Self regulated learning for social cognitive perspective in mathematics lessons

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Abstract. The research results describe of self-regulated learning for a social cognitive perspective in mathematics lessons. Students adapt to the social environment based on skills, knowledge, and skills previously owned. Every student in the social system adopts information and knowledge. Students learn through the social process of observing, imitating, and modeling the behavior of others. Students need to actively demonstrate independent learning orientation to find challenges and learning opportunities to acquire new skills and knowledge. About 116 new students from one of the state vocational high schools in West Java province of Indonesia participated in the self-regulated learning questionnaire from five aspects: organizations, elaboration, self-evaluation, learning strategies for examinations, and metacognition. We present responses to each self-regulated learning students about academic time management, summarized study materials in a personal way, evaluated their own learning and performance, were strategic in preparing for exams and reflected metacognitively during the study. From social cognitive theory, self-regulated learning is influenced by the students’ personal factors (cognitive, attitudes, and self-evaluation), behavior, and environment (social support). This research contributes to the understanding of students’ self-regulated learning and gives teachers insight into designing learning innovations.

1. Introduction

Individuals with superior quality can be established through education. The function of education is to develop the skills/abilities of human beings who have faith and piety, personality good, healthy physical and spiritual, knowledgeable, creativity, independence, and responsible. The role of teachers to improve the quality of education, including designing learning so that students get meaningful learning through an educational curriculum [1]. Besides, the Government’s efforts to improve the quality of education by establishing a standard of graduates are tailored to future needs based on the needs of the twenty-first century. These competencies can be developed through mathematical learning activities.

The aim of learning mathematics in secondary education according to ministerial regulation of education and culture [2] is that students can: (a) have a logical attitude, critical, analytical, creative, careful, thorough, responsible, responsive, and not easy to give up in solving problem (b) have curiosity, confidence, a passion for continuing to learn, reflective thinking, and an interest in mathematics; (c) have an attitude of belief in the usefulness of mathematics and the critical attitude of the results of learning interactions; (d) have an open attitude, objective, and respect the work of friends through group interactions or daily activities; (e) communicate mathematical ideas clearly and effectively; and (f) determine an effective problem-solving strategy, evaluate results, and make a solution.
The difference in the level of competency that students get affects the learning process, so the intensity of student learning experience is increasingly complex. The student's competence includes aspects of knowledge, attitudes, and skills [3]. Students' ability in the dimension of attitude reflects an attitude: (a) honest, disciplined, polite, caring, mutual, cooperation, tolerant, responsible, responsive, and pro-active; (b) diligence, advise, strengthen one another, and habituation continually; and (c) to be a problem solver through effective interaction with the social environment.

A theory of learning that states that individuals learn through observation of the behavior of others. The theory is social cognitive theory. This theory has the idea that many learning takes place in the social environment. From this theoretical perspective, human functions are seen as a result of the process of dynamic interaction between personal, behavioral, and environmental influences. This is the basis of the concept of Bandura on reciprocal determinism [4], indicating that (a) personal factors in the form of cognition, affect, and biological events; (b) behaviour; and (c) environmental influences create interactions that result in triadic reciprocality.

Bandura proposes only one internal principle consisting of three interacting elements. This principle is termed triadic reciprocality. Human behavior as a triadic, dynamic, and reciprocal interaction of personal factors, behavior, and the environment [5,6]. All three aspects are reciprocal, as shown in Figure 1.

![Internal principle of social cognitive theory](image)

**Figure 1.** Internal principle of social cognitive theory

Research conducted by [5] on behavior based on the theory of Bandura, suggests that: (a) conduct directed to specific objectives; (b) behaviour obtained from independent processes; and (c) cognition plays a role in learning. In social cognitive theory, learning is an internal mental process that does not necessarily appear to change immediate behavior [7]. Bell believes that the learning process will succeed when it is implemented in the form of learning activities [8]. This means that students gain learning experience by doing their own exercises. The important idea in social cognitive theory is that people are capable of self-regulation their thoughts, emotions, motivation, and actions. This suggests that self-regulation capability is important to have.

Self-regulation refers to the process by which people are able to conduct self-control and direct behavior, as well as to use their thoughts and actions to achieve their goals. Individuals who can govern and manage behaviors, thoughts, emotions and the environment will have academic achievements [9], [10]. So self-regulation behavior is very important to use in the learning process. Effective self-regulation is a cyclical process whereby individuals actively observe the surrounding environment, are able to strategize, be able to implement the plan, and monitor the outcome [11]. Without self-regulation, an individual cannot appreciate himself after successfully reaching the goal and would not maintain behavior until it could be reinforced.

2. Experimental Method
The study intends to obtain information on self-regulated learning of new students in the teaching of mathematics based on the social cognitive perspective. Therefore, this research includes qualitative research, as it explores and understands the meaning of several individuals derived from social problems [12]. Qualitative research is temporary and adjusted to the reality in the field continuously [13]. The research strategy used is case studies. The importance of this research is based on the basic assumption that (a) individuals learn by observing the behavior of others, as well as the human thought process is
central to understanding personality [7]; and (b) cognition plays an important role in learning and behavior eventually becomes self-regulated [5].

The subject of the research was new students from one of the state vocational high schools in West Java province of Indonesia in the study year of 2019-2020. The samples used in this study were students who were accessible to the researchers, namely students with the technical competencies of automotive lightweight vehicles as much as of 116 students, consisting of 109 male students, and 7 female students.

Data is derived from the results of self-regulated learning questionnaire. The statement used to measure self-regulated learning consists of 30 items adapted from [14]. Aspects measured include organization, elaboration, self-evaluation, strategies for learning for exams, and metacognition. The scale used in this study was the Likert scale. Furthermore, to determine the attitude classification of students used the criteria presented in the table below.

| Table 1. Self-regulated learning criteria |
|------------------------------------------|
| %        | Criteria       |
| 81 – 100 | Very high      |
| 61 – 80  | High           |
| 41 – 60  | Medium         |
| 21 – 40  | Low            |
| 1 – 20   | Very low       |

3. Result and Discussion

Respondents in this study were the new student with technical competencies of automotive lightweight vehicles. The new student entered through several registration lines, namely (a) the national exam value as much as 66%; (b) Economic groups are not capable as much as 28%; and (c) achievement as much as 6%. The following are presented early observations about self-regulated learning before they adapt to the new environment.

| Table 2. Early observations of new self-regulated learning students |
|---------------------------------------------------------------|
| Observed aspects | Description | Number of respondents |
| Daily learning time management | < 1 hour | 43 |
| | 1 – 2 hour | 48 |
| | 2 – 3 hour | 25 |
| Motivational sources of learning | Father | 19 |
| | Mother | 83 |
| | Other | 14 |
| The usual learning activities | Reread the subject matter | 54 |
| | Read the material for the next meeting | 29 |
| | Discuss with friends | 33 |
| Availability of home-study facilities | Internet | 65 |
| | Laptop | 15 |
| | Study room | 20 |
| | Another source book | 16 |

Based on the information from Table 2 that daily student learning habits for 1-2 hours. It shows students already have a good learning habit. Most of the students are motivated to learn by parents, especially their mothers. Students’ frequent learning activities is to reread the subject matter already given. In addition, the majority of students already have adequate learning facilities at home. Furthermore, parents’ role toward children’s development can be used for transactional analysis, how parents and children influence each other [15], [16]. Research on the role of parents earned the results that children have a tendency towards the value of career self efficacy depending on the type of work the parents [17]. This suggests that parental guidance greatly affects the socialization process.

The research results of every aspect of self-regulated learning are associated with the social cognitive theory model. In this model, reciprocal determinism suggests that: (a) personal factors in the form of
daily learning time management; (b) behavior in the form of daily learning habits; and (c) environmental in the form of a source of motivational learning and availability of home-study facilities. However, it takes enough time to determine what is the causal factor that can give you the influence and reciprocal.

In the discussion on socialization, people develop moral standards of various factors that influence [4].

A further description of the self-regulated learning measurement results is presented in the table below.

| Table 3. Description of self-regulated learning measurement |
|---------------------------------------------------------------|
| Indicator | Description | Percentage | Category |
|-----------|-------------|------------|----------|
| Organization | Time management | 65 | High |
| | Complying with rules | 66 | High |
| | Responsibility | 64 | High |
| Elaboration | Summarizes study materials | 56 | Medium |
| | Creating an analogy | 67 | High |
| | Create a generative note | 63 | High |
| Self-evaluation | Self-awareness | 64 | High |
| | Ability to monitor self-learning and performance | 61 | High |
| Strategies for studying for an exam | Monitor the entire material | 61 | High |
| | Independently test understanding through material questions | 60 | Medium |
| Metacognition | Monitor your own thoughts | 56 | Medium |
| | Evaluate the conformity of used procedures | 60 | Medium |
| | Identifying potential errors | 57 | Medium |

According to Table 3, shows that there is a difference in the category criteria on each self-regulated learning indicator. This can be influenced by differences in the outcome of students’ adaptation with the previous environment and the difference in its ability. The measurement results in accordance with the opinion that what people think, believe, and feel, will influence the behavior [4], [18].

Information about self-regulated learning can be used as a reference for teachers to design learning. Self-regulation is a dynamic and evolving element. Developmental is a life-long process [19]. Students will adapt to the new environment, so there will be changes in student attitudes. Some aspects that can last for a certain period of time, but some can change according to the situation for a moment [20].

Competence, self-efficacy, motivation and organizational commitment are individual factors that influence innovative work behavior [21]. Within the social cognitive perspective, social factors have an effect on cognitive development. The maturity factor and information from the experience contributes to cognitive growth. The idea of this theory is that one learns through imitation. In this case, there are three underlying assumptions [22]. First, individuals learn by imitating what is in their environment, especially behaviors. Secondly, there is a close relationship between individuals and their environment. Learning occurs through interactions between behaviors, individuals (cognitive), and the environment. Third, learning outcomes are stored in a visual form of behavior and are verbally implemented in everyday behavior.

Teachers play an important role in enhancing behavioral competencies. So the challenge is to improve the quality of students’ learning and trust in carrying out responsibilities. In this case, students must be able to solve the problem and integrate the relationships between previous knowledge and new knowledge [23]. Using social cognitive theory, teachers are required to: (a) improve emotional state, correct mistakes in self-beliefs and habitual thinking (personal factors); (b) improve academic skills and self-regulatory practices (behaviour factors); and (c) change the state of the schools and classrooms that could undermine the student’s success (environmental factors).
4. Conclusion
Individual behavior will grow and evolve consistently. The growth and development of such behavior as an effort to meet the needs and achieve its objectives. It is done to obtain a better and more effective quality of life. To achieve the expected behavior, the individual learns through self-experience, learns from others, and learns from the surrounding environment. The learning process is adapted to the social cognitive learning theory of Bandura. This theory is an important literature on the notion of role model behavior, which is an important factor in shaping individuals, creating interests, and self-experiences. The theory also emphasizes that learning behavior includes cognitive and social factors. From social cognitive perspective, self-regulated learning is influenced by the students’ personal factors (cognitive, attitudes, and self-evaluation), behavior, and environment (social support).

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