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In what level and how medical students use metacognition? A case from Hacettepe University

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Abstract

The aim of this study is to describe in what level and how medical students use metacognition. In the study, quantitative and qualitative methods were used together, by benefiting from descriptive method. The first three year (preclinic year) students of Hacettepe University, Faculty of Medicine participated to the study. In order to determine the metacognition level, Metacognition Scale was used and also 9 students were interviewed. In the metacognition scores, the differences were determined according to the phases and academic achievement levels but not gender and the curricular language. In the interviews, it's been observed that the students in the learning process go through similar cognitive stages. These stages are recalling knowledge, learning new information and ensuring the sustainability of learning.

Keywords: Metacognition; medical students; qualitative study; metacognition scale; achievement.

1. Introduction

Metacognition is the knowledge of the individual about his/her own cognition and its structure and operation. It is individual to be aware of own cognitive structure and learning characteristics (Senemoğlu, 1998). Metacognition is a form of cognition; it is a secondary and upper level thinking process including effective control over cognitive process. It can be simply defined as thinking how to think or cognition of the individual about his/her cognition (Wellman, 1985, as cited Gama, 2004). Metacognition usually means the individual who is aware of the boundaries of his/her own knowledge.

Explaining the metacognition concept and its differences from cognition is one of the main concerns. While cognition is being aware of a thing and understanding that thing, metacognition is not just understanding but also being aware of how that thing is learned. While metacognition includes knowledge and skills about cognition, cognition includes things in the real world and mental images (Bland, 2005). There are different models which try to explain metacognition. Besides the model of Flavell and Brown, there are also models directed towards the special properties of metacognition (for example knowledge about language structure, metacognition strategies for self-regulation during reading etc.) (Hacker, 1998; Gama, 2004).

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Metacognition plays an important role in verbal communication, verbal persuasion, reading comprehension, writing, language education, caution, memory, problem solving, social cognition and other kinds of self-control and self-instruction (Flavel, 1979). It's been stated that the individuals with the skill of metacognition are more efficient learners, display higher performance levels, use more strategies, organize their own learning better; and in some studies it's been stated also that there is a relationship between academic achievement and metacognition processes (Hammann and Stevens, 1998). The studies show that the metacognition strategies can be learned. Guiding the students in their experiences will enable the students to develop their metacognition strategies which they require for directing their own learning methods (Kincannon et al., 1999).

Metacognitive skills include taking control of learning consciously, selecting strategies and planning, monitoring learning process, correcting mistakes, analyzing the effectiveness of learning strategies and changing the learning strategies and behaviors when it is necessary. To be successful in medical professions, it is very important to be able to organize his/her own learning experiences. The aim of this study is to describe in what level and how medical students of Hacettepe University use metacognition.

1. Method

In the study, quantitative and qualitative methods were used together, by benefiting from descriptive method. In order to determine the metacognition level of the students, the data is collected using Metacognition Scale. Also qualitative data is collected to determine how the students use metacognition.

1.1. Subjects

The study was carried out with pre-clinical students (phases I, II and III) at Hacettepe University, Faculty of Medicine. In the 2005-2006 academic year in which the study was conducted, there were 903 students in total whose 470 are in Turkish stream and 433 are in English stream. The study tried to take into account all the pre-clinical students without taking any sampling. 89.7% of the students participated to the study (810 students).

Students were interviewed one to one in order to collect qualitative data. Convenient sampling method (İşçil, 1977) was used to determine the students who will be interviewed and 9 students were interviewed. For the students who will be interviewed to represent each phase and different achievement levels, 3 students were selected from each phase. 4 of the students who participated to the interviews are in English stream and 5 are in Turkish stream. 4 are men and 5 are women. In respect of achievement levels in the faculty of medicine, 3 of the students are A level, 5 of the students are B level and 1 of the student is C level.

1.2. Instruments

Metacognition Scale: In order to determine the metacognition levels of students, Metacognition Scale was prepared using the items of Metacognition Awareness Inventory (MAI) developed by Shraw and Dennison (1994).

To improve the scale, a preliminary study was conducted with the participation of 846 students. A factor analysis is performed with the data collected from this study. As a result of repeating the factor analysis by eliminating the high weighted items and items whose factor load value are lower than 0.45, in multiple factors; a structure with 6 factors which is composed of 28 items and which explains 54.55% variance was obtained. The results obtained from this analysis didn't include the sub-dimensions of the metacognition which were defined theoretically in the inventory of Shraw and Dennison (1994). When we examine the results generally, the facts of the scale to explain 33.62% of the explained variance in the first factor before the transformation and this percentage to rise up to 35.77% in the final analysis after the repetitions indicate that the scale demonstrates one dimensional structure. Also the items to be higher than the load values in Factor 1 (0.416 and 0.704) indicate that the scale has a structure with one factor.

For this reason, even though the items of the inventory developed by Shraw and Dennison (1994) were taken as the basis for the development of this scale, in this study a different scale was reached as a result of the scale development. Unlike the original study, the scale improved in this study has 28 items and one dimension. Each item is rated on a five- point Likert scale.

In the preliminary study Cronbach α was found as 0.93 and it was found as 0.91 in the study.

Achievement Test: In order to determine the academic achievement level, the averages of the scores the students get from committee exams in the academic year 2005-2006 were calculated. The reliability of these exams varies between 0.71 and 0.95. The scores of the exams are announced to the students in letter system. In this system A means excellent, B means good, C means average and F means failure.

Metacognition Skills Interview Form: There are 6 main questions and sub-questions in the semi-constructed interview form. The questions were determined by benefiting from the literature and the opinions of the experts. The first 4 questions were prepared to reveal the cognitive activities of the students during the learning process in their final lesson. The form was prepared to include these four questions at the beginning. After the form was prepared 2 experts were consulted about this form and a trial application was conducted with two students. Since it's seen that the questions fall short in revealing the cognitive processes during this interview, two more questions were added. The added questions were aiming to reveal the cognitive activities about learning while studying to the exams.

1.3. Data Collection Process

The study was conducted in the last committee of the academic year 2005-2006. The information about the study was forwarded to the students by teachers and their consents for participation were taken. The subject was told to the students by visiting them in their lecture hall and their participation to the interview was requested. The interview started by explaining the aim of the interview and the approximate amount of time it will take. The consents of the students were requested about using a recorder after underlying the fact that their names will be kept anonymous. All the questions in the form were asked to the students during the interview, but the order of the questions was not strictly followed. The interviews lasted between 40 and 60 minutes.

1.4. Statistical Analysis

Whether the metacognition scores of the students change depending on gender and curricular language was determined using t-test; and whether these scores change depending on phases and academic achievement was determined using one way analysis of variance. Thematic coding was used for the analysis of the qualitative data.

2. Results and Discussion

In the scores that the students get from metacognition scale, the differences were determined according to the phases and academic achievement levels but not gender and the curricular language. The scores of the phase III students were much lower. The scores of the students who have higher academic achievements were higher (Table 1).

The experienced students can perform the comprehension and recalling, and monitoring and evaluation phases automatically by themselves. For this reason, even though individuals use metacognition knowledge and skills during the learning process, sometimes they may not be aware of this fact since strategies are automatically formed, and therefore they cannot define the metacognition knowledge (Hacker, 1998; Sperling et al., 2002; Gama, 2004). It's been stated that monitoring thought and awareness are not distinguished from the organization of thought in many cases, but in cases where the skill is automatically applied, the need for conscious awareness, monitoring, organization or metacognition can decrease (Manning and Glasner, 1996). The fact that the metacognition level and performance awareness are low in the term III students defined in this study can be resulted from the fact that these students are much more experienced in the medical training and so these processes are performed by themselves automatically.

Some of the studies in this subject analyzed the relationship between achievement and metacognition, and obtained different results. In two studies that used Metacognition Inventory, a relationship between sub-dimension of metacognition knowledge in this inventory and achievement levels was found (Shraw and Dennison, 1994; Hammann and Stevens, 1998). The studies which analyzed metacognition together with the use of strategy also determined a relationship between metacognition and achievement (Symons and Reynolds, 1999; Kincannon et al., 1999; Cartier et al., 2001). In the study of Altındağ (2008) which was conducted together with the students who study classroom teaching and middle school science and math teaching, a significant relationship between metacognition scores and academic achievement averages was determined. In the contrary of all these finding, Hsu

(2001) and Sperling et al. (2004) didn't determine a relationship between metacognition and academic achievement in their studies that are conducted using Metacognition Inventory. And in this Hacettepe study the idea that academic achievement has a relationship with metacognition is supported.

In the interviews of the study, it's been observed that the students in the learning process go through similar cognitive stages. These stages are recalling knowledge (remembering), learning new information and ensuring the sustainability of learning. Monitoring and controlling metacognition in these stages can be summarized as follows by using the findings of the interviews. Generally participating to the lecture is a start for learning and there is no preliminary preparation. And this start causes the individual to recall his/her own knowledge about the subject. Then what to learn and which methods to use for learning these are decided. By using these methods, the learning is tried to be achieved and whether the learning is actualized or not is evaluated. According to the result obtained from this evaluation, learning process starts again if there are gaps in knowledge or an effort is made to ensure the sustainability of this structure until new items are added. It's been observed that the interviewed students monitor their cognitive processes by judging learning and control their learning process by applying the decisions they made as a result of this monitoring. To organize cognitive activities in learning, judgments are made about the ease of learning process, judgment of learning and its sustainability during and after the learning process.

Table 1. Students Mean Scores of Metacognition According to Their Characteristics

	Mean	Standart Deviation
Gender		
Women (n=348)	100.62	11.84
Men (n=449)	99.91	14.04
t-test	t=0.75; p>0.05	
Curricular language		
Turkish (n=452)	100.32	13.12
English (n=423)	100.02	13.21
t-test	t=0.31; p>0.05	
Phase		
I (n=210)	102.49	12.66
II (n=278)	100.77	13.34
III (n=315)	98.11	13.05
Analysis of variance	F=7.51; p<0.01	
Different groups	Phase I-Phase III p<0.01. Phase II-Phase III p<0.05	
Academic achievement		
F	96.67	11.84
C	98.23	14.50
B	99.44	11.88
A	105.33	13.12
Analysis of variance	F=11.94; p<0.01	
Different groups	A-F, A-C, A-B p<0.01	

3. Conclusion and recommendation

In the scores that the students get from metacognition scale in this study, the differences were determined according to the phases and academic achievement levels but not gender and the curricular language. Also the routes the students take in monitoring and control of metacognition was described. The hope is that these findings will lead the guidance to students. The relationship between academic achievement and metacognition indicates that this guidance will contribute positively to the students.

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