

*Familia Novita Simanjuntak, 2019*

*Volume 5 Issue 2, pp. 765-777*

*Date of Publication: 27<sup>th</sup> September 2019*

*DOI- <https://dx.doi.org/10.20319/pijss.2019.52.765777>*

*This paper can be cited as: Simanjuntak, F. N., (2019). Facilitating the Need for Self-Esteem to Approach the Adolescents' Chemistry Learning Style. PEOPLE: International Journal of Social Sciences, 5(2), 765-777*

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## **FACILITATING THE NEED FOR SELF-ESTEEM TO APPROACH THE ADOLESCENTS' CHEMISTRY LEARNING STYLE**

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### **Abstract**

*Based on preliminary observation, it was found that one of the adolescents highest need in chemistry learning is self-esteem. Self-esteem affects the thinking process, desires emotions, values, and goals of an individual so that self-esteem for adolescents can be related to academic achievement. The adolescent's target is middle adolescence. This adolescents learning style requires more warmth and more teacher-motivated. This study aims to support chemistry learning based on students' need. One hundred and three (103) students were selected by purposive sampling technique. The students are 10<sup>th</sup>-grade students, Class of Natural Science X-1, X-2, & X-3 of The National High School 18 Jakarta. The needs of chemistry learning were observed as the preliminary observation using a Likert scale on Maslow's hierarchy of needs. Then, the researcher composed a chemistry learning module, based on Likert scale analyze, with pre-test and post-test to measure the students' learning outcomes which will be indicated as the learning style approach. Data analysis is a descriptive statistic and shows that there is an increase in the average value of chemistry learning outcomes. Means that self-esteem facilitating on chemistry learning process can be applied to approach the learning style of adolescents.*

**Keywords**

## **1. Introduction**

Adolescence is the period of life between childhood and adulthood that is regarded as a unique journey with predictable patterns. The predictable patterns are individually experienced forming a very special character in our society (Simmons & Blyth, 2017; Gozdas et.al., 2019) and typically identified as a time of opportunity and growth, marking a shift from a generally negative to a more positive discourse (Eccles et.al., 1993; Allen et.al., 2019). Though, some individuals experienced adolescence period with difficulties because of its excessively high levels of storm and stress, of raging hormones, and of transition from a child to an adult (Eccles et.al., 1993; Maes et.al., 2019; Allen et.al., 2019).

Adolescence development tasks embody personal independence and a philosophy of life which are confronted with learning to achieve new forms of intimate relationships, preparing for an occupation, achieving emotional independence of parents, and developing a mature set of values and ethical principals (Ekerdt, 2002; Gruskin, Rosenberg, & Holmes, 2019). Therefore, adolescence can be defined as a period of experiment and exploration of various identities and attitudes which rapid change and is centered on adolescent's relationship to authority (Lawrence, 2006; Maes et.al., 2019).

Adolescents can more effectively prepare themselves for the future (Schulz, 2006) if they possess the elements of planfulness specifically self-confidence, an intellectual investment, and dependability (Fuhrmann, Knoll, & Blakemore, 2015; Sawyer et.al., 2018). Bonino (2005) has a perspective recognize that adolescents are active participants in the shaping of their own development influenced by context of family, peers, school, media, neighborhood, workplace which are important in determining their life course as individual attributes. The interaction between context and individual attributes become crucial for developing remarkable diversity in the pathways (different tasks, opportunities, and challenges) that can be taken by youth as they traverse the adolescent life-stage (Curtis, 2015).

This research discusses about how the adolescents who are the 10<sup>th</sup>-grade students (age between 15-17 years old) dealing with their developmental tasks through chemistry learning in school. In Jakarta, chemistry learning is the most difficult subject for 10<sup>th</sup>-grade students since it is separated from Integrated Natural Science Subject which was learnt in Junior High School (7<sup>th</sup>-9<sup>th</sup>-grade). One of the most popular reason is because the chemistry learning urges the 10<sup>th</sup> grade students to study more focus on formulation and chemical reaction equations. As the

beginner in chemistry, some students experience anxiety while learning the formulation and chemical reaction equations (Ibrahim et.al., 2018) because they have never taken a course in chemistry or had limited instruction in the basic math necessary to solve chemistry problems, so chemistry course become very threatening to them (Goldberg, 2006).

Theoretical, chemistry is an extraordinarily interesting subject to study, for its dynamic and rapidly changing field, so that chemistry is an intriguing one to teach (Goldberg, 2006; Kirna, 2013). An understanding of chemistry, especially chemical reactions as the primary purpose, will enable students to master the intent of the chemical concern in their daily life (Gillespie, 1997; Subagia, 2014).

The 10<sup>th</sup>-grade students as young adolescent learners are vulnerable to disengagement from educations as they are struggle to make the adjustment to a change of school environment which impacts on their self-esteem of students. Therefore, Allen et.al. (2019) describes three components to enhance the engaging in learning for high school learners they are: (1) five core elements such as student centredness, transition, social and emotional wellbeing, quality teaching, and parental and community involvement; (2) flexible learning provision supports; and (3) alternative education provision.

This research studies about the learners engagement by facilitating the need for self-esteem to approach the adolescents' chemistry learning style. Maslow's Hierarchy of Needs is the reference of adolescence needs to enhance the engaging in learning for 10<sup>th</sup>-grade students. Self-esteem affects the thinking process, desires emotions, values, and goals of an individual so that self-esteem for adolescents can be related to academic achievement, means that, self-esteem can determine the self-regulated learning to support autonomous regulation on adolescents' care for self-development (Mesárošová, 2017). There are four sources of self-esteem (Mruk, 2013) they are power, significance, virtue, and competence.

Maslow's hierarchy of needs-based studies had been executed by some educators or learning practitioners. The research of Cohen, Gordon, & Kendziora (2019) uses the application of the Maslow's hierarchy of needs to study about school safety, wellness, and learning. Then, Maslow's model is applied as the reference of socio-emotional factors that mediate learning through virtual learning (Iyengar & Smith, 2019). Jacobs & Renandya (2019) studies about students centred cooperative learning to address the students' physical, social, and psychological needs based on Maslow's hierarchy of needs.

This study aims to support chemistry learning based on students' need which also apply the Maslow's model as the reference of students' physical, social, and psychological needs. The

findings of this research can be applied as the alternative learning approach to facilitate the students' chemistry learning style.

## **2. Methods**

### **2.1 Participants**

Participants in this research were selected by purposive sampling method which consisted of students from The National High School 18 Jakarta, Indonesia. The observed students are 103 10<sup>th</sup>-grade students of Class of Natural Science X-1, X-2, and X-3. The age of student is between 15-16 years old.

### **2.2 Measures**

*Maslow's hierarchy of needs questionnaire.* Maslow's hierarchy of needs questionnaire aims to identify students' chemistry learning style based on their needs which consists of the needs of physiological, safety, social, esteem, and self-actualisation. The questionnaire depicts the reason and motivation of why students learn chemistry and how chemistry learning works in students' everyday life.

The example statements for psychological needs are "I learn chemistry to be able to know the good chemical for my healthy and productive life", "Chemistry learning help me to identify the harmful chemical in my everyday life usage." The example statements for safety needs are "I learn chemistry to protect my self and family from harmful chemicals", "Chemistry learning practises me to act properly with certain chemicals I use for everyday life usage."

For social needs, the questionnaire applies the example statements as follows "I learn chemistry to be accepted in peer group in classroom, school, and home", "Chemistry learning makes me be more confident to socialize in classroom, school, and home". Next, for the esteem needs, the questionnaire applies the example statements as follows "I learn chemistry to get good appreciation from teacher and friends". "Chemistry learning trains me to master some soft skills and hard skills to get a certificate/appreciation for my excellent achievement in chemistry or win a competition."

The top of the triangle of Maslow's hierarchy needs is self-actualisation which are stated as "I learn chemistry to create some chemistry project", "Chemistry learning inspires me to build a chemistry-based business for future healthy everyday life." All observed students answer the questionnaire by giving a checkmark in one of five columns suits to their needs of chemistry learning style. The five columns are Likert scale which is 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree.

The result of Maslow's hierarchy of needs questionnaire become the preliminary research as the basis data for constructing the chemistry learning module which facilitate the students' needs. The module's discussion based on everyday life includes five major topics of General Chemistry II: thermodynamics, equilibrium, kinetics, acid-base chemistry, and electrochemistry.

The next phase is measuring the students' achievement of chemistry learning using the module through the application of pre-test and post-test. The scores of pre-test and post-test are between 0 – 100 and analysed by descriptive statistics. The achievement which is showed by the mean, median, and mode of pre-test and post-test scores are the indicators of students' chemistry learning style.

### 3. Results

This research consists of two phase. First phase is to identify students' chemistry learning style based on their needs using Likert scale questionnaire according to Maslow's hierarchy of needs which consists of the needs of physiological, safety, social, esteem, and self-actualisation. Second is the application of chemistry learning module based on the result of the questionnaire in first phase.

The result of Likert scale questionnaire shows that the highest score in score (1) which is strongly disagree is the esteem needs, then followed by self-actualisation. The result as described in Table 1.

**Table 1:** *The Result of Likert Scale Questionnaire based on Maslow's Hierarchy of Needs*

No.	Hierarchy of Needs	Score for Likert Scale					
		5	4	3	2	1	0*
1.	Physiological needs	136	109	178	65	21	1
2.	Safety needs	240	137	102	21	10	0
3.	Social needs	179	181	107	15	9	19
4.	Esteem needs	102	142	143	49	47	27
5.	Self-actualisation	60	129	213	71	28	9

Source: research data compilation

Before going to the second phase, a chemistry learning module was composed based on Likert scale questionnaire result to be applied in three classes of Natural Science X-1, X-2, and X-3. Pre-test and post-test are also applied at the same time with module application to measure the students' ability to comprehend and follow the chemistry learning concepts and rules which are arranged in the chemistry learning module.

**Table 2:** Frequency Distribution Table of Pretest Score

Score of Pre-test	Frequency	Score of Post-test	Frequency
0 – 10	26	5 – 13	2
11 – 21	39	14 – 22	4
22 – 32	10	23 – 31	7
33 – 43	12	32 – 40	25
44 – 54	6	41 – 49	7
55 – 65	8	50 – 58	35
66 – 76	0	59 – 67	15
> 76	2	> 67	8

Source: Descriptive Analysis Compilation

The lowest score of pre-test is 0 (zero) and the highest score is 90 (ninety). Meanwhile, the lowest score of post-test is 5 (five) and the highest score is 80 (eighty). The scores of pre-test and post-test are described as frequency distribution table in Table 2.

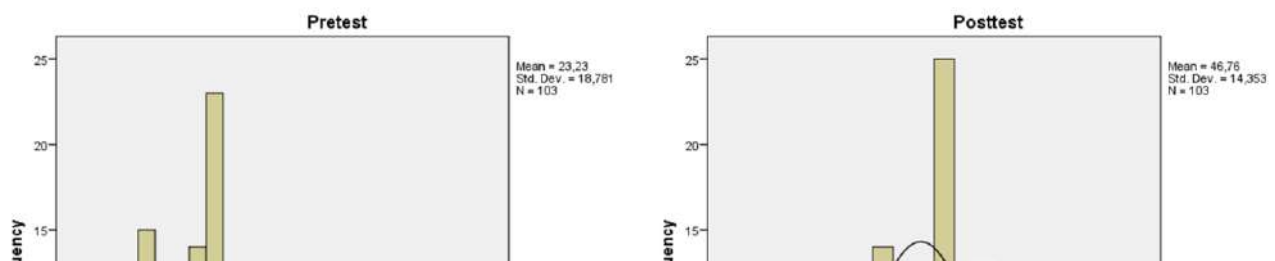
Next, descriptive statistic analyses the score of pre-test and post-test by central tendency (mean, median, and mode). The central tendency of pre-test and post-test as described in Table 3.

**Table 3:** The Central Tendency of Pre-Test and Post-Test

Central Tendency	Pre-test	Post-test
Mean	23,23	46,76
Median	20	50
Mode	20	50

Source: Descriptive Analysis Compilation

Furthermore, the descriptive statistic analysis on pre-test and post-test scores distribution is illustrated with a histogram to figure out the pattern of score distribution. The histogram can be seen in Figure 1.



**Figure 1:** *Histogram for Pre-Test and Post-Test Score Distribution*

Source: Descriptive Analysis Histogram

#### **4. Discussion**

This research aims to support chemistry learning based on students' need based on the Maslow's model as the reference of students' physical, social, and psychological needs. So that, identifying the students' needs is the important preliminary research through the application of Maslow's hierarchy of needs in a simple set of Likert scale questionnaire.

The identification of students' needs based on Maslow's hierarchy of needs due to the result of Cohen, Gordon, & Kendziora (2019) that use it to study the learning process. Then, Iyengar & Smith, 2019 also applied Maslow's model as the reference of socio-emotional factors to mediate the learning process (Jacobs & Renandya, 2019).

Table 1. shows that students need an esteem approach to help them getting interested in chemistry learning, so, they can get a better achievement in chemistry or even apply it in their everyday life (Gillespie, 1997; Subagia, 2014). The situation is in accordance with Fuhrmann, Knoll, & Blakemore (2015) that adolescents need to possess the elements of planfulness specifically self-confidence which is supported by self-esteem, an intellectual investment, and dependability (Sawyer et.al., 2018) to be able more effectively prepare themselves for the future (Schulz, 2006).

The esteem approach for adolescents' learning style can develop the alternative education provision as stated by Allen et.al. (2019) that the development can be started by enhancing the engaging in learning for students through the social and emotional wellbeing which follow by the quality teaching to perform the flexible learning provision in chemistry. Further, Mesárošová (2017) stated that self-esteem affects the thinking process, desires emotions, values, and goals of

an individual so that self-esteem for adolescents can be related to academic achievement, means that, self-esteem can determine the self-regulated learning to support autonomous regulation on adolescents' care for self-development.

Specifically, the esteem needs refers to a feeling of self-worth and confidence with regard to a specific activity or behavior (Lawrence, 2006). In this research, the students' efforts to get an appreciation for better achievement in chemistry become the specific activity or behavior. It is in line with Mruk (2013) that competence to be a successful performance in regard to a goal is the fourth source of self-esteem.

High school students, especially the 10<sup>th</sup>-grade students, are the beginner of chemistry learner. At the same time, the 10<sup>th</sup>-grade students are middle adolescents who are struggling for distance from parents and their internalized voices. No matter how they actively sought, the struggle contributes to a sense of alienation and existential loneliness, even while surrounded by peers (Gilmore & Meersand, 2014). The change will impact on self-esteem simultaneously with the vulnerabilities experienced during middle adolescence, especially those involving identity formation and peer group acceptance (Allen et.al., 2019).

Lawrence (2006) considers three personal characteristics to be desirable qualities that are involved in the establishment of a positive relationship in the middle adolescence teaching, they are acceptance, genuineness, and empathy. Acceptance exists when the teacher is being non-judgemental of the students and accepting their personality as they are. Genuineness means being a 'real person' rather than hiding behind a 'professional mask', in other words, being assertive and able to express personal views and attitudes without fear. To be a genuine teacher, someone has to have high self-esteem so the teacher can be able to reveal his/her personality without fear of rejection or disapproval.

The third characteristic to establish a positive relationship in teaching is empathy which is a quality of being able to appreciate what it feels like to be another person. Empathy means we have sufficient feelings and experiences in common to be able to 'get into other person's shoes' to some degree. The quality of empathy can be learned and developed by practising to listen the feelings behind a person's words. In empathy, the teacher remains in the role of teacher and, so, in charge of the class, even though being able to understand the students' feelings.

Gradually, self-esteem can be authentic when competence and worthiness are balanced. Competence connects to self-esteem when influence and achievement involve some degree of mastery and skill. The acceptance and virtue are connected to being worthy to others. So that, authentic self-esteem requires accessing either influence or achievement and acceptance or



virtue. There are also another similar four sources of self-esteem, but does so more dynamically. Self-esteem involves the balance of achievement and loss, the condition where power is offset by powerlessness, acceptance is coupled with the possibility of rejection, and moral self-acceptance must also include the possibility of shame or guilt (Mruk, 2013).

This research also collaborated with the under-graduate students of Chemistry Education Study Program, Faculty of Teachers Training and Education, Christian University of Indonesia. These students are participated as tutors for chemistry learning module application in school. Before doing their role as tutor, lecturer arranged one month preliminary intensive training to encourage the three personal characteristics development as desirable qualities for a positive relationship in the middle adolescence teaching (Lawrence, 2006).

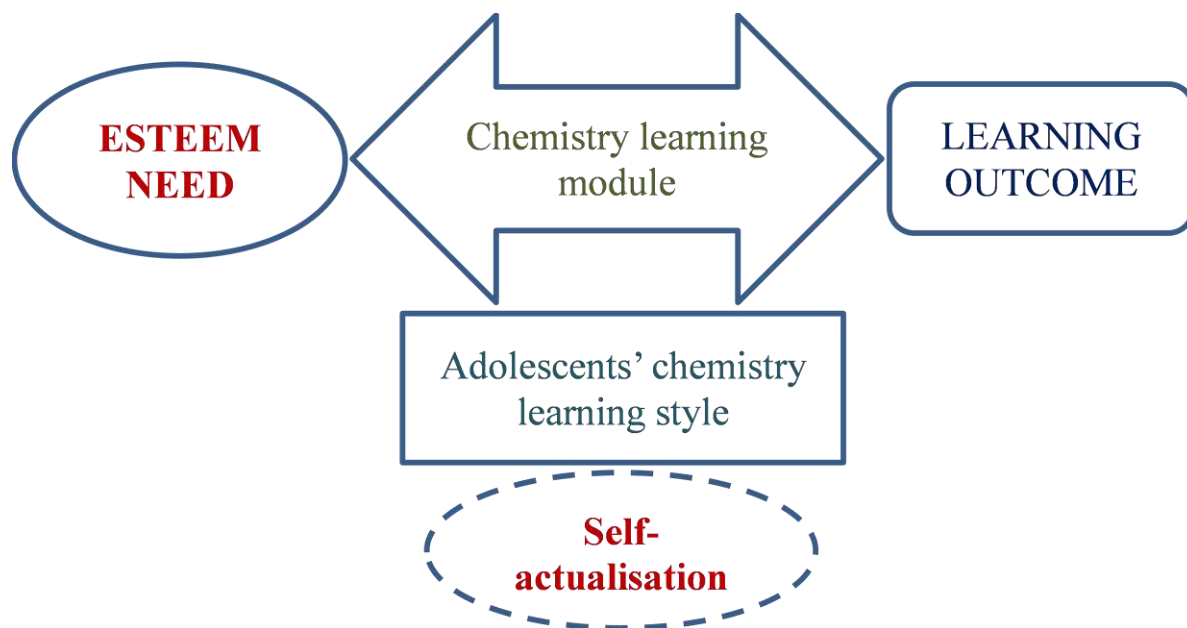
The intensive preliminary training is intended to apply an appropriate chemistry learning modules according to the result of Likert scale questionnaire, so that research data derived from students' expressions and activities in pre-test and post-test can be collected properly. This situation means that acceptance, genuine, and empathy as three personal characteristics are also reflected in pre-test and post-test scoring.

Distribution of pre-test and post-test scores showed in Table 2. describes that post-test scores distribution is higher than pre-test score distribution. This condition means that students can learn chemistry better by following the learning module which facilitates the students' needs of chemistry learning.

Descriptive statistics analysis is also described by central tendency they are mean, median, and mode. Mean shown in Table 3. is similar to median and mode, this condition means that the curve of pre-test and post-test scores distribution is symmetric. The symmetric curve as shown in Figure 1.

## **5. Conclusions**

Facilitating the need for self-esteem of students by chemistry learning module in order to approach adolescents' learning style can be applied as alternative learning approach especially in chemistry. Furthermore, facilitating the need for self-esteem gradually can encourage students to create or execute some project by implementing chemistry learning based on their needs in everyday life. Creating or executing some project by students can be the initial progress to facilitate their need for self-actualisation, the top of the triangle of Maslow's hierarchy needs. Figure 2. illustrates the connection between facilitating the need for self-esteem to approach adolescents' learning style.



**Figure 2:** Facilitating the Need for Self-Esteem to Approach Adolescents' Chemistry Learning Style

When the teachers are able to facilitate the chemistry learning on 10<sup>th</sup>-grade students by developing their esteem then the students can get the proper support to actualize them selves in classroom. This situation will prevent the experience anxiety while learning the formulation and chemical reaction equations (Ibrahim et.al., 2018) and chemistry course does not become very threatening to them (Goldberg, 2006).

If so, the teacher together with the students can achieve the chemistry, theoretically and practically, as an extraordinarily interesting subject to study, for its dynamic and rapidly changing field. Furthermore, chemistry learning in classroom can be designed as the systematic investigation of the properties, structure, and behavior of matter and the changes matter undergoes (Goldberg, 2006; Kirna, 2013).

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