How to Scaffold Extroverted and Introverted Students in Mathematics?

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Abstract---**Every person has a different personality. It is important for teachers to consider these personality differences in providing scaffolding for their students. This study aims at: 1) describing the proper scaffolding with the students' needs for each personality type; 2) formulating recommendations on how to give scaffolding to each student's personality type. It is a qualitative research on X grade students of SMK N Tengaran, Semarang in the year of 2019/2020. Research data is collected by observation, documentation, and interviews. The results show that 1) extrovert student appear to be more active in building interactions, while neurotic student prioritize comfort in providing scaffolding; 2) if the scaffolding is done by peers, each personality type requires scaffolding from peers with certain personality types; 3) there is no difference techniques used by students with different personality types in direct interaction, but for indirect interaction the choice of techniques is influenced by the level of ability. Based on these findings, the recommendation is the need to consider the characteristics of each personality type in: 1) involving students in the process of providing classical or personal scaffolding; 2) forming peer tutor groups; and 3) selecting the technique used in the scaffolding process.**

Key words: scaffolding, extrovert, introvert

I. INTRODUCTION

At vocational high school, group C (vocational) subjects hold a proportion for about 50% compared to group A (national content) and group B (regional content) subjects in grade X, then about 70% in grades XI and XII (Kemdikbud, 2018). With such a dense curriculum structure, self-regulated learning is needed to plan, carry out learning activities independently in order to master the required knowledge and skills.

In fact, not all students can construct their knowledge independently during the learning process. In many cases, students need help from others who are more skilled in order to achieve higher levels of understanding and performance. This kind of assistance in Vygotsky's sociocultural theory is referred as scaffolding (Wood, et al, 1976).

Wood, Bruner and Ross define scaffolding was developed as a metaphor to describe the type of assistance offered by a teacher or peer to support learning (Wood, et al, 1976). Another definition states that scaffolding is the role of teachers and others in supporting the learner's development and providing support structures to get to that next stage or level"

(Raymond, 2000). Both of these statements indicate that the essence of scaffolding is not only helping students to be capable but also increasing their self-regulated learning. The scaffolding portion can be reduced and then eliminated when students begin to be able to do their own assignments.

Although the provision of scaffolding in the learning process is not something new, it is not easy to provide scaffolding. Teachers mostly pay attention to the extent of students' Zone of Proximal Development (ZPD). In fact, even though it departs from the same ZPD, the scaffolding cannot be equated. The unique character of each student is very diverse. Some students looked anxious, nervous, or afraid when they are invited to interact in front of the class, but not with other students.

Wood et al. (Anghileri, 2006) stated one of the six key elements in scaffolding is emotional control in responding to students' emotional responses. Understanding emotional conditions will requires understanding of the student's personality.

Personality as characteristic of a person that causes consistency in feelings, thoughts, and behavior (Pervin et al., 2010). Personality is unique and consistent, so that each person has a unique way to act or react to the environment. Based on this consideration, the question research is: "how to provide scaffolding for students with different personality types?" Thus, the objectives of this study were to: 1) describe the proper scaffolding with the students' needs for each personality type; 2) formulate recommendations on how to provide scaffolding for each personality type based on the obtained findings.

II. METHODS

This study uses a qualitative method. In the pre-research, two from nineteen classes on grade X at public vocational high school (SMK N) 1 Tengaran in the year of 2019/2020 were randomly taken. In both classes, personality types were categorized using the Eysenck Personality Inventory (EPI) based on the personality theory of Hans Jurgen Eysenck (1970). This theory combines the dimensions of Extraversion (E) and Neuroticism (N). The E dimension confirms an individual's tendency to certain social situations, while the N dimension confirms whether an individual is unstable, easily aroused, sensitive, and anxious or not.

In the E dimension, a maximum score of 12 is categorized as introverted, while a minimum score of 13 is categorized as extroverted. In the N dimension, a maximum score of 12 is categorized as stable, while a minimum score of 13 is categorized as neurotic. Extroverted - Neurotics tend to be active, optimistic, impulsive, changeable, excitable, aggressive, restless, and touchy. Extroverted - Stable tends to be sociable, outgoing, talkative, responsive, easygoing, lively, carefree and leadership. Introverted - Neurotics tend to be moody, anxious, rigid, sober, pessimistic, reserved, unsociable, and quiet. Meanwhile, Introverted - Stable are passive, careful, thoughful, peaceful, controlled, reliable, even-tempered, and calm (Eysenck, 1970). Despite having opposite characters, introverts and extroverts basically do not have a significant difference in ability in mathematics (Igbojinwaekwu, 2009; Chinelo, 2016).

Based on the results of the EPI, observation, and interviews with the counselor, the research subjects were selected for each personality type. as follows

Group	Subject Code	Score	
		E	N
Ekstrovert –	EN23	17	15
Neurotic (EN)	EN20	15	22
	EN1	15	17
Ekstrovert –	ES12	16	8
Stable (ES)	ES7	15	9
	ES10	13	10
	ES9	14	12
Introvert –	IS2	8	12
Stable (IS)	IS4	8	8
	IS8	12	6
Introvert –	IN8	8	13
Neurotic (IN)	IN5	10	21
	IN15	11	13

Data is collected by observation, documentation, and interview techniques. Observation is used to observe scaffolding patterns and teacher interactions with research subjects during the research process. The documentation comes from the written documentation of the research subject in the Counseling Guidance book. Meanwhile, an unstructured interview used to explore the way to provide desired scaffolding by students with different personality types.

The technical analysis in this study refers to the opinion of Miles & Huberman, namely data reduction, data presentation, and drawing conclusions (Sugiyono, 2013). Meanwhile, the validity of data in qualitative research is determined using four criteria, namely the trust test, transferability, dependence, and certainty (Moleong, 2013).

III.   RESULTS AND DISCUSSION

HOW DOES SCAFFOLDING FIT THE NEEDS OF STUDENTS FOR EACH PERSONALITY TYPE?

Different personality types require different handling in the learning process. As stated by Eysneck, the E dimension confirms the tendency of an individual in certain social situations. The higher the E score, the easier he will build interactions with other. As a result, extroverts appear more active.

The N dimension, which confirms whether an individual is unstable, easily aroused, sensitive, and anxious, makes different responses during learning. The higher the N score, the lower the ability to control emotions. This character is very visible in interactions in the classroom. In the neurotic group, the low ability to control emotions makes mood swings easy. This factor greatly affects the ongoing learning process, although not for a long time.

"Actually there is no problem with mathematics, but it depends on the mood. If you're in a bad mood, it will affect everything. The mood swings, sometimes just because being laughingstock by friends, snapped by teacher, or unable to do task, make us lazy."

(EN23)

With such character, comfort is the main factor in the process of giving scaffolding.

In the traditional concept, scaffolding involves one to one interaction between the giver and receiver of scaffolding. For a class of more than 30 students, it is impossible to rely solely on the teacher as the scaffolding provider. Peers can also replace that role (Gillies, 2008; Pata, et al., 2006) so that scaffolding can run more effectively.

The results of the in-depth study to all research subjects, they are positively welcomed this idea. All research subjects from each personality type state that the teacher is the ideal scaffolding provider. However, the position of peers is also considered important.

In the Extroverted -Neurotic group, the frequency of asking friends was more than asking the teacher. The reasons are as follows.

"Asking friends is more flexible and free. If you don't immediately understand, there is no bad feeling."

(EN23)

"I feel more comfortable with my classmate, because the language is familiar."

(EN1)

The comfort aspect takes more consideration in choosing friends. The typical character of extroverts, as expressed by Eysneck tends to need other people to talk to. In order to feel comfortable, a balanced opponent is needed. In this case, people who both like to interact with other people or fellow extroverts.

In the Extroverted-Stable group, the frequency of asking friends was also more than asking the teacher. The difference with the Extroverted-Neurotic group, i.e. the choice of friends was based more on the

aspect of comfort. In the Extroverted-Stable group, it was more on technical or practical abilities.

"I ask the smart one."

(ES10)

"Anyone who near me."

(ES12)

Based on personality type, friends who are usually asked for help in this group come from all personality types, both extrovert and introvert.

An interesting finding is found in the both Introverted-Stable and Introverted-Neurotic groups. Although the typical character of people with introverted personality types is to be very careful in relationships, it does not make them reluctant to ask the teacher. In the Introverted-Stable group, the statement "will ask the teacher if they still do not understand" is not only expressed by students with high abilities such as IS2 but also students with lowest abilities such as IS8. Same as in the Introverted-Neurotic group too. The difference appears in the Introverted-Stable, i.e. students are initiated to ask questions, while in the Introverted-Neurotic, teacher had to actively approach this group.

The position of peers as the scaffolding provider for both groups is still important. However, the number is lesser than the extrovert group. Subjects from the extrovert group, both Extroverted-Stable and Extroverted-neurotic, mentioned at least three names of friends who were usually asked for help, while the Introverted-Stable and Introverted-Neurotic students mentioned a maximum of three friends. These findings indicate conformity in the E dimension which introverts are indeed very careful in relationships, so that the number of friends is limited.

The choice of friends between the Introverted-Neurotic and Introverted-Stable groups was different. In the Introvert-Neurotic group, the comfort aspect becomes the main consideration in choosing friends. The typical character of introverts, who are very careful in relationships, makes friends as scaffolding provider almost entirely from close friends. Even though there are technical considerations, i.e. by looking for a smarter scaffolding provider, the comfort aspect remains a major consideration. As a result, scaffolding givers who tend to be impatient and impulsive, as it is in common Extroverted-Neurotic, are disliked.

The Introverted-Stable group has uniqueness in combining introvert character with the dimension of stable emotional management. Same as the Extroverted-Stable group, in terms of choosing friends, the Introverted-Stable can also come from all personality types. Among the names who are often asked for scaffolding, there are several names that are actually complained about, but they are remain asked for scaffolding. It means that they are also flexible in choosing friends to provide scaffolding.

In terms of technique used in this study, the scaffolding was divided into two: scaffolding in direct (face-to-face) and indirect (online) interactions. For direct scaffolding, there was no specific pattern of using certain techniques in each personality group. There are subjects who prefer to "do it yourself with guidance", there are also those who say "see first and then do it yourself".

Roehler and Cantlon (Bikmaz, 2010) state that there are five types of scaffolding techniques in learning, namely (1) modeling of desired behaviors, (2) offering explanations, (3) inviting student participation, (4) verifying and clarifying student understandings, and (5) inviting students to contribute clues. The statement "do it yourself with guidance" can essentially cover all scaffolding techniques at once. When the scaffolding giver invites to participate in completing the task: he asks what should be done to do the task, what concepts should be used, and allows students to solve the problem. This time, inviting student participation techniques are used. If this technique does not work well, the offering explanations technique use by giving an explanation of the concept needed, leaving it to rework. In this process, the clarifying student understandings technique is also used. If it is still wrong, the scaffolding giver will use the inviting students to contribute clues by mentioning keywords from the concepts being studied or using the modeling technique of desired behaviors to give direct examples of how to complete the task.

For the statement "see first and then do it yourself", it seems that it only refers to the modeling technique of desired behaviors. However, its application could coincide with four other techniques because it is rare to find students who can immediately do it just by being given an example.

Online scaffolding was observed in this study through Whatsapp. The method is divided into two, namely "waiting for other people's work" and "sending my work first to be corrected".

It must be admitted that scaffolding in most cases does not work as it should. Instead of guiding, scaffolding givers often take over the completion of the task, without giving the mentored opportunity to construct their knowledge. In this study, the data analyzed only came from subjects where the scaffolding provider did not do that.

The limitations of online interactions compared to direct interactions make the scope of the scaffolding technique used in the two terms different. In direct interaction, the term "waiting for other people's work" can include the modeling technique of desired behaviors which is supported by the other four techniques until the entire task is completed. However, in online interactions, the term "waiting for someone else's job" only includes the modeling technique of the desired behavior, because usually there is no meaningful follow-up interaction after the provider sends the job.

The similar thing applies to the term "send my work first for corrections". In face-to-face interactions,

asking a friend to make corrections may include clarifying student understandings which the other four techniques followed until the entire task is completed. In online interactions, however, the term "send my work first for corrections" usually only consists of two stages: the scaffolding provider clarifies, then tells him where the error was. In some cases, if you still cannot understand, the scaffolding provider sends a photo of the correct steps with a minimum explanation. So that the techniques used only include clarifying student understandings and modeling of desired behaviors.

Interestingly, the choice to actively act - by sending my work first - or to passively act was actually influenced by the students' abilities. Students with low abilities prefer to act passively, whereas students with high abilities prefer to act actively. The reasons stated are relatively the same,

"I am not confident, I am afraid of doing wrong"

(EN20)

WHAT DO THESE FINDINGS RECOMMEND?

The first is related to the characteristics of students in each personality type. The higher the E score, the easier it will be to build interactions with other people. The higher the N score, the lower the ability to control emotions. These two aspects need to be considered when involving students in the scaffolding process. If scaffolding is done classically, teachers can involve extroverted children. However, for introverted children, involve them only in giving scaffolding personally or in small groups. However, caution is needed in responding to the neurotic group, due to its sensitive and anxious characteristics. Responses that tend to be negative should be avoided so that the scaffolding that is given will not make the neurotic group feel uncomfortable.

The second is the formation of peer tutor groups. Peer tutors are recognized to facilitate learning (Robinson, Schofield, and Steers-Wentzell 2005; Ginsburg-Block, Rohrback, and Fantuzzo 2006; Roscoe and Chi 2007), increase the cognitive level of introverted students (Bombardelli, 2016) as well as solve to the concerns that scaffolding is classically ineffective (Stone, 1998). This technique has actually been done. However, the formation of the group, not only based on the aspect of ability, but need to be considered the personality type. This technique is actually often done. The formation of groups is often only based on the aspect of ability. Personality types also need to be considered. There are two personality types that require scaffolding of certain personality types. If there are members is Extroverted-Neurotic student, do not place the introvert as the tutor. Likewise, if there are members is Introverted-Neurotic student, do not place Extroverted-Neurotic student as tutors.

The third is in terms of the technical ability of the scaffolding provider. In addition to understanding the material, understanding the character of students based on their personality types is also important. It is a provision for how to build good interactions as well as providing a reference for the choice of techniques that should be used, so that the scaffolding process runs optimally. If the scaffolding is done by peers, the teacher need to have a more complex preparations. The contents are not only about the framework to guide the provision of scaffolding as disclosed by Belland (2013), but also the understanding of preparing tutors about the character skills of other students according to personality types so that the scaffolding can be effective.

IV. CONCLUSION

The results show that: 1) extroverted student appeared to be more active in building interactions, while neurotic student prioritized comfort in providing scaffolding; 2) if the scaffolding is done by peers, each personality type requires scaffolding from peers with certain personality types; 3) in direct interaction, there is no difference techniques used by students with different personality types, but for indirect interaction the choice of techniques is influenced by the level of ability. Based on these findings, it is recommended to pay attention on 1) understanding the character of each personality type in involving students in the process of providing classical or personal scaffolding; 2) forming peer tutor groups; and 3) selecting the technique used in the scaffolding process. Therefore, if the scaffolding is done by peers, the teacher need prepare the tutor about technical skills in giving scaffolding as well as provide an understanding of the character of other students according to the personality type.

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