualitas pembelajaran sains siswa Indonesia berdasarkan studi PISA 2015, (3) Pada sekolah prestasi kelas tinggi, kualitas pembelajaran memiliki 0,31 pengaruh terhadap kemahiran hasil belajar siswa Indonesia dengan tingkat determinasi 10%, (4) Pada sekolah pencapaian kelas menengah, kualitas pembelajaran memiliki 1 pengaruh terhadap hasil belajar sains siswa Indonesia dengan tingkat determinasi 100%, (5) Pada sekolah dengan prestasi belajar rendah kualitas pembelajaran berpengaruh sebesar 0.51 terhadap capaian pembelajaran sains siswa Indonesia dengan taraf determinasi sebesar 26 %.

**Kata Kunci:** kualitas pembelajaran sains; capaian pembelajaran sains; siswa Indonesia

**Permalink/DOI:** <http://dx.doi.org/10.15408/es.v10i1.7444>

## INTRODUCTION

High science knowledge has a very significant effect on the progress of a nation. This is because community science knowledge have a positive effect on the quality of economic development, democracy, culture and the quality of one's personality. In this regard, the Indonesian government is very concerned about learning science in schools through improving the ability of science teachers, providing science learning facilities and improving the science learning curriculum. The implementation of the 2013 curriculum even uses a scientific approach as a learning approach for all fields of study. However, the results of Indonesian student science learning are still relatively low.

Indonesia had joined four times TIMSS in the eighth grade (Junior High School) since 1999, 2003, 2007 and 2011. In 2015 Indonesia only joined surveying the fourth grade. Since four times it joined TIMSS (1999-2011), it got sciences score 405 or it was included of Low Performance Country category, it was far from the average scores of 500 (Martin et al, 2012). For PISA survey outcome, Indonesian student skills in sciences weren't pleased. Even in 2012, Indonesian student achievements in sciences were on 71<sup>th</sup> grade from 72 countries. PISA survey in 2015, scientific performances among students in fifteen age enhanced 21 points (from 382 points in 2012 to 403 points in 2015), and it got rank of 64 from 72 participant countries. But, these results were still under of neighbour country achievements like Vietnam and Thailand (Martin et al, 2012). These are something pity as has known that student scientific literacy is the main goal of science education (Wenning, 2006). By looking at the results of the study, the question arises as to how much science learning in Indonesia has an effect on students' science learning achievements?

There are three main factors that influence learning achievement, namely internal factors, external factors and learning approach factors. Internal factors include the physical and spiritual state of students while external factors are environmental conditions around students, including school and family environments. Learning approach factor is a type of student learning effort which includes strategies and

methods used by students to conduct learning activities of subject matter. Success and failure of a person in learning is influenced by several factors. Thus the quality of learning is very influential on student achievement.

In the school levels, there are many aspects of science learning process which had been studied by PISA in 2015 and it was believed have influences to student learning outcomes. These aspects are School policies, Teaching and learning. School policies consists of: (1) program offered, admission and grouping policies, (2) allocated learning-time, (3) additional learning-time and studying support, (4) extracurricular activities, (5) professional development,(6) leadership, (7) parental involvement, (8) assessment/ evaluation/ accountability policies, (9) school climate (teacher and student behaviours). Teaching and learning consists of: (1) disciplinary climate, (2) teacher support and (3) cognitive challenge (OECD, 2016a). School climate aspect concerns on the using strategy aspect of teacher in science teaching and student behaviors which is expected to support learning. Teaching and learning aspect concerns on student disciplinary aspect in the class and teacher's support in learning.

Education system, school and teacher are necessary to determine how often concerning have given in concept and factual learning, observing natural phenomena, designing and doing experiment, and applying scientific ideas and technology to understand daily life so that scientific education goals can be fulfill effectively. Science teacher is also necessary to choose the strategies that will be used in the class and allocate learning-time such as how much time to explain, discuss, do debate, do activities and answer some questions, give feed back and they must be able to use technique that will be used. The way learning science is able to influence student performa and student belief about science interest. Students need great teachers whom challenge and have innovative ideas in combining all learning methods and be able to reach all kind of students in the class (OECD, 2016b).

PISA 2015 sees the quality of science learning in four aspects, they are: (1) teacher-directed science instruction, (2) perceived feedback from science teachers, (3) adaptive instruction in

science lessons, (4) Inquiry-based science instruction. These four approaches are related to each other and used by science teachers in teaching (OECD, 2016c). Minner, Levy, Century (2009) made study the impact of science learning based on inquiry to science achievement student from 1984 to 2002. From analyzing showed that 138 researches showed positive trend, it supported learning based on inquiry, it was especially for learning that concerns students to think actively and to make a conclusion from data. The study also showed that learning strategy which was involved students in learning process by scientific investigation was more increasing conceptual knowledge than passive strategy.

Practical of learning based on inquiry is so important in physical and life science. Inquiry refers the way scientist investigates nature, proposes ideas, explains and corrects asersi based on scientific method evidence (Hofstein dan Lunetta, 2004). In science education, inquiry based on instruction is involved students in experiment or direct activities, and challenged students to think and motivated them to dilate conceptual knowledge about scientific ideas. Students have the best performance in science learning and they are expected to be able to understand, explain and debate scientific ideas, design and do experiment, communicate and connect scientific ideas and their investigation to problem in their real life (Minner, Levy and Century, 2010).

The previous study showed that inquiry based on instruction could enhance the quality of students learning, science behavior, science achievement learning and critical thinking (Hardianti, & Kuswanto, 2017; Syafrilianto & Rahman, 2017, Fatmawati, & Utari, 2016; Blanchard et al., 2010; Furtak et al., 2012; Hattie, 2009; Minner, Levy dan Century, 2010). But, some scientists remind that laboratory activities can improve learning if it is designed carefully and student can manipulate idea (Hofstein dan Lunetta, 2004). The aim of science instructions from teacher is to give structural, explicit, informative lesson about certain topics. It is included teacher explanation, class debating and student equestions. If the strategy is successful for passive students in the class, some of teacher instructions are important for students to receive the knowledge (Driver,

1995). MacSuga- Gage & Simonsen (2015) investigated with 527 reseraches about the influence of teacher instructions to achievement student, and the result showed that instructions from teachers had influences to enhance student learning achievement.

Giving feed back and motivating students are important to enhance student learning achievement (Hattie and Timperley, 2007; Lipko-Speed, Dunlosky and Rawson, 2014). Feed back is received from peer teaching, parents and teachers after doing assignments, it is usually showed from evaluation. The aim from this infoemation is to modify and enhance student behaviours. Feed back is such a credit, surprise, agreement or punishment. But, it should be information about assignment (Deci, Koestner and Ryan, 1999). Not all kinds of feed back are effectively, successful feed back is reversvible from teachers to students and it is related to learning outcome (Hattie, 2009).

The previous research result proved that Teacher support very influenced positively to student learning outcome (Dietrich et al, 2015; Strati, Schmidt, & Maier, 2017). Teacher support influenced much in involving students in learning so then it influenced to learning outcome too (Weyns et al, 2017). The roles of science teacher were so important so that science teacher ability must be enhanced (Tatar et al, 2017). Walberg (2004) developed the theory from more than 100 research results about factors influencing to learning achievement. The theory explained there were 9 factors influencing to learning achievement, those were divided to 3 parts, those were: (1) Student aptitude variables included previous achievement, motivation/ self-concept and mental development, (2) instruksional variable included time and learning quality and (3) environmental variable included home, classroom peer and exposure to mass media. The first variable related to personal characteristic and background, the second related to learning aspect, while the third related to social phycology involving home condition, classroom peer. For Student aptitude variable, initial ability was measured by standart test, motivation was measured by survey and mental development was measured by age (Paik, 2004).

Perez, Costa & Corbi (2012) explained that there were two main variables which influenced to general learning achievement, those were Aptitude (general intelligence) and self concept (motivation) besides goal and effort orientation (self-involving). The research involved 341 students and 7 variables by using analyze technique of structural equation modeling (SEM). The result showed: (1) General intelligence was dominant factor influenced learning achievement, (2) Student's goal orientation and academic self-concept was much impact to effort or self-involving in learning, (3) student motivation and effort influenced to suit learning strategy choice. Blums et al (2017) proved that it was only strong rational ability could influence science and mathematics learning achievement.

In learning outcome aspect, PISA 2015 divided into two groups, those were cognitive outcome and non-cognitive outcome. In scientific literacy context, cognitive outcome was science proficiency while non-cognitive outcome involved: (1) achievement motivation, (2) well-being in school, (3) attitude toward science, (4) environment awareness. Attitude toward science consists of students' enjoyment of learning science, students' instrumental motivation, (4) students' self-efficacy in science, (5) students' epistemic beliefs, (6) Subjective well-being or Sense of Belonging to School. Based on PISA framework and the previous study looked that Enquiry-based science instruction, Teacher-directed science instruction, Perceived feed-back from science teachers and Adaptive instruction in science lessons influenced to science learning achievement and so teacher support in a science classes did. But, the quality of learning was not the only dominant factor influenced to science learning achievement. Because of the previous research also showed that general intelligence had influence strongly and dominant to learning achievement (Karch, et al, 2013; De Castella, & Byrne, 2015; Blankson, & Blair, 2016). Thus, to determine how the science learning quality is, it is necessary to consider student's general intelligence with main indicators learning achievement in the school.

PISA survey in Indonesia, the schools differ for some of considerations, some of them are final examination scores, school type, school organizer. About final examination scores, Indonesian schools

are member of PISA survey sample, they consist of school with high final examination scores, school with intermediate final examination scores and school with low final examination scores sekolah (PISA, 2015). By considering that learning achievement is main indicator from student's general intelligence so it can be made the next study about learning quality to science learning achievement for three domains In high, intermediate, and low ability. This study will give the information about factors that can be maximized to enhance science learning achievement of Indonesian student in the school based on initial ability by student's own. The problems of this study are:

- (1) What factors of being indicators of science learning outcome Indonesian student based on PISA study 2015?
- (2) What factors of being indicators of science learning quality Indonesian student based on PISA study 2015?
- (3) How does learning quality influence to science learning outcome Indonesian student in high grade achievement school?
- (4) How does learning quality influence to science learning outcome Indonesian student in intermediate grade achievement school?
- (5) How does learning quality influence to science learning outcome Indonesian student in low grade achievement school?

## METHOD

Research data was as taken from PISA database, it could be accessed in pages of OECD at <http://www.oecd.org/pisa/data/2015database> by using code PUF\_COMBINED\_CMB\_STU\_QQQ.Zip. There are 519,334 student respondents from 72 countries and 921 variables related to students. Indonesian students are involved in this PISA survey are 6,513 students and they are more a half of the samples are in the ninth grade (OECD, 2016d:2). There are uncompleted data from this, data from this research only use 6,425 student respondents, they are 1,208 student respondents from high learning achievement school, 4,005 student respondents from intermediate learning achievement school and

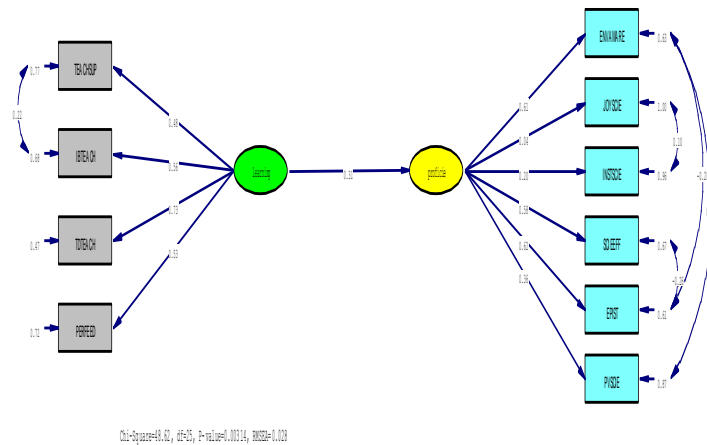
1,212 student respondents from low learning achievement school.

This study used ex post facto research method. Data analyze technique used structural equation modeling(SEM) using software LISREL 8.30. SEM was used to determine the validity each science learning quality and learning outcome indicator and to examine the influence of learning quality model to science learning outcome. This research was involved 10 eksogen variables and 2 laten variables. Laten variables of science learning outcome has 6 indicators, those are: (1) Environment awareness (ENVAWARE), (2) Enjoyment of Science (JOYSCIE), (3) Instrumental motivation (INSTSCIE), (4) Science Self-Efficacy (SCIEEFF), (5) Epistemological beliefs (EPIST),

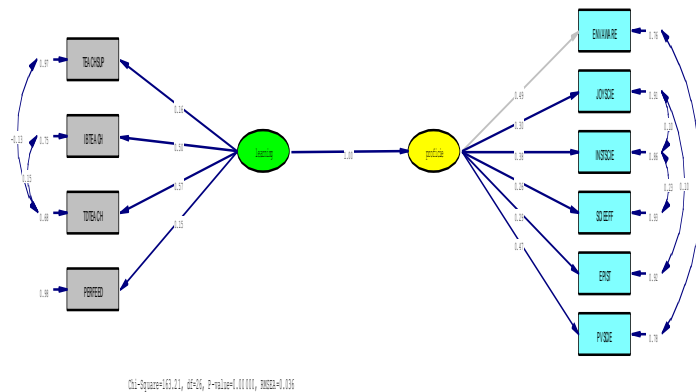
(6) Science Achievement (PVSCIE). Laten variables of learning quality are: (1) Teacher support in a science classes of students choice (TEACHSUP), (2) Inquiry-based instruction in science lesson (IBTEACH), (3) Teacher-directed science instruction (TDTEACH), (4) Perceived Feedback (PERFEED). In this study is not involved Adaptive instruction in science lessons as learning quality indicators due to available data is not fulfill the SEM analyze condition.

**RESULT AND DISCUSSION**

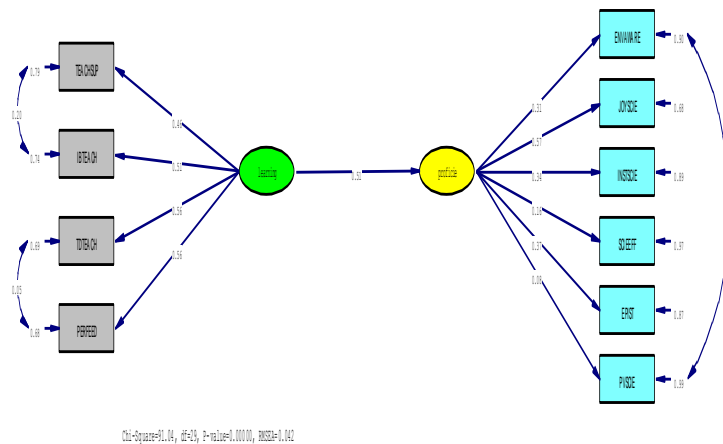
Research result shows in the three kinds of school, learning quality influences to science learning outcome Indonesian students variatively as shown on the Picture 1, 2, and 3.



Picture 1. The influences of learning quality to science learning outcome Indonesian students in the high learning achievement school (standardized, n=1208)



Picture 2. The influences of learning quality to science learning outcome Indonesian students in the intermediete learning achievement school (standardized, n= 4005)



Picture 3. The influences of learning quality to science learning outcome Indonesian students in the low learning achievement school (standardized, n= 1212)

Table 1. Some of size goodness of fit test (GFT) in SEM test in influences of learning quality to science learning outcome in the high learning achievement school

GFT	Test criteria	Test Result	Conclusion
P value	$\geq 0.05$	0.032	Model Not Good Fit
$\chi^2/df$	$\leq 5$	1.94	Model Good Fit
Root Mean Square Error of Approximation (RMSEA)	$\leq 0.08$	0.016	Model Good Fit
Goodness of fit index (GFI)	$\geq 0.9$	0.99	Model Good Fit
Adjusted Goodness of fit index (AGFI)	$\geq 0.9$	0.98	Model Good Fit
Comparative fit index (CFI)	$\geq 0.9$	0.99	Model Good Fit
Normal fit index (NFI)	$\geq 0.9$	0.97	Model Good Fit
Non Normal fit index (NNFI)	$\geq 0.9$	0.97	Model Good Fit

(Kusnendi, 2008; Ghozali&Fuad, 2005)

Table 2. Some of size goodness of fit test (GFT) in SEM test in influences of learning quality to science learning outcome in the intermediete learning achievement school

GFT	Test criteria	Test Result	Conclusion
P value	$\geq 0.05$	0.000	Model Not Good Fit
$\chi^2/df$	$\leq 5$	6.27	Model Not Good Fit
Root Mean Square Error of Approximation (RMSEA)	$\leq 0.08$	0.036	Model Good Fit
Goodness of fit index (GFI)	$\geq 0.9$	0.99	Model Good Fit
Adjusted Goodness of fit index (AGFI)	$\geq 0.9$	0.98	Model Good Fit
Comparative fit index (CFI)	$\geq 0.9$	0.99	Model Good Fit
Normal fit index (NFI)	$\geq 0.9$	0.96	Model Good Fit
Non Normal fit index (NNFI)	$\geq 0.9$	0.94	Model Good Fit

(Kusnendi, 2008 ;Ghozali&Fuad, 2005)

Table 3. Some of size goodness of fit test (GFT) in SEM test in influences of learning quality to science learning outcome in the low learning achievement school

Ukuran GFT	KriteriaUji	Hasil Uji	Kesimpulan
P value	$\geq 0.05$	0.000	model not good fit
$\chi^2/df$	$\leq 5$	3.25	model good fit
Root Mean Square Error of Approximation (RMSEA)	$\leq 0.08$	0.042	model good fit
Goodness of fit index (GFI)	$\geq 0.9$	0.99	model good fit
Adjusted Goodness of fit index (AGFI)	$\geq 0.9$	0.97	model good fit
Comparative fit index (CFI)	$\geq 0.9$	0.94	model good fit
Normal fit index (NFI)	$\geq 0.9$	0.92	model good fit
Non Normal fit index (NNFI)	$\geq 0.9$	0.91	model good fit

(Kusnendi, 2008; Ghozali&Fuad, 2005)

Table 4: Estimation and Testing Model Parameter of Science Proficiency dan Learning Quality Measuring in the high learning achievement school (Completely Standardized Total Effect)

Model	Indicator	Estimation	t	R <sup>2</sup>	Statement
Science Proficiency (Proficie)	Envaware	0.61	11.27	0.37	Valid
	Joyscie	0.04	1.31	0.002	Not valid
	Instscie	0.20	6.05	0.04	Valid
	Scieeff	0.58	10.56	0.33	Valid
	Epist	0.62	8.37	0.39	Valid
Science Learning Quality (learning)	Pvscie	0.36	8.63	0.28	Valid
	Teachsup	0.48	13.66	0.23	Valid
	Ibteach	0.56	16.22	0.32	Valid
	Tdteach	0.73	20.04	0.53	Valid
	Perfeed	0.53	16.12	0.28	Valid

noted: t value on table in 95 % and n>30 is  $\pm 2.00$

There are many parameters used to measure goodness of fit test (GFT) value in SEM test. From eight parameters as shown in Table 1, Table 2 and Table 3, there are seven parameters which is fulfill criteria so that it can be stated the produced model from SEM analyze can be accepted. Unfulfill criteria in confirmation test is probability value (P) which is lower than minimal criteria 0.05 in SEM analyze in the high, intermediate, and low learning achievement school. While SEM analyze to analyze influences learning quality to science learning outcome in the high learning achievement school have probability value (P) approach minimal criteria, it is 0.032. It is due to P value very depends on Likelihood Ratio Test ( $\lambda^2$ ). One of the characteristic of Likelihood Ratio Test ( $\lambda^2$ ) is the higher P value, the lower P-calculated value is produced, or reverse. It is expected that Likelihood Ratio Test is small value so that P value is large. The other characteristic from  $\lambda^2$  statistic is the sensitifity to ukuran samplesize (Hair et al, 1998). The larger sample size, the larger  $\lambda^2$  statistic is got which is P value is small, so that the big size of  $\lambda^2$  statistic sample leans to reject the model (Joreskog&Sorbom, 1996). This occurs in SEM analyze that have been done in this research, with size sample is big over 1000 respondents,  $\lambda^2$  value leans to be big and P value leans to be small below the minimal criteria of 0.05. It shows that the generated model in this research has not had a high absolute fit measure (AFM). AFM gives information about model ability to estimate absolutely covariant matrix population based on covariant matrix sample. The main of two size compability absolute in LISREL version is statistic Likelihood Ratio Test ( $\lambda^2$ ) and Root means Square Error of Approximation (RMSEA) (Joreskog &

Sorbom, 1996). But, all these models can be accepted due to only one or two criteria are not fulfilled among all criterias, this is due to the huge of sample amount.

All the related variables as shown in Picture 1, Picture 2 and Picture 3 generally are significant with belief level of 95 %, They are also shown in the Table 4, 5 and 6.

In the high learning achievement school, Environment awareness, Instrumental motivation, Science Self-Efficacy, Epistemological beliefs, and Science Achievement can be valid indicators from student science learning outcome. Epistemological beliefs and Environment awareness have high determination coefficient, it can explain student science learning outcome. While enjoyment of Science is not able to be significant indicator for science learning outcome. It is due to have many ambiguous meaning for students with high ability. Enjoyment of Science is not influenced by science learning outcome. This is scale with the previous research where Enjoyment of Science is only influenced by gender, the level education of parents, parents job level, and students job orientation (Hampden-Thompson, & Bennett, 2013). From this research result as shown in the Table 4, determination coefficient from Enjoyment of Science to clarify science learning outcome is almost zero so that it can be conluded that students with high ability have Enjoyment of Science lean to be constant and they are not influenced the other of science learning outcome aspects. This study also shows that the high learning achievement schools, Teacher support in a science classes of student choices, Inquiry-based instruction in science lesson, Teacher-directed science instruction dan Perceived

Feedback are valid indicators from science learning quality. Teacher-directed science instruction has the highest determination coefficient in clarifying science learning quality. It means that teacher role in giving instruction in the science learning class is very dominant in influencing to learning quality.

In the high learning achievement school, Environment awareness, Instrumental motivation, Science Self-Efficacy, Epistemological beliefs, and Science Achievement can be valid indicators from student science learning outcome. Epistemological beliefs and Environment awareness have high determination coefficient, it can explain student science learning outcome. While enjoyment of Science is not able to be significant indicator for science learning outcome. It is due to have many ambiguous meaning for students with high ability. Enjoyment of Science is not influenced by science learning outcome. This is scale with the previous research where Enjoyment of Science is only influenced by gender, the level education of parents, parents job level, and students job orientation (Hampden-Thompson, & Bennett, 2013). From this research result as shown in the Table 4, determination coefficient from Enjoyment of Science to clarify science learning outcome is almost zero so that it can be concluded that students with high ability have Enjoyment of Science lean to be constant and they are not influenced the other of science learning outcome aspects. This study also shows that the high learning achievement schools, Teacher support in a science classes of student choices, Inquiry-based instruction in science lesson, Teacher-directed science instruction dan Perceived Feedback are valid indicators from science learning quality. Teacher-directed science instruction has the highest determination coefficient in clarifying science learning quality. It means that teacher role in giving instruction in the science learning class is very dominant in influencing to learning quality.

In the intermediate and low learning achievement school, Environment awareness,

enjoyment of Science, Instrumental motivation, Science Self-Efficacy, Epistemological beliefs, and Science Achievement can be valid indicators from science learning outcome as explained in Table 5 and Table 6.

Students from intermediate learning achievement school, Environment awareness and Science Achievement have determination coefficient higher than other indicators in explaining students science learning outcome. While students from low learning achievement school, enjoyment of Science becomes an indicator which has the highest coefficient in explaining students science learning outcome. It means science learning in Indonesia have succeeded making low ability students enjoy in the science learning.

This study also shows students from intermediate and low learning achievement schools, Teacher support in science classes of student choice, Inquiry-based instruction in science lessons, Teacher-directed science instruction and Perceived Feedback are valid indicators from science learning quality. Teacher-directed science instruction and Inquiry-based instruction in science lesson have high determination coefficient in explaining science learning quality from intermediate learning achievement school. It means teacher role in giving inquiry based instructions is really dominant influences to learning quality. It concurs with previous researches that was inquiry based learning strategy was able to enhance science learning outcome (Hardianti & Kuswanto, 2017; Wardani, Lindawati, & Kusuma, 2017; Srisawasdi & Panjaburee, 2015; Abdi, 2014; Kogan & Laursen, 2014; Johnson & Cuevas, 2016; Hsiao et al, 2017). If Inquiry-based instruction in science lesson is integrated with Teacher-directed science instruction as learning strategy to produce directed science learning model or Guided Inquiry, it effectively enhance science learning outcome as previous proven research (Almuntasheri, Gillies & Wright, 2016; Gupta et al, 2014)

Table 5. Estimation and Parameter Model Test Science Proficiency Measurement and Learning Quality in the intermediate learning achievement school (Completely Standardized Total Effect)

Model	Indicators	Estimation	t	R <sup>2</sup>	statement
Science Proficiency (Proficie)	Envaware	0.49	33.25	0.24	Valid
	Joyscie	0.30	12.52	0.091	valid
	Instscie	0.38	14.68	0.14	Valid
	Scieeff	0.26	11.35	0.069	Valid



Model	Indicators	Estimation	t	R <sup>2</sup>	statement
Scince Learning Quality (learning)	Epist	0.29	12.38	0.085	Valid
	Pvscie	0.47	19.99	0.22	Valid
	Teachsup	0.16	7.59	0.026	Valid
	Ibteach	0.50	22.36	0.25	Valid
	Tdteach	0.57	24.96	0.32	Valid
	Perfeed	0.15	7.40	0.024	Valid

noted: t value table in 95 % and n>30 is  $\pm 2.00$

Table 6. Estimation and Parameter Model Test Scince Proficiency Measurement and Learning Quality in the intermediate low achievement school (Completely Standardized Total Effect)

Model	Indicators	Estimation	t	R <sup>2</sup>	statement
Scince Proficiency (Proficie)	Envaware	0.31	7.35	0.096	Valid
	Joyscie	0.57	10.54	0.32	Valid
	Instscie	0.34	7.94	0.11	Valid
	Scieeff	0.16	4.02	0.026	Valid
	Epist	0.37	8.48	0.13	Valid
	Pvscie	0.08	2.01	0.0069	Valid
Scince Learning Quality (learning)	Teachsup	0.46	10.00	0.21	Valid
	Ibteach	0.51	10.82	0.26	Valid
	Tdteach	0.56	10.68	0.31	Valid
	Perfeed	0.56	10.73	0.32	Valid

Noted: t value table in 95 % and n>30 is  $\pm 2.00$

Table 7. Estimation and Test of Structural Parameter Model of Influences Learning Quality to Scince Proficiency (Completely Standardized Total Effect)

Model	Average of learning achievement school	Estimation	t	R <sup>2</sup>
Learning ->Proficie	high	0.31	7.15	0.099
Learning ->Proficie	intermediete	1.00	22.89	1
Learning ->Proficie	low	0.51	7.23	0.26

In the low learning achievement school, Teacher-directed science instruction and Perceived Feedback have high determination coefficient in explaining science learning quality. It shows that the low learning achievement school beside the directed science teacher's instructions, it needs Perceived Feedback. This Perceived Feedback is proved to enhance learning achievement as reported by previous research (Harks, et al, 2014; Núñez et al, 2015; Sari, Djudin & Oktavianty, 2016; Parimba, Azis & Tawil, 2015). From three school levels, Teacher-directed science instruction is consistent factor for indicator which has the highest determination coefficient in explaining science learning quality. It is consistent with research from MacSuga-Gage & Simonsen (2015) and it shows that for Indonesian students, Teacher-directed science instruction has the great role in science learning.

There are differences Learning Quality influences to Scince Proficiency in each school in Indonesian as explained in Table 7.

The high learning achievement school, learning quality influences 0.31 to student learning outcome with determination level of 10 %. It means that 10 percent of student science learning outcome from high learning achievement school can be explained the variation of learning quality. Other aspect that influences to learning outcome is initial student abilities so that to some students with high initial abilities are less influenced by learning model. It has been showed by some previous researches, they stated there was interaction between the influence of learning model and initial student abilities to learning achievement (Warouw, 2009; Prayitno, 2011; Sumardi, Sutarna & Fathoni, 2017). At the intermediate grade achievement school, learning quality influences 1 or determination level of 100 % to students learning outcome. It means that learning quality influences to students learning outcome at the intermediate learning achievement school. The low grade achievement school, learning quality influences 0.51 to student learning outcome with determination level of 26 %. It means that learning

quality very influences to student learning outcome from low learning achievement school. This research result is supported by some previous researches, it stated that the influence of learning to learning achievement is higher in students which have intermediate and low initial abilities than students with high initial abilities (Freeman et al, 2014; Han, Capraro, & Capraro, 2015).

## CONCLUSION

Environment awareness, Enjoyment of science, Instrumental motivation, Science Self-Efficacy, Epistemological beliefs, and Science Achievement are valid indicators from science learning outcome Indonesian students based on PISA survey in 2015. Teacher support in a science classes of students choice, Inquiry-based instruction in science lesson, Teacher-directed science instruction and Perceived Feedback are valid indicators from science learning quality Indonesian students based on PISA studies 2015. In high grade achievement school, the quality of learning had 0.31 influences to science learning outcome Indonesian students with determination level of 10 %. In intermediate grade achievement school, the quality of learning had 1 influences to science learning outcome Indonesian students with determination level of 100 %. In low grade achievement school, the quality of learning had 0.51 influences to science learning outcome Indonesian students with determination level of 26 %.

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