# The Influence of Collaborative Teamwork Learning on Science Process Skills of High School Students

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***Abstract.*** Learning physics is not assessed from the student's academic perfomance but also from the process that student experiences through various activies. Student's science process skills are might be affected by learning models and internal factors such as personality of teacher and students as well. This research aims to know the differences of science process skill on varieties of personality types of students, i.e. sanguine, choleric, melancholy, and phlegmatic with was checked by the implementation of the collaborative teamwork learning model. Subjects we are 12 boys and 28 girls students of Grade X Science 5 of *SMA Negeri 1 Sidomulyo* selected by purposive sampling technique. A technique to collect science process skills data was classroom observation, and the personality type of student was categorized by personality profile test form. The data were analyzed using descriptive statistics and tested by the *Kruskal Wallis*. The result showed (1) there is a significant influence of collaborative teamwork learning model toward students in choleric, sanguine, melancholy, and phlegmatic personality type, which showed by the sig value of 0,03, (2) there are differences between the science process skills of four personality types, i.e. phlegmatic and sanguine; phlegmatic and choleric; phlegmatic and melancholy. Students who were the sanguine, choleric, and melancholic had higher science process skills compared to phlegmatic students. While there is no significant differences between choleric and melancholy student's science process skills. It might be caused by choleric students tended to orientating on learning target and melancholic students tended to elaborating on learning process.
**Keywords:** collaborative teamwork learning, science process skills, personality type

## 1. Introduction

Physics is a branch of science which plays an important role in the development of science and technology in the future. Physics Learning is not only seen from the results achieved students but of the process as well. Therefore, to enhance the science and technology, then a physics learning process needs to be improved (Wirtha and Rapi, 2008).

The purpose of implementing the approach in the process of learning skills is to achieve the goal of learner-an optimal, effective, and efficient (Gunawan, 2012:224). Process skills provide opportunities to students to be actively involved during the process of learning. Training skills in process through experiments in learning will make students more easily in understanding, receiving, considering the material learned in a relatively long time.

Practice in the field, the activities of physics learning conducted yet could facilitate students to develop skills in the process of their science. This is because teachers are still using methods of lecture in the delivery of the learning material (Zulaeha et.al, 2014). So that students tend to memorize concepts that are not based on his own experience or not through the investigation.

Based on these problems, need to be applied to a model of learning that is able to optimize the learning activities, i.e. the learning collaborative model teamwork learning.

Collaborative teamwork learning is a learning model that gives the opportunity to students to optimize their ability to work collaboratively within a team (Laksmi, 2013). Collaborative learning can trainingstudents to have a sense of positive interdependence in the process of learning and problem-solving so that they cooperate. Generally students will more easilyunderstanding a concept when they can exchange thoughts with their friend or team. All activity in a collaborative team can be negotiated and organized by students

According to Frances (2008:11-17), the learning collaborative model teamwork learning has several stages, namely:

Forming, the activities of team formation,and discussing problems given by teachers. This activity provides an opportunity to the students to classify and compare the problems with his life to be discussed with his team.

Stroming, includes the disclosure of student hypotheses related to the problem. In this case,student pose a hypothesis related to the problem that given. These activities provide someopportunities to students to guess temporary the related answers from the problems, so the students can developean understanding of concepts in particular on indicators of suspect and can also develope science process skills on the indicator formulation of hypotheses.

*Norming*, determine some sources related to solving the problems that discussed in the is categorized. In addition to sources of related books, students can also undertake an inquiry as a source for others in problem solving. In scientific inquiry, the students are given the opportunity to formulate problems, to communicate the research, so that it will be able to develop indicators of science process skills of students.

*Performing*, communicate the results of problem solving through the team presentation. These activities, provide opportunities to students to communicate the results of the investigator. It can also developscience process skills students in particular indicators to communicate the results.

*Adjourning*,includes a collaborative understanding activitiesbased on a presentation that have been done. These activities provide opportunities to students to summarize the results of the discussion so as to improve the understanding of students on the indicator sums up.

Science process skillsof students are also influenced by factors that are present in students who are referred to as internal factors. One of the internal factors that affect students ' learning is the hallmark/characteristics of students (Aunurrahman, 2012:178). The hallmark/characteristics on a person that is formed through the environment, e.g. the childhood family, individual's interaction with the individual, the individual's interaction with the environment that will determine the pattern of behavior is called personality. The personality of the students are distinguished into four, namely, personality, personality sanguine melancholy, choleric, personality and personality phlegmatic (Littauer, 2011:22-27).

Sanguine personality, students tend to have traits that emotional and demonstrative, optimistic, talking and high curiosity. Melancholy personality, students tend to have serious nature, diligent, persistent, meticulous, analytical, perfectionist, and pessimistic. Personality choleric, students tend to have traits of leadership, active, assertive, emotional, sure isn't easy, and moving fast in the act. Phlegmatic personality, students tend to have personality traits that are relaxing, quiet, calm, his emotions hidden, peaceful, unhurried,dan good listener personality.

Based on the explanation that has been put forth, then the researcher aims to examine (1) the influence model of collaborative teamwork learning science process skills against students on personality types sanguine, choleric, melancholy and phlegmatic, (2) a comparison of the science process skills in personality type, sanguine, choleric, melancholy, and phlegmatic in learning using collaborative teamwork learning model.

## 2. Method

This research was carried out to the students of class X of scince SMA Negeri 1 Sidomulyo on even-numbered Years semester Lesson 2016/2017. From the whole class X sample was selected using the porposive technique of sampling. According to the results of a personality profile test now given to the entire population, with a background of classes have 4 personality types, namely, sanguine personality type, choleric, melancholy, and a phlegmatic class that is used as a sample of the research. Then specified class X 5 as a class of sciences experiments with the number of 40 students consisting of 12 male students and 28 female students who were given the treatment model of collaborative teamwork learning.

This research uses research methods that are quantitative comparisons or differences, that kind of research which aims to distinguish or compare the results between the two groups or more research groups.

This research consists of two variables the study that is free, and the variables are bound. Free variables in this study is a model of a learning collaborative teamwork learning and personality types students divided into four, namely, personality type, choleric sanguine, melancholy, and phlegmatic, the dependent variable is the science process skills in choleric sanguine, personality type, melancholy, and phlegmatic with the treatment of collaborative teamwork learning.

Research instrument used in this research is the observation sheet developed by student of physics education Mike Anita Putri, et al. personality profile tests and garlands of Florence Littauer's Personality Plus.

The methods used for data retrieval in this research is to obtain data observation process skills science and question form to obtain data on background of the learners.

On the study of science process skills of students as measured using observation sheets in the form of charging score with a value between 1 and 5. The observation sheet is used to know the description of the process of science skills of students duringthe learning process. Assessment guidelines made to measure student's process skills science consists of 8 aspects are assessed, namely the skills of observing, formulating hypotheses, planning the experiment, experimenting, interpreting data, predicting, apply, and communicating

The data was analyzed descriptivelyand Kruskal Waliis. A descriptive analysis is used to describe the average value and standard deviation of science process skills.

Before testing the hypothesis, first carried out using statistical normality test Shapiro Wilk to test whether the research sample were normal or not and  homogeneity test to find out whether data science process skills from four groups of samples has variance homogeneity or not homogeneous. If any data is not normally distributed, then no  homogentitas test is required (Sudjana, 2005).

If the four sample data were from a normallydistributed population, then the different test usedwas the parametric test. One of parametric test is One Way Anova, while for the sample data that comes from non-distributed  population, different test using a non parametric test of Kruskal Wallis. Comparisons of significance test score averages using the Kruskal Wallis. All hypothesis testing was performed at the level of significance and use SPSS program 21.0 for Windows.

## 3. Result and Discussion

This research was doing at 5 X class of sciences in SMA N 1 Sidomulyo as an experimental class that was given treatment by collaborative teamwork learning and three times. Before the study was doing, the data has been got personality types students on the class. The data obtained by personality type was showed in table 1.

**Table 1.**The Data Type of Personality Test Results Students

| | Personality Type | | | | |
| --- | --- | --- | --- | --- | --- |
| | **Sanguine** | **Choleric** | **Melancholy** | **Phlegmatic** | **Amount** |
| Persentase (%) | 37,50 | 25,00 | 12,50 | 25,00 | 100 |

General description of the research results are presented is a description value processskills science students are presented in table 2.

**Table 2.**The Description Of The Value Of The Process Skills Science Students

| Statistik | Score | | | |
|---|---|---|---|---|
| | $K_1$ | $K_2$ | $K_3$ | $K_4$ |
| Average value | 80,50 | 82,00 | 82,00 | 73,75 |
| Standard Deviation | 3,43 | 4,04 | 3,25 | 7,19 |
| Minimum Value | 75,00 | 77,50 | 80,00 | 57,50 |
| Maximum Value | 87,50 | 87,50 | 87,50 | 80,00 |

Description:

$K_1 =$ Science process skills of students at the personality types who follow learning model sanguine collaborative teamwork learning

$K_2 =$ Science process skills of students at the choleric personality type that follows the model of a learning collaborative teamwork learning

$K_3 =$ Science process skills the students on a melancholy personality type follows the model of a learning collaborative teamwork learning

$K_4 =$ Science process skills of students at the phlegmatic personality type that follows the model of a learning collaborative teamwork learning

The next measurement is knowing the data acquired is normal or not test data science process skills of normality detailed in table 3. The fourth data shows that science process skills in choleric sanguine personality type and Gaussian. While the students are ofpersonality type and melancholy phlegmatic Gaussian is not normal.

Its homogeneity testing was not done, because one of those data is not Gaussian.

After the data that the data obtained by Gaussian normal do not do hypothesis testing to answer the problem. There are two hypotheses on this research, with the Kruskal Wallis test. The hypothesis is:

*The First Hypothesis*

$H_0$        : There is no influence model of collaborative teamwork learning science process skills against students in choleric sanguine, personality type, melancholy, and phlegmatic

$H_1$ : There is the influence model of collaborative teamwork learning science process skills against students in choleric sanguine, personality type, melancholy, and phlegmatic.

*The Second Hypothesis*

$H_0$        : There was no difference in average science process skills in choleric sanguine, personality type, melancholy, and phlegmatic in learning to use the model of collaborative teamwork learning.

$H_1$: There is a difference in average science process skills in choleic sanguine, personality type, melancholy, and phlegmatic in learning to use the model of collaborative teamwork learning.

**Table 3.**Normality Test Results

| Data | Student Personality Type | Shapiro-Wilk | | |
|---|---|---|---|---|
| | | *Statistic* | *df* | *Sig.* |
| Science Process Skills | Sanguine | 0,932 | 15 | 0,296 |
| | Choleric | 0,875 | 10 | 0,109 |
| | Melancholy | 0,735 | 5 | 0,021 |
| | Phlegmatic | 0,723 | 10 | 0,002 |

**Table 4.**Kruskal Wallis Test Result Different Data Science Process Skills

| | *Sig.* |
|---|---|
| Science Process Skills | 0,003 |

**Table 5.**Difference between test results of students ' personality type

| Sample 1-Sample 2 | *Sig*. | There is a difference | There is no difference |
|---|---|---|---|
| Phlegmatic-Sanguine | 0,039 | ✓ | |
| Phlegmatic-Choleric | 0,009 | ✓ | |
| Phlegmatic-Melancholy | 0,022 | ✓ | |
| Sanguine-Choleric | 1,000 | | ✓ |
| Sanguine-Melancholy | 1,000 | | ✓ |
| Choleric-Melancholy | 1,000 | | ✓ |

Table 4 shows that the value of the science process skills is 0.003, where its value less than 0.05 indicates that H0 rejected, then there are the influences of model learning collaborative teamwork learning process of science skills against students in cholericsanguine, personality type, melancholy, and phlegmatic.

The results of hypothesis testing in this study using Kruskal Wallis, the results of hypothesis testing or test different process skills science students detailed in table 5, which shows that the acquisition process skills science students on personality type and the phlegmatic sanguine; phlegmatic and choleric; phlegmatic and melancholy, there is a difference. However, there was no difference in students science process skills of personality type and the choleric sanguine; sanguine and melancholy; choleric and melancholy.

**The influence of Learning Models Collaboratibe Teamwork Learning process of science Skills against students in choleric Sanguine, personality type, melancholy, and phlegmatic**
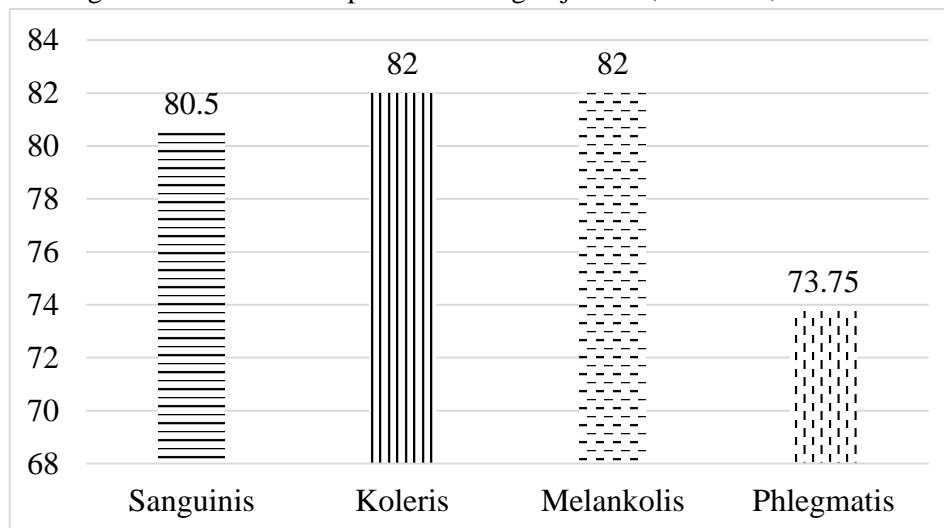
Science process skills after learning collaborative teamwork model applied learning, testing results Waliis results obtained by Kruskal shows there is influence model of collaborative teamwork learning science skills against roses on personality types sanguine, choleric, melancholy, and phlegmatic.

Learning collaborative teamwork learning, students are given the problems of the earth around the Sun through videos, activities in the group seemthe students expressing opinions about the things that happened when the Sun and the earth did not have gravity. Then students also discuss to give information about the gravitational force owned the Earth and the Sun. Students also show allegations while the related answers from the problem, so that students can develop an understanding of concepts and process skills science on indicators of the hypothesis. According to Sudarman (2008), collaborative learning is the learning process of each group member contributed information, experience, ideas, attitudes, opinions, abilities, and skills, to jointly develop science process skills each other whole.

In addition to using the troubleshooting related books, students can also do scientific investigations. Students withteacher guidance performing scientific investigations using Phet simulations of Colorado about gravitational forces of the Earth and the Sun, it gives the opportunity to students to formulate problems, analyze the results of the investigation to communicate the results his research related troubleshooting, so that students can develop their science skills on the indicator process observation, planning and conducting an experiment, interpreting data, predicting, applying and communicating.

Learning collaboratively foster a sense of positive interdependence in learning, trains on a student to take charge of his duties, cooperate in teams so that collaborative abilitiy in learning can be achieved optimally. According to the research of Lakshmi (2013), stating that collaborative teamwork learning is a learning model that gives the opportunity to students to optimize their ability to work collaboratively within a team. Learning collaborative teamwork learning involves students to work in teams, so the students get easier learning to understand the concept that have been provided through the activities of

group discussion, as revealed by Gunawan (2012) that the purpose of implementing the approach in the process of learning skills is to achieve optimal learning objectives, effective, and efficient.



**Pictures 1.**The average value of Process Skills science Students

**Comparison of Science Process Skills in Choleric Sanguine, personality type, melancholy, and Phlegmatic in learning to use the Model of Collaborative Teamwork Learning**

The average value of the science process skills in students choleric higher than average skills obtained from the process of science students phlegmatic after applied collaborative teamwork learning.

Differences in the skills of the science process obtained due to the stage of learning collaborative teamwork learning choleric students in solving problems has a strong willpower, optimistic, and canorganize a group well. It is similar with research conducted by Littauer (1996), stated that the choleric is a fast and practical organization. While the phlegmatic students tend to have a pessimistic nature, receptive to the opinions of others, prefer silence to avoid problems. So by using a model of collaborative teamwork learning, choleric students can collaborate with both within the Group and acquiring the skills of the process of science.

*a. Science Process Skills of Students Personality Type in PhlegmatisVs. Sanguine*
Hypothesis test results using the Kruskal Wallis, then it can be inferred that there is a difference between students of the science process skills personality type with phlegmatissanguine. The following is a diagram illustrating the existence of differences between students science process skills of personality types and phlegmatissanguine.

The average value of the science process skills in studentssanguine is higher than on an average science process skills of students phlegmatis after applied learning collaborative teamwork learning.

Science process skills differences on these two personality types related to the learning process of the two types. The overall learning process on both personality types have different properties. Students have problems in solving sanguine nature optimistic in a fringe opinion and full of curiosity, therefore students will find it easier to Exchange each other's mind from the problems encountered, this process skills science students that type personality sanguine embedded either. As revealed by Littauer (1996) States that sanguine is the one who is always optimistic and enthusiastic towards almost everything, full of curiosity and don't want to miss anything.

While the students are of type personality phlegmatis tend to have a relaxed nature in the Act, it is easy to agree when taking a decision, and would rather be a listener rather than expressing his opinion of his own.

### b. Science Process Skills of Students Personality Type in PhlegmatisVsCholeric

Hypothesis test results using the Kruskal Wallis, then it can be inferred that there is a difference between students of the science process skills personality type with phlegmatissanguine. The following is a diagram illustrating the existence of differences between students science process skills personality types phlegmatis and choleric.

The average value of the science process skills in studentscholeric higher than average skills obtained from the process of science students phlegmatis after applied learning collaborative teamwork learning.

Science process skill differences is obtained due to the stage of learning collaborative teamwork learning choleric students in solving problems has a strong willpower, optimistic, and can organise a group well. It is similar with research conducted by Littauer (1996), stated that the choleric is a fast and practical organization. While the students phlegmatis tend to have a pessimistic nature, receptive to the opinions of others, prefer silence to avoid problems. So by using a model of collaborative teamwork learning, choleric students can collaborate with both within the Group and acquiring the skills of the process of science.

**Table 6.** The Achievement Process Skills Science Students of Sanguine and Choleric

| Indicators Of Achievement | Sanguine Students | Choleric Students |
| --- | --- | --- |
| Observe | 72% | 88% |
| Hypothesized | 68% | 82% |
| Planning a trial | 83% | 82% |
| Experiment | 81% | 74% |
| Interpret Data | 83% | 80% |
| Predicting | 84% | 84% |
| Implementing of Concept | 84% | 74% |
| Communicate | 89% | 92% |

**Table 7.** The Achievement Process Skills Science Students of Sanguine and Melancholic

| Indicators Of Achievement | Sanguine Students | Melancholy Students |
| --- | --- | --- |
| Observe | 72% | 84% |
| Hypothesized | 68% | 88% |
| Planning a trial | 83% | 92% |
| Experiment | 81% | 72% |
| Interpret Data | 83% | 84% |
| Predicting | 84% | 88% |
| Implementing of Concept | 84% | 88% |
| Communicate | 89% | 60% |

**Table 8.** The Achievement Process Skills Science Students of Choleric and Melancholic

| Indicators Of Achievement | Choleric Students | Melancholy Students |
| --- | --- | --- |
| Observe | 72% | 84% |
| Hypothesized | 68% | 88% |
| Planning a trial | 83% | 92% |

| | | |
|---|---|---|
| Experiment | 81% | 72% |
| Interpret Data | 83% | 84% |
| Predicting | 84% | 88% |
| Implementing of Concept | 84% | 88% |
| Communicate | 89% | 60% |

*c.* *Science Process Skills of Students Personality Type in Phlegmatic Vs Melancholy*
Hypothesis test results using the Kruskal Wallis, then it can be inferred that there is a difference in student's science process skills between students phlegmatic personality types with sanguine. The following is a diagram illustrating the existence of differences between student's science process skills personality types phlegmatic and choleric.

The average value of the science process skills in students of melancholy is higher than the average science process skills of phlegmatic students after applied learning collaborative teamwork learning.

Science process skill differences is obtained due to the stage of collaborative teamwork learning students of melancholy resolve problems with meticulous, diligent, orderly, and seriously, therefore the science process skills after learning collaborative teamwork learning embedded properly. While the phlegmatic students tend to have aneasy nature of agreement, procrastinator science process skills work so obtained is low.

In accordance with the results of research Fitria and Siswono (2014) stated that in resolving the problem, students possess analytical, emphasis on results, well organized, meticulous, and got a creative solution to suit melancholy personality type.

*d.* *Science Process Skills of Students Personality Type in Sanguine Vs Choleric*
Science process skills after doing Kruskal Wallis test obtained the results that showed there was no difference in average process skills science students learning in choleric sanguine and using a model of collaborative teamwork learning.

The learning process by using a model of collaborative teamwork learning involves students to work in teams and have responsibility towards problem solving. Students and cholericsanguine have properties like talking, so during the learning process they dare to express his opinion. In addition, they have always been optimistic and determined.

The was no difference in the skills of the process of science students that type of personality choleric and melancholy as these two personality types are able to improve overall indicators on skills owned the process of science, though on any indicators of achievement there is the dominant science process skill between the two personality types. The achievement indicators of process skills science students in both groups of personality types described in table 6.

*e.* *Science Process Skills of Students Personality Type in Sanguine Vs Melancholic*
Science process skills after doing Kruskal Wallis test obtained the results that showed there was no difference in average process skills science students learning in a melancholy and sanguine using model of collaborative teamwork learning.

The learning process by using a model of collaborative teamwork learning involves students to work together in a collaborative group. Studentssanguine and melancholy have creative in problem solving.

There was no difference in the skills of the process of science students of type personality sanguine and melancholy as these two personality types are able to improve overall indicators on skills owned the process of science, though on any indicators of achievement there is the dominant science process skill between the two personality types. The achievement indicators of process skills science students in both groups of personality types described in table 7.

**f.** *Science Process Skills of Students Personality Type in CholericVsMelancholic*

Science process skills after doing Kruskal Wallis test obtained the results that showed there was no difference in average process skills science students choleric and melancholy in learning using models of collaborative teamwork learning.

The learning process of collaborative teamwork learning involves students to work in teams and have responsibility towards problem solving. Students choleric and melancholy of this target-oriented and specifies during the learning process takes place.

There was no difference in the skills of the process of science students that type of personality choleric and melancholy as these two personality types are able to improve overall indicators on skills owned the process of science, though on any indicators of achievement there is the dominant science process skill between the two personality types. The achievement indicators of process skills science students in both groups of personality types described in table 8.

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