

Analysis of Metacognitive Awareness of Primary and Secondary School Students in Terms of Some Variables

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Abstract

Metacognition is important for learners of all ages. Therefore, this situation raises all important questions about how to develop metacognitive skills and habits in the classroom regardless of primary, secondary and high school. The aim of this study is to investigate the metacognitive awareness of primary and secondary school students according to the variables of gender, grade level and region. The model of this research, which was conducted to determine the metacognitive awareness levels of the students in primary and secondary school, is a survey model. Metacognitive Awareness Scale was administered to 399 students (195 girls, 204 boys) in third, fourth and fifth grade. The research shows that the metacognitive awareness scores of primary and secondary school students do not differentiate in gender. According to another result obtained in the research; metacognitive awareness scores of primary and secondary school students differentiate in locality. The students' metacognitive awareness is higher than that of the urban local. When the metacognitive awareness scores were examined according to the grade level, it was seen that the metacognitive awareness scores of the fifth grade students were higher than the other groups. However, there is no significant difference between the metacognitive awareness scores of the third and fourth grade students. Similar studies aiming to examine the development of metacognitive awareness of students are thought to be useful in planning the education process in this direction.

Keywords: metacognition, metacognitive awareness, primary education, secondary education

1. Introduction

The concept of metacognition was developed by Brown and John Flavell about 40 years ago (Lin, 2001). Flavell defined metacognition as the knowledge of one's own cognitive processes (Crain, 1988). This process includes information about when one understands and does not understand, or how one uses existing knowledge to reach a goal, and develop a problem-solving strategy (Gourgey, 1998). Likewise, Costa (1984) defines metacognition as the ability to know what one does not know. Costa also states that some people are unaware of their own thinking processes. Such people cannot explain the steps or strategies they use during the problem-solving action. They cannot verbalise the visual images in their minds. They rarely evaluate the quality of their thinking skills (Ganz & Ganz, 1990). Dirkes (1985) states that students who direct their own thinking generally do three things: associate their previous knowledge with new knowledge, identify thinking skills to solve a problem, and manage their time for learning purposes (Ganz & Ganz, 1990). Dirkes defines this awareness of students as metacognition. This awareness affects the understanding of what is learned and how the new knowledge can be used to solve a problem, as well as development of effective learning, development of critical thinking and problem-solving skills. Metacognitive awareness allows thinking and thinking on learning processes and products, and its control over learning and self-assessment.

Metacognition is important for learners of all ages. Therefore, this raises all important questions about how to develop metacognitive skills and habits in the classroom. The first thing that needs to be done is to ensure that students have the opportunity to practice their metacognitive skills in the classroom and face situations that require metacognition. Students should be aware of the meaning and importance of metacognition, and capacity building should be a clear goal for both the teacher and the student. Indeed, this goal should have a permanent place in the education process (Martinez, 2006).

Metacognition is divided into sub-scales because it is a multi-faceted concept. The first classification was made

by Flavell who introduced the concept of metacognition and he claimed that metacognition consisted of two sub-dimensions: metacognitive knowledge and metacognitive control. Brown (1987), another researcher working mainly on metacognition, categorised metacognition as cognitive knowledge and cognitive regulation. The literature shows that there are different classifications. However, over time, these classifications became clear and a consensus has been reached on two sub-scales: metacognitive knowledge and metacognitive control (Ozsoy, 2008).

Metacognitive knowledge is what one knows about how the cognitive processes take place (Flavell, 1979; Pintrich, 2002). In other words, it is the information that a person needs to perform a task successfully. For instance, the individual's awareness of one's cognitive abilities (ability to say that his/her memory is not good); the cognitive strategies one uses (to develop his/her own methods to easily remember phone numbers) and to know how to behave in which situation (knowing that categorized information can be remembered more easily) (Tanner & Jones, 2000; cited in Ozsoy & Gunindi, 2011).

Metacognitive knowledge is also divided into three sub-skills: declarative knowledge, procedural knowledge and state of knowledge. Declarative means having an idea about the information one possesses; procedural knowledge means knowledge of how to do a given task. In other words, a person knows what information he/she should use in the case of a problem. State of knowledge is defined as knowing when and what information to use (Schraw & Mosshman, 1995).

Many studies show that successful students have all three different types of knowledge. Many theorists argue that metacognitive knowledge has started to develop in children at an early age and continues to develop in adolescence (Schraw & Mosshman, 1995).

Metacognitive control consists of basic mental processes and is described as the ability to use metacognitive information strategically to achieve cognitive goals (Ozsoy, 2008). In other words, it is a series of activities that help individuals control their own learning (Schraw, 1998). It consists of three sub-skills: planning, monitoring and evaluation (Jacobs & Paris, 1987).

Planning involves selecting strategies that are appropriate to the problem and arranging solution resources that affect success, for example, to make predictions before reading, to determine the appropriate reading comprehension strategy (Schraw, 1998). Monitoring is one's potential and ability of using skills when dealing with a topic during the cognitive process.

People regularly follow their own development during the learning process (Ozsoy & Gunindi, 2011). Self-testing at certain intervals during the learning process, checking the learning level in the process are some examples of monitoring skills (Pressley & Ghatala, 1990). The evaluation skill is aimed at whether the result appropriate to the learning objective reached at the end of the process (Schraw, 1998). In other words, it is about being aware of how efficient learning is.

High metacognitive awareness of students plays a significant role in quality education process. It is expected that identifying the metacognitive awareness of primary and secondary school students will be useful in the evaluation of current education. Therefore, the research aimed to compare the metacognitive awareness levels of primary and secondary school students according to the variables of gender, grade and locality of study. The study seeks to answer following research questions:

- 1) Do the metacognitive awareness levels of primary and secondary school students differ according to gender?
- 2) Do the metacognitive awareness levels of primary and secondary school students vary according to the locality variable?
- 3) Do metacognitive awareness levels of primary and secondary school students differ according to grade variable?

2. Method

The relational survey model as one of the quantitative research methods was used in the research. The relational survey model aims to determine the presence or degree of change between two and more variables (Cohen, Manion, & Morrison, 2000). Relational survey can be done in two ways: correlation and comparison. Correlation-type relationships are sought in order to find out whether the variables change together if there is a change. Comparison type is a research design that has no trials but is close to it (Karasar, 2005).

2.1 Sample Group

The study group consists of primary school 3th and 4th grades and middle school 5th grade students receiving education in the 2018–2019 academic year. The study group was chosen by the purposeful criterion sampling

method. In the case of the criterion sample, all conditions are studied within the criteria previously prepared by the researcher (Yıldırım & Şimşek, 2006). Attributes related to participants are presented in Table 1 and Table 2:

Table 1. Information about the demographic characteristics

Demographic Characteristic	f	%
Girls	195	48.9
Boys	204	51.1
Total	399	100.0

Table 2. Information about the participant types

Participant Types	f	%
3 th grade students	114	28.6
4 th grade students	151	37.8
5 th grade students	134	33.6
Total	399	100.0

Table 3. Information about the locality

Locale	f	%
Rural	232	58.1
Urban	167	41.9
Total	399	100.0

2.2 Collection of Data

Jr MAI scale developed by Sperling et al. (2002) was used in this research. The scale aims to identify the children's metacognitive awareness. The scale is based on Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994) for adults and consists of two forms. The adaptation of the scale into Turkish was done by Karakalle and Sarac (2007) and it was named Metacognitive Awareness Scale for Children: Forms A and B.

Form A has 3-point Likert style questions with the options of 'always, sometimes and never.' B form has 5-point Likert style question (never, randomly, sometimes, frequently, always). The lowest score for form A of the scale is 12, the highest score is 36, while the lowest score for form B is 18 and the highest is 90 (Karakalle & Sarac, 2007). Since the study was conducted with third, fourth and fifth grade students, the form A was used.

2.3 Data Analysis

SPSS 18.0 was used to analyse the data. The t-test for independent groups was utilised to examine the scores of the students from Metacognitive Awareness Scale according to the variables of gender and region of study. One-way analysis of variance (ANOVA) was used to conduct the analysis of grade variable. Before the parametric tests, it was examined whether the study group showed normal distribution (skewness and kurtosis values). The Skewness values were found to be -.314 and kurtosis was calculated as -.321. Since the values are between -1 and +1, there is a normal distribution. Levene test was applied to test homogeneity which is the other assumption of parametric tests. According to gender, region and grade variables, p value was higher than .05. Based on these findings, parametric tests were used for data analysis.

3. Findings

When the metacognitive scale total scores of the 3rd, 4th and 5th grade students were examined, it was observed that they were in the general middle-to-high level (\bar{x} = 26.67, S = 4.84).

3.1 Findings of Metacognitive Awareness Levels of Primary and Secondary School Students in Terms of Gender Variable

Table 4 presents the metacognitive awareness of primary and secondary school students in terms of gender variable.

Table 4. Results showing significance of difference between means of scores of metacognitive awareness of students based on gender

Gender	N	\bar{x}	Ss	T	p
Girls	195	26.90	4.67	.91	.36*
Boys	204	26.46	5.00		

When Table 4 is examined, it is seen that the mean scores of metacognitive awareness of female students are ($\bar{x} = 26.90$), while the mean score of male students is ($\bar{x} = 26.46$). When the difference between the mean scores of metacognitive awareness scores of the two groups was checked with t test ($t = .91$) it was concluded that there was no significance.

3.2 Findings of Metacognitive Awareness Levels of Primary and Secondary School Students in Terms of Locale Variable

Table 5 presents the metacognitive awareness of students according to the locale variable (rural vs urban)

Table 5. Results showing significance of difference between means of scores of metacognitive awareness of students based on locality

Locale	N	\bar{x}	Ss	T	p
Rural	167	24.99	5.22	-6.15	.00*
Urban	232	27.88	4.15		

Table 5 presents that mean scores of metacognitive awareness of the students. The mean scores of students in rural areas is ($\bar{x} = 24.99$) while the average score of the students studying in urban areas is ($\bar{x} = 27.88$). When the t-test ($t = -6.91$) was used to check whether the difference between the metacognitive awareness scores of the two groups according to the region of study was significant, it was found to be significant at .05 level. In this case, the metacognitive awareness level of the students studying in urban areas is significantly higher than the students studying in rural areas.

3.3 Findings of Metacognitive Awareness Levels of Primary and Secondary School Students in Terms of Grade Level Variable

Table 6 presents the metacognitive awareness of the students according to the grade variable.

Table 6. Results showing significance of difference between means of scores of metacognitive awareness of students based on grade variable

Class Level	N	\bar{x}	Ss
5 th Grade	134	28.15	3.92
4 th Grade	151	26.29	5.49
3 th Grade	114	25.43	4.49
Total	399	26.67	4.84

As seen in Table 6, metacognitive awareness of 5th grade students is ($\bar{x} = 28.15$); 4th grade is ($\bar{x} = 26.29$) and 3rd grade is ($\bar{x} = 25.43$).

Table 7. One-way ANOVA results of primary and secondary school students' metacognitive awareness scores in terms of grade variable

Dependent Variable	The source of the variance	Sum of Squares	S.D.	Mean of Squares	F	P
Grade	Within Groups	489.925	2	244.962	10.952	.00*
	Among Groups	8857.369	396	22.367		
	Total	9347.293	398			

Note. *p<0.05.

According to Table 7, there was a significant difference in metacognitive awareness scores ($F = 10.952$) of primary and secondary school students in terms of grade level variable. Tukey HSD test was performed to

determine the source of the differentiation and the results are given in Table 8 below.

Table 8. Tukey HSD test results regarding metacognitive awareness scores of primary and secondary school students in terms of grade level variable

	Grade		Difference of Mean Scores	Standard Deviation	p
Metacognitive awareness	5 th Grade	4 th Grade	1.85(*)	.56	.003*
		3 th Grade	2.71(*)	.54	.000*
	4 th Grade	3 th Grade	.85	.61	.413

Note. *p<0.05.

There was a significant difference at the level of 0.5 between the metacognitive awareness scores of the 5th grade and the 4th grade students. Metacognitive awareness of 5th grade students is significantly higher than the metacognitive awareness of 4th grade students. There was also a significant difference (0.5) between the metacognitive awareness scores of 5th and 3rd grade students. Metacognitive awareness of 5th grade students is significantly higher than the metacognitive awareness of 3th grade students. There is no significant difference between the metacognitive awareness scores of the 4th grade students and the metacognitive awareness scores of the 3th grade students.

4. Discussion and Conclusion

The aim of this study was to examine and compare the metacognitive awareness levels of primary and secondary school students in terms of gender, locality and grade variables. The participants of the research were 232 students studying in three primary and two secondary schools in Konya city center and 167 students studying in 2 primary and 2 secondary schools in Cumra and Akoren districts of the city center.

The data collection tool of the research was Jr. MAI Scale developed by Spering, Howard, Miller and Murphy (2002) to determine the metacognitive awareness of children. The scale was adapted to Turkish by Karakalle and Sarac (2007) and re-named as Metacognitive Awareness Scale for Children: Forms A and B. There has been several research on metacognitive awareness in Turkey and majority of this research use Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison in 1994.

When literature is examined, various researches about metacognitive awareness have been done (Akin, 2006; Aktag, Semsek, & Tuzcuoglu, 2017; Bagceci et al., 2011; Baykara, 2011; Demirsoz, 2010; Emrahoglu & Ozturk, 2010; Kramarski, 2004; Gul et al., 2015; Gursimsek et al., 2009; Kiremitci, 2011; Pilten, 2008; Turan & Demirel, 2010; Yavuz, 2009).

In this research, it was examined whether the metacognitive awareness levels and metacognitive awareness of the students showed significant differences according to various variables. Yavuz (2009), Demirsoz (2010) and Gul et al. (2015) by gender; Akin (2006), Emrahoglu and Ozturk (2010), Bagceci et al. (2011) according to the academic achievement of students; Ozsoy & Gunindi (2011) stated that pre-school teachers' age, education level and high school type; Dilci and Kaya (2012) class teachers according to age, gender, marital status, seniority, graduation status and the school variable they graduated; Emrahoglu & Ozturk (2010) and Turan & Demirel (2010), according to the academic achievement of students; Kramarski (2004), Gursimsek et al. (2009), Pilten (2008), Kiremitci (2011) according to problem solving skills; Baykara (2011), on the other hand, investigated whether the metacognitive awareness of the students showed a significant difference according to their teacher competence perceptions.

There are very few metacognitive awareness studies conducted with primary school students (Gursimsek et al., 2009; Ozsoy & Gunindi, 2011; Dilci & Kaya, 2012; Baysal et al., 2013). Therefore, it is thought that this research will contribute to the literature as it is one of the few metacognitive awareness studies conducted with small age groups.

The results show that metacognitive awareness scores of primary and secondary school students do not differ significantly according to gender. This result echoes the findings of Kapucu & Oksuz (2015). Kapucu and Oksuz study with 448 secondary school students; they concluded that their metacognitive awareness did not change between male and female students. In a similar study, Saracoglu & Cengel (2013); gender factors concluded that metacognitive awareness was not predictive variable. Similar results have been obtained in many studies conducted in Turkey and abroad (Veloo et al., 2015; Rahman et al., 2010; Jaleel & Premachandran, 2016).

The research also shows the metacognitive awareness scores of the students differ significantly according to the

locality (rural vs urban) they are studying. Metacognitive awareness scores of the students studying in the urban areas were higher than those of the students studying in rural areas. This may be explained by the factors such as the students in urban areas are in a more active educational environment and encountering more stimuli. In a similar study (Jaleel & Premachandran, 2016), contrary to the results obtained in this study, no significant difference was found according to locality. In Turkey, due to the lack of a similar study by locale variable, the results cannot be compared. However, a more in-depth review in another study would be useful to identify the sub-causes of this result.

When the metacognitive awareness scores of the students were examined according to the grade level, which is another sub-question of the research, it was seen that the metacognitive awareness scores of the fifth-grade students were higher than the third and fourth grade students. However, there was no significant difference between metacognitive awareness scores of third and fourth grade students. While the levels of metacognitive development are less active during the primary school period, the students' awareness about how much they will learn and how to effectively use what they have learned at the secondary school increases. In the studies conducted on metacognitive awareness and grade level, results were obtained in parallel with the results obtained in this study (Ozturk & Kurtulus, 2017; Ozdemir & Arik, 2018).

If one aim of schooling is to prepare children to be lifelong learners, then it is important to help students become aware of themselves as learners and to take control of their own activities. It is possible for students to know themselves and to take control of their learning activities by gaining metacognitive awareness. The students who gain metacognitive awareness are also conscious individuals who know what they learn and why and how to use the information they learn. In this context the investigators got an interest in the area metacognitive awareness.

Therefore, the research aimed to compare the metacognitive awareness levels of primary and secondary school students according to the variables of gender, grade and locality of study. Based on the results obtained, the following suggestions can be made;

- Education and training process; both should be designed to enable students to think about themselves and to develop an awareness of themselves.
- Teachers should know that students' individual metacognitive awareness differs and regulate the classroom environment in this direction.
- In addition, innovative teaching methods and activities should be applied to identify and develop students' metacognitive awareness.
- The performance and academic achievements of the students who developed their metacognitive abilities will improve in the same direction.

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