Analysis of students' self-determination in learning mathematics

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Abstract. Self-determination (SDT) is the ability in identifying and achieving the purpose based on knowledge and the assessment of the individual against himself. Three aspects in the SDT includes autonomy, competence and relationships become an important part for students to be able to understand the capabilities of themselves, having a positive competitiveness to other students and can interact well between friends. Therefore, teachers need to know the ability of students SDT after making the learning process. This research was conducted to improve the process of learning mathematics by knowing the ability of students SDT. The researcher gave the question form to 38 students and analyzed the ability of SDT. The Results of the study showed that the student SDT ability is still poor. Students were lack of confidence to solve math problems. In addition, the competitiveness of students was low that have made them looked lazy. This can be resolved by making learning more interesting for students so that it can increase the student SDT ability.

1. Introduction

Self-determination (SDT) includes three psychological needs, i.e. need competence, autonomy, and relationship. The third of these requirements, when successful, can increase self-motivation and mental health, on the other hand, if they fail, they will reduce motivation and well-being. So it could be interpreted that the three important psychological needs are important in the field of healthcare, education, employment, sports, religion, and psychotherapy [1].

In education, students and teachers need to have those three needs in the learning process. The needs for autonomy, competence and relationship can increase the student's motivation in learning so as to alleviate the difficulties of the students in the learning process. Teachers must be able to facilitate students to be able to improve these three needs in the learning process.

Field research has shown that teachers who support autonomy (in contrast with control) catalyze intrinsic motivation, curiosity, and their desire for a challenge. Students who are taught with an approach that is more in control are not only losing their initiatives but also learning effectiveness, especially when learning requires a conceptual and creative process [2].

The learning process is demanding students to always think conceptually, systematically and creatively. Students who have the ability to think creatively will love the challenges in resolving problems that are given by the teacher. Students will use ideas freely, yet remain conceptual and systematic, so it will be a reliable problem solver. Habits of students in solving a problem, it will affect the attitude and way of thinking in the face of problems in daily life.

In addition, research shows that not only tangible rewards but also threats, deadlines, leads, depressed evaluations, and forced goals to diminish intrinsic motivation because, as a real appreciation, they are leaning to the perceived external causality locus. In contrast, choice, recognition of feelings,
and opportunities for self-direction are found to increase intrinsic motivation because it allows people to feel greater autonomy [3].

Teachers who do not reprimand the students when they do not do the job or do not pay attention to the teacher whenever he explains the lesson had resulted in no motivation in learning. The impact of this is the result of student learning is low and they do not like math lessons. Appropriate appreciation can increase students' motivation in learning, so that students will love the math lesson, would seek to resolve the matter and the results of learning towards mathematics will increase.

Additionally, Niemic [4] stated the evidence suggests that teacher support for students' basic psychological needs for autonomy, competence, and relevance facilitates student self-regulation for learning, academic achievement, and well-being. Thus, SDT has strong implications for classroom practice and educational reform.

SDT is useful in the learning process because the three needs of autonomy, competence and relationships are needed in the learning process in the classroom. Learning that facilitates these three needs is owned by students will make students become human beings who have the character and can compete. This can increase the quality of creative and superior human resources.

2. Methods

The method used in this research is descriptive. This research aimed to analyze the self-determination of students. Students who serve as samples are as many as 60 students with 24 male students and 36 female students. The selection of the number of students is not determined by previous researchers. Researchers gave the question form SDT to 60 SMP students in Tangerang. Question form given by the researchers was the result of the adaptation of BNSP developed by Decy and Ryan [1]. The adaptation was done by researcher by aiming at adjusting the character material junior and math students.

3. Results and Discussion

3.1. Aspects of the SDT

Overall aspects of SDT and all charge indicators will be spelled out in the table below:

| Aspects of SDT       | Indicator                                      | Answers |
|----------------------|------------------------------------------------|---------|
|                      | Recognition of the feeling of acting of their own accord | SA | A | D | SD |
| Autonomy             | 1 | 14 | 37 | 8 |
|                      | 11 | 38 | 10 | 1 |
|                      | 4 | 37 | 16 | 0 |
|                      | 16 | **89** | 63 | 9 |
|                      | 8.9% | 49.4% | 35% | 5% |
| Choice over their own experience | 3 | 37 | 19 | 1 |
|                      | 4 | 30 | 23 | 1 |
|                      | 7 | **67** | 42 | 2 |
|                      | 5.8% | 55.8% | 35% | 1.7% |
| Fighting power       | 2 | 24 | 33 | 0 |
|                      | 0 | 12 | 34 | 14 |
|                      | 2 | 36 | **67** | 14 |
|                      | 1.7% | 30% | 55.8% | 11.7% |
| Feedback             | 5 | 37 | 17 | 1 |
|                      | 20 | **70** | 29 | 1 |
|                      | 16.7% | 58.3% | 24.2% | 0.8% |
| Total                | 3 | 36 | 20 | 1 |
|                      | 2 | 42 | 14 | 1 |
|                      | 3 | 24 | 29 | 3 |
|                      | 8 | **102** | 63 | 5 |
|                      | 4.4% | 56.7% | 35% | 2.8% |
| Awards               | 6 | 35 | 18 | 1 |

Table 1. The Overall Aspects of The SDT
Total | 6 | 35 | 18 | 1 |
The percentage | 10% | 58.3% | 30% | 1.7% |
Relation | 9 | 37 | 10 | 1 |
The development of self confidence | 18 | 34 | 7 | 1 |
| 10 | 32 | 10 | 5 |
| 2 | 10 | 35 | 10 |
| 15 | 38 | 7 | 0 |
| 19 | 35 | 3 | 2 |
Total | 73 | 186 | 72 | 19 |
The percentage | 24.3% | 62% | 24% | 6.3% |
Fulfilling relationships with others | 27 | 28 | 6 | 1 |
| 6 | 30 | 20 | 4 |
Total | 33 | 58 | 26 | 5 |
The percentage of | 27.5% | 48.3% | 21.7% | 4.2% |

Table 1 describes that the elaboration is overall of the three aspects of SDT, most students responded in agreement. Many students responded disagree on the indicator of opportunity for the promoted direction that is equal to 55.8%. Although many students answered in every SDT indicator agree but the percentage of students' SDT capability is still low under 65%. It can be concluded that in the autonomous ability of students still lack the sense of confidence and recognition that in themselves, there is the ability to decide the problem or have great ability. While in the competence, students still lack the fighting power and good feedback, so that during the learning in the class seemed resigned and did not want to try to ask if experiencing problems in learning mathematics. In the aspect of relations, students lack the ability to develop confidence so that the interaction with others are low. The explanation of each aspect of SDT can be explained in the following table:

### Table 2. Percentage of SDT

| Aspect of SDT | Answers | SA | A | D | SD |
|---------------|---------|----|---|---|----|
| Autonomy      | 5.5%    | 45.3% | 41.9% | 6.3% |
| Competence    | 10.6%   | 57.8% | 29.8% | 1.8% |
| Release       | 22.9%   | 52.3% | 19.8% | 5.3% |

Table 2 can be described as follows: (1) On the aspect of autonomy, 45.3% respondents answered agree and disagree as much as 41.9%. Students answered strongly disagree by 6.3% and strongly agree 5.5%; (2) On the aspect of competence, most students answered agreed at 57.8% while the answer did not agree equal to 29.8%. Students strongly agree as much as 10.6% and strongly disagree as much as 1.8%; (3) On the aspect of Relation, students agree most at 52.3% and strongly agree as much as 22.9%. Students answered disagree as much as 19.8% and strongly disagree as much as 5.3%; (4) On the calculation of SDT aspect, it is seen that for the most dominant aspects of the students answered agree; and (5) The relation aspect is superior to the aspect of autonomy and competence.

### 3.2. The elaboration of every aspect of the SDT in learning mathematics

The elaboration of every aspect of the SDT in learning math can be outlined as follows:

#### 3.2.1. Aspects of autonomy

In Table 3, the indicator on the recognition of the feeling of acting on their own accord, the students who responded agree as much as 49.4% this looks like some students are not depressed in the face of a math problem, students are free to express their ideas in solving math problems.

### Table 3. The percentage of indicators on
the recognition of the feeling of acting on their own accord

| Indicator                        | SA | A  | D  | SD |
|----------------------------------|----|----|----|----|
| Recognition of the feeling of    | 1  | 14 | 37 | 8  |
| acting on their own accord       | 11 | 38 | 10 | 1  |
| Total                            | 16 | 89 | 63 | 9  |
| The percentage                   | 8.9%| 49.4%| 35%| 5% |

Table 4. Percentage on the experience over the choice of indicators

| Indicator                        | SA | A  | D  | SD |
|----------------------------------|----|----|----|----|
| Choice over their own experience  | 3  | 37 | 19 | 1  |
| Total                            | 4  | 30 | 23 | 1  |
| The percentage                   | 5.8%| 55.8%| 35%| 1.7%|

In Table 4, the indicator of choice on their own experience, most students answered agree as much as 55.8%. It is seen that some students in learning mathematics or solving math problems have used his experience of prerequisite materials in accordance with the matter. This shows the students' material understanding is due to they still remember the previous mathematical material. So the teacher can improve this ability by giving the problem that can be represented in many ways.

Table 5. Percentage on the indicator of chance for the promoted direction

| Indicator                        | SA | A  | D  | SD |
|----------------------------------|----|----|----|----|
| The opportunity for the          | 2  | 24 | 33 | 0  |
| promoted direction               | 0  | 12 | 34 | 14 |
| Total                            | 2  | 36 | 67 | 14 |
| The percentage                   | 1.7%| 30%| 55.8%| 11.7%|

In Table 5, the indicator of opportunity for the promoted direction, most students responded not agree that is equal to 55.8%. It is seen in the learning process that students are less confident that they have potential in math so that teachers and friends recognize that talent in mathematics is more dominant. As a result, when told to explain to his friends, they are still shy and seemingly refused. This can be overcome by teachers motivate students more to dare to be wrong and convince them that there is great potential that can benefit themselves and others.

3.2.2. Aspects of Competence

Table 6. The percentage indicator of fighting power

| Indicator | SA | A  | D  | SD |
|-----------|----|----|----|----|
| Fighting power | 15 | 33 | 12 | 0  |
|           | 5  | 37 | 17 | 1  |
| Total     | 20 | 70 | 29 | 1  |
| The percentage | 16.7%| 58.3%| 24.2%| 0.8%|

In Table 6, the indicator of fighting the power, most students agreed are as much as 58.3%. This is seen though not all of the students, there are some students who have low fighting power in solving math problems. Most students who have the fighting power are students who have the ability to go higher. students always ask a friend who is smarter or ask the teacher.
Table 7. The percentage indicator of feedback

| Indicators            | Answers |
|-----------------------|---------|
|                       | SA      | A   | D   | SD    |
| Feedback              | 3       | 36  | 20  | 1     |
|                       | 2       | 42  | 14  | 1     |
|                       | 3       | 24  | 29  | 3     |
| Total                 | 8       | 102 | 63  | 5     |
| The percentage        | 4.4%    | 56.7% | 35% | 2.8%  |

On the Table 7, feedback indicator, most students answered agree as much as 56.7%. This is apparent in the learning process that most students who have the higher capability often do feedback to friends or teachers when facing difficulties in understanding the material or completing a math problem.

Table 8. Indicator percentage of awards

| Indicator      | Answers |
|----------------|---------|
|                | SA      | A   | D   | SD    |
| Awards         | 6       | 35  | 18  | 1     |
| Total          | 6       | 35  | 18  | 1     |
| The percentage | 10%     | 58.3% | 30% | 1.7%  |

In Table 8, the award indicator, students who answered agreed as much as 58.3%. This is seen in the learning process that students always do the cooperation in groups well, the students always solve the problem in accordance with the ability and receive feedback from teachers and friends well.

3.2.3. Relation Aspect

Table 9. Indicator Percentage of Confident Development

| Indicator                      | Answers |
|--------------------------------|---------|
|                                | SA      | A   | D   | SD    |
| Developing confidence          | 9       | 37  | 10  | 1     |
|                                | 18      | 34  | 7   | 1     |
|                                | 10      | 32  | 10  | 5     |
|                                | 2       | 10  | 35  | 10    |
|                                | 15      | 38  | 7   | 0     |
|                                | 19      | 35  | 3   | 2     |
| Total                          | 33      | 186 | 72  | 19    |
| The percentage                 | 24.3%   | 62% | 24% | 6.3%  |

In Table 9, confident development indicators, most students answered agreed as much as 62%. This is seen in the learning process that students interact well, have mutual care and friendliness among friends.

Table 10. Indicator Percentage of Relationship Fulfillment with Others

| Indicator                             | Answers |
|---------------------------------------|---------|
|                                       | SA      | A   | D   | SD    |
| Relationship fulfillment with others  | 27      | 28  | 6   | 1     |
|                                       | 6       | 30  | 20  | 4     |
| Total                                 | 33      | 58  | 26  | 5     |
| The percentage                        | 27.5%   | 48.3% | 21.7% | 4.2%  |

In Table 10, the indicator of the relationship fulfillment with others, most students answered agreed are amounted to 48.3%. This is seen in the learning that students are befriended with friends who are considered in accordance with their wishes. Although in general, they are all friends, for closer interaction students are grouped together.
4. Conclusion
The learning process requires students to always think conceptually, systematically and creatively. Students who have creative thinking skills will love the challenge of solving problems given by teachers. Students will use ideas freely but conceptually and systematically, so that will be a reliable problem solver. Habits of students in solving problems will affect the attitude and way of thinking in dealing with problems in everyday life. SDT is useful in the learning process because the three needs of autonomy, competence and relationships are needed in the learning process in the classroom. Learning that facilitates these three needs that are owned by students will turn them into human beings who have the character and can compete. This can increase the quality of creative and superior human resources.

References
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