International J. Soc. Sci. & Education
2013 Vol.3 Issue 4, ISSN: 2223-4934 E and 2227-393X Print

Metacognitive Awareness and Achievement Focused Motivation as the Predictor of the Study Process

By

Etem Yeşilyurt
Department of Education Science, Mevlana University, Konya, Turkey.
eyesilyurt@mevlana.edu.tr etemyesilyurt@gmail.com

Abstract

There is a large cycle of works on regarding metacognitive awareness, motivation and study process of pre-service teachers. However, no study has been found that has been conducted on the correlation among effect of metacognitive awareness, achievement focused motivation and study process and their explaining ratios of each other. The level of correlation and the effect of the metacognitive awareness, achievement focused motivation and study process with each other and explaining ratios of each other have been tested in this research. For this, five hypotheses were developed. The participant group in the research consists of 510 pre-service teachers in the Faculty of Vocational Education at Selcuk University and the Faculty of Education of Afyon Kocatepe University in the spring semester of the 2010-2011 academic year. The relational survey model was utilized while conducting the research. This research is done by using the metacognitive awareness, achievement focused motivation and study process scale. Exploratory factor analyses of scales were analyzed via SPSS 16.0 software. For the confirmatory factor analyses of scales and the structural equation modeling, AMOS 17.0 software was used. The fit index of the model built was obtained as follows. RMSEA=.054; SRMR=.052; CMIN\DF=2,501; GFI=.965; CFI=.956; AGFI=.923; NFI=.911 and p=.000. This result illustrates that the model fit index is at an acceptable and desired level. The most significant finding of this study is that metacognitive awareness and achievement focused motivation are important predictors of the study process.

Keywords: *Metacognitive awareness, achievement focused motivation, study process, structural equation modeling.*

1. Introduction

The rapid development of science changed the quality of education along with it. This situation also paved the way for transitioning from teacher-centered education, which is the traditional understanding of education, to student-centered education. Critical, creative and reflective thinking of the student, learning by doing and experiencing, and active participation in the teaching process are present among the general objectives of student-centered education. In addition, students utilizing their metacognitive awareness, possessing motivation and regulating their own study processes are also among the crucial components of student-centered education.

Metacognitive beliefs, metacognitive awareness, metacognitive experiences, metacognitive knowledge, upper memory, metacognitive skills, high-level skills, metacognitive components and self-regulation are some terms related to metacognition (Veenman, Hout & Afflerbach, 2006).

The term metacognition was first brought to the literature by John Flavell (1976). According to Schraw and Dennison (1994), metacognition is defined as thinking well, understanding and controlling one's learning. Flavell covered metacognition in two main categories in the form "knowledge of cognition" and "regulation of cognition". However, in time, other researchers (Brown, 1987; Flavell, 1987; Jacobs & Paris, 1987) extended these categories and determined sub-components. Knowledge of cognition was separated into components in the form of definitional (statement), methodological (process) and situational knowledge. In addition, regulation of cognition was categorized as planning, knowledge

management strategies, observation (self-monitoring), debugging (repair) strategies and regulative skills including assessment. According to Caliskan (2010), a student who is able to use his/her metacognitive awareness thinks about what he/she knows about the subject that he/she is going to learn, plans how much time he/she needs to learn the subject and the study processes. Moreover, metacognitive awareness appears as an important factor in the formation of motivation.

There are studies which demonstrate that cognitive domain skills as well as affective domain skills play a significant role in instructional environments for the academic achievement of the student (Duit & Treagust, 2003; Lee, Brophy, 1996; Thompson & Mintzes, 2002; Weaver, 1998). In this context, motivation is recognized among skills that appear in the affective domain (Morgan, 1984). Basically, motivation can be defined as the direct energy of human capacity to achieve the aim. Motivation, which is a general concept, assumes different names according to its function. One of them, achievement focused motivation, can be described as "the endeavor for being able to competent in activities that entail effort" (Eliot & Church, 1977 cited by Schunk, 2009) or "a student's adjustment of his/her time and energy to achieve his/her goal, whose standard was determined by him/her" (Ulgen, 1994). Motivation in general and achievement focused motivation in particular affects an individual's learning, performance, study level and processes by influencing his/her learning strategies and cognitive process, guiding the individual to certain targets and enabling him/her to keep on in these activities (Ormrod, 1999).

Study processes are separated into two categories as deep and surface learning. According to Enwistle (1987; cited by Oner, 2008, 50), the general features of deep and surface learning are as follows:

Deep Approach	***Surface Approach***
To be willing to understand the subject	*To be willing to complete the subjects that one is obliged to*
To be able to establish a dialogue more comfortably	*To memorize the information required for lessons*
To base new ideas on previous knowledge accumulation	*Fails to separate principles from examples*
To apply knowledge, ideas in daily life	*To regard subjects as an external effect for oneself*
To conclude an existing situation	*Focusing on independent points without being able to establish connection among subjects*
To be able to grasp the logic of the discussion	*Not being able to reflect on or determine the strategy to achieve the objective*

Surface learning puts forward low-level learning products, deep learning puts forward high-level learning products (outputs) (Trigwell & Prosser, 1991). Marton and Saljö (1976a, 1976b) examined the learning approaches of students in a study which they conducted regarding study processes. As a result of this study, it appeared that students better understand what they read, and give better answers to questions in the deep learning approach in which comprehending the meaning predominates, rather than in the surface learning approach, in which memorization is predominant. Besides, research studies carried out on this subject (Ramsden, 2003; Rollnick, Davidowits, Keane, Bapoo & Magadla, 2008) put forth that deep learning has more influence on a student's academic achievement.

While the memorizing-remembering process aims to generate meaning for the student who learns knowledge via deep learning, this situation refers to the end of the learning process for the student in surface learning. While a deep learning approach rests on the student's active restructuring and formation of knowledge, readily presenting information to the student by the teacher is the case in a surface learning approach (Dart, Burnet, Purdie, Boulton-Lewis, Campbell & Smith, 2000). Consequently, surface learning refers to the approach in which a teacher-centred teaching strategy via presentation is used predominantly; deep learning refers to the approach in which a student-centered research-examination strategy is used predominantly.

Many research studies have been conducted on metacognitive awareness of students (Annevirta & Vauras, 2006; Balcikanli, 2010; Barnert, 2006; Batha & Carroll, 2007; Corlis, 2005; Dean, 2004; Desoete, Roeyers & Clercq, 2003;Garrett, Mazzocco & Baker, 2006; Ge & Land, 2003; Ozcan, 2007; Pifarré & Cobos, 2009), their motivation (Fergusson, 2003; Hart, Stasson, Mahoney & Story, 2007; Madran, 2006; Selvarajah, Chelliah, Meyer, Pio & Anurit, 2010; Vansteenkiste, Lens & Deci, 2006; Wang & Liu, 2008) and their study processes (Chalmers & Fuller, 2009; Jansen & Bruinsma, 2005; Mayya, Rao & Ramnarayan, 2004; Premuzic & Furnham, 2008; Segers, Gijbels & Thurlings, 2008; Turmo, 2004; Wilson & Fowler, 2005). However, no study has aimed to take into account metacognitive awareness, achievement focused motivation and the study process together and put forward their level of effect and the state (variance) of causality for each of them. Furthermore, the level and ratio of effect and causality ratio of one or more independent variables on one or more dependent variables can be detected by beginning to use high-level analysis softwares (such as AMOS, Lisrel) in the social sciences.

In this direction, hypotheses developed to test the effect of metacognitive awareness, achievement focused motivation and the study process on each other and their ratio of causality of each other based on theory are presented below. In addition to this, path diagram related to the hypothesis of this study is shown in Figure 1.

H1: Metacognitive awareness of pre-service teachers (teacher candidates) affects achievement focused motivation positively and significantly.

H2: Metacognitive awareness of teacher candidates contributes significantly to achievement focused motivation.

H3: Metacognitive awareness of teacher candidates affects the study process positively and significantly.

H4: Teacher candidates' metacognitive awareness and achievement focused motivation together affect the study process positively and significantly.

H5: Teacher candidates' metacognitive awareness and achievement focused motivation together significantly contribute to study process significantly.

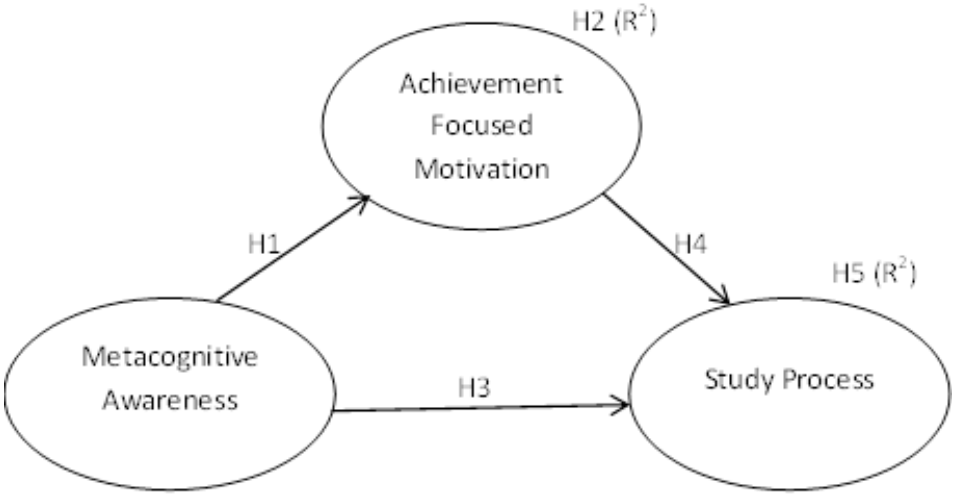

Figure 1. Path diagram related to study hypothesis

2. Method

Research Model

The relational survey model was utilized while conducting the research. The relational survey model is a research model that aims to determine the presence and extent of covariance among two or more variables (Karasar, 2012). In this context, the effect of teacher candidates' metacognitive awareness,

achievement focused motivation and the study process on each other and their level of causality of each other are dwelt upon in this research.

Participants

The participant group in the research consists of 510 teacher candidates who receive education at the level of third and fourth years in the Faculty of Vocational Education at Selcuk University and the Faculty of Education of Afyon Kocatepe University in the spring semester of the 2010-2011 academic year. As structural equation modelings are based on the significance of differences in covariance matrix and tests susceptible to the number of participants, the number of participants should be more than 200 when such models are built (Bayram, 2010). Due to the fact that the number of research participants consists of 510 people, this figure is appropriate for the research objective and statistical analysis. Demographic attributes of participants are as follows: 74.5% of participants are women (f=380) and 25.5% are men (f=130) in terms of gender. 67.4% of participants (f=330) receive education at the Faculty of Education of Afyon Kocatepe University and 35.3% (f=180) receive education at the Faculty of Vocational Education at Selcuk University. In terms of the level of year studied, 83.1% (f=424) of participants receive education at the third-year level, 16.9 (f=86) receive education at the fourth-year level. In terms of program type studied, 33.7% (f=172) of participants receive education in the department of pre-school teaching, 25.3% (f=129) receive education in the department of classroom teaching, 19.0% (f=97) in the department of social studies teaching, 13.1% (f=67) in the department of Turkish teaching and 8.8% (f=45) receive education in the department of child development teaching.

Data Collection Process

Permission was obtained from scale owners for using scales in line with the research objective and participants voluntarily attended the scale implementation process. The goal of the scales and form of implementation was explained to the participants. Scales were implemented between 01-30 May 2011. The scale implementation period lasted 23 minutes on average per person.

Data Analysis

The data obtained were first entered in the SPSS 16.0 software package and the demographic characteristics of the participants and exploratory factor analyses of scales were analyzed via this software. For the confirmatory factor analyses of scales and the model, I used AMOS 17.0 programs. The maximum likelihood estimation method was used to estimate model parameters in confirmatory factor analysis. Root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), goodness of fit index (GFI), comparative fit index (CFI), adjusted goodness of fit index (AGFI), normed fit index (NFI) and chi-square / degrees of freedom (X2/sd = CMIN/DF) and level of significance (p) fit indexes were taken into account in the evaluation of the model goodness of fit. With RMSEA value being between 0-0,08; SRMR value being between 0-0.10; GFI value between .90-1.00; CFI value between .90- 1.00; AGFI value between .85-1.00; NFI value between .90-1.00; X2/sd (CMIN/DF) value between 0-3and p value being between 0.01-0.05 show good fit indexes (Bayram, 2010; Byrne, 2001; Joreskog & Sorbom, 1993; Kline, 2005; Schermelleh-Engel & Moosbrugger, 2003; Reisinger & Mavondo, 2006; Simsek, 2007). The lower boundary of factor loads in exploratory and confirmatory factor analysis was accepted as .30. If there is a limited number of items in a scale prepared in the field of social sciences, boundary value can be reduced to .30 for factor load. Moreover, if an item whose factor load is below .30 considerably affects the content validity of the scale; in this case analyses can be conducted without omitting the respective item from the scale (Buyukozturk, 2007). In addition, critical ratio was based on being below 10 in normality testing for confirmatory factor analysis and structural equation modeling. According to Kline (2005), critical ratio is somehow a normalized estimation of multivariate kurtosis, to wit z value. A critical ratio being absolutely higher than 10 suggests that there is a problem in kurtosis value of distribution.

Data Collection Instruments and Confirmatory Factor Analyses

Study Process Questionnaire:
The original of this questionnaire was developed by Biggs, Kember and Leung (2001). The questionnaire adapted into Turkish by Onder and Besoluk (2010) consists of two main dimensions as deep and surface learning and 20 items. Cronbach's Alpha coefficient of reliability was found to be .78 for the deep learning dimension and .74 for the surface learning dimension. 5-point Likert-type items appeared in the Study Process Questionnaire and every item was assessed with a 5-point rating expressed as "always" (5), "usually" (4), "occasionally" (3), "rarely" (2) and "never" (1). As a result of analysis conducted on the data obtained from this study, Cronbach's Alpha coefficient of reliability was found to be .76 for the deep learning dimension and .72 for the surface learning dimension. Besides, the diagram for confirmatory factor analysis of the questionnaire is shown in Figure 2.

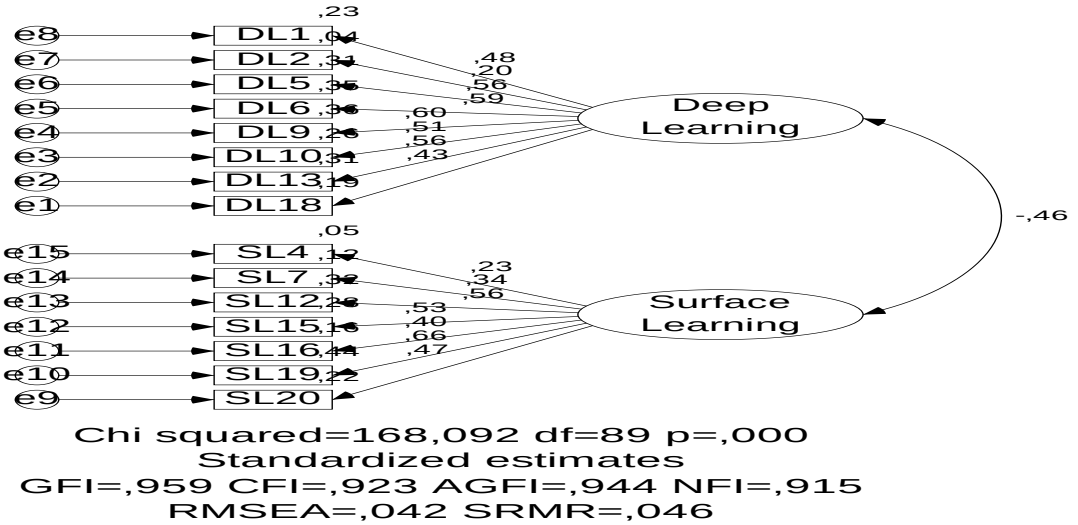

Figure 2. Confirmatory factor analysis diagram of the study process questionnaire
As a result of confirmatory factor analysis and taking normality testing into consideration, critical ratio (c.r.) appeared to be 27.102 in terms of multivariate (Mardia) values. For this reason, items with a critical ratio bigger than 10 were not analyzed in the next step. In this case, considering confirmatory factor analysis results of the "Study Process Questionnaire" which consists of 15 items, the fit index emerged as RMSEA=.042; SRMR=.046; X2/sd (CMIN/DF)=1.88; GFI=.959; CFI=.923; AGFI=.944 and NFI=.915. This result demonstrates that the model fit index is at an acceptable and desired level.

Metacognitive Awareness Inventory:
The original of this inventory was developed by Sperling, Howard, Miller and Murphy (2002). The inventory, which was adapted into Turkish by Aydin and Ubuz (2010), consists of two dimensions as knowledge of cognition and regulation of cognition and 17 items. Cronbach's Alpha coefficient of reliability was found to be .75 for the knowledge of cognition dimension and .79 for the regulation of cognition dimension. 5-point Likert-type items appeared in the metacognitive awareness inventory and items were assessed with a 5-point rating expressed as "always" (5), "usually" (4), "occasionally" (3), "rarely" (2) and "never" (1). As a result of analysis conducted on the data obtained from this study, Cronbach's Alpha coefficient of reliability was found to be .76 for the knowledge of cognition dimension and .80 for the regulation of cognition dimension. Besides, the diagram for confirmatory factor analysis of the inventory is displayed in Figure 3.

As a result of confirmatory factor analysis and taking normality testing into consideration, critical ratio (c.r.) appeared to be 53.55 in terms of multivariate (Mardia) values. Therefore, items with a critical ratio

bigger than 10 were not analyzed in the next step. In this case, considering confirmatory factor analysis results of the "Metacognitive Awareness Inventory", which consists of 12 items, the fit index of the inventory emerged as RMSEA=.060; SRMR=.048; CMIN/DF=2.82; GFI=.952; CFI=.922; AGFI=.929 and NFI=.903. This result demonstrates that the model fit index is at an acceptable and desired level.

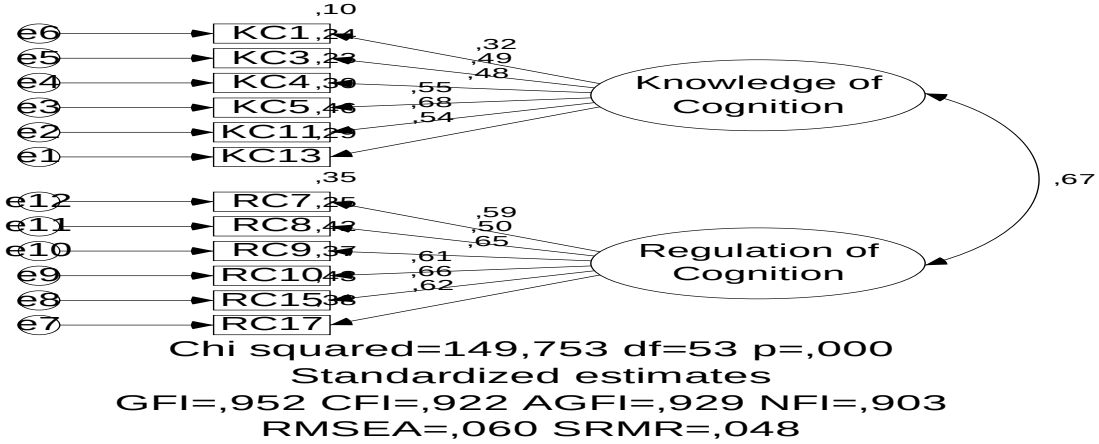

Figure 3. Confirmatory factor analysis diagram of the metacognitive awareness inventory

Scale of Achievement Focused Motivation

The Scale of Achievement Focused Motivation developed by Semerci (2010) consists of four dimensions as external effects, internal effects, the growth of aim and self-conscious and 35 items. Cronbach's Alpha coefficient of reliability of the scale occurred as .805 in the external effects dimension, 758 in the internal effects dimension, .745 in the growth of aim dimension and .666 in the self-conscious dimension. 5-point Likert-type items appeared in the Scale of Achievement Focused Motivation and items were assessed with a 5-point rating expressed as "I totally agree" (5), "I mostly agree" (4), "I partially agree" (3), "I mostly do not agree" (4) and "I certainly do not agree" (1). As a result of analysis performed on the data attained from this study, Cronbach's Alpha coefficient of reliability occurred as .815 in the external effects dimension, 855 in the internal effects dimension, .729 in the growth of aim dimension and .795 in the self-conscious dimension. Besides, the diagram for confirmatory factor analysis of the scale is displayed in Figure 4.

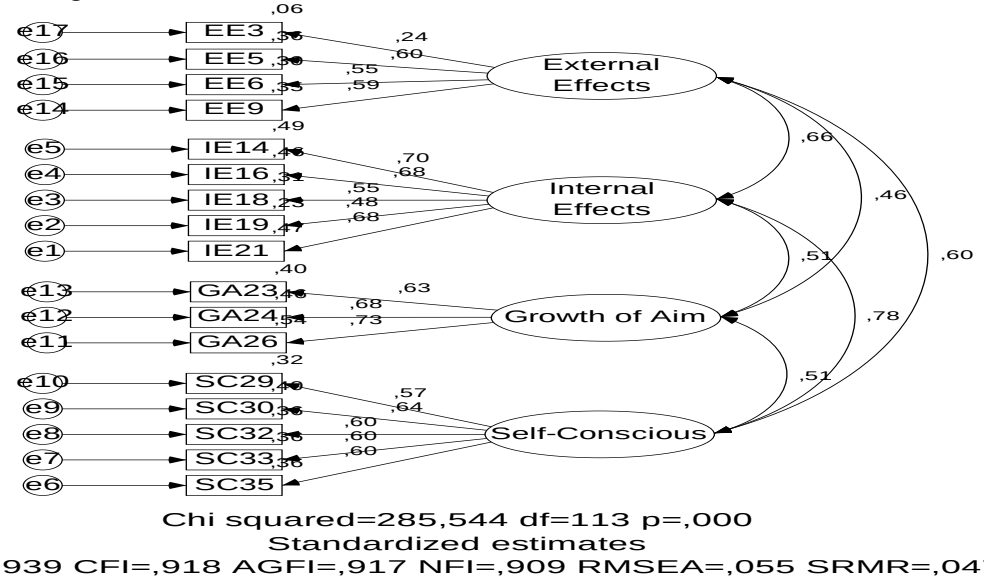

Figure 4. Confirmatory factor analysis diagram of the achievement focused motivation scale

As a result of confirmatory factor analysis and taking normality testing into consideration, critical ratio (c.r.) appeared to be 123.548 in terms of multivariate (Mardia) values. Therefore, items with a critical ratio bigger than 10 were not analyzed in the next step. In this case, considering confirmatory factor analysis results of "Scale of Achievement Focused Motivation", which consists of 17 items, the fit index emerged as RMSEA=.055; SRMR=.047; CMIN/DF=2.527; GFI=.939; CFI=.918; AGFI=.917 and NFI=.909. This result illustrates that the model fit index is at an acceptable and desired level.

3. Results

As a result of research, a model was put forward which shows the level of effect of latent variables of metacognitive awareness, achievement focused motivation and study process on each other and their causality ratios of each other. While forming this model, attention was paid to testing study hypotheses. Structural equation modeling built for this purpose is presented in Figure 5.

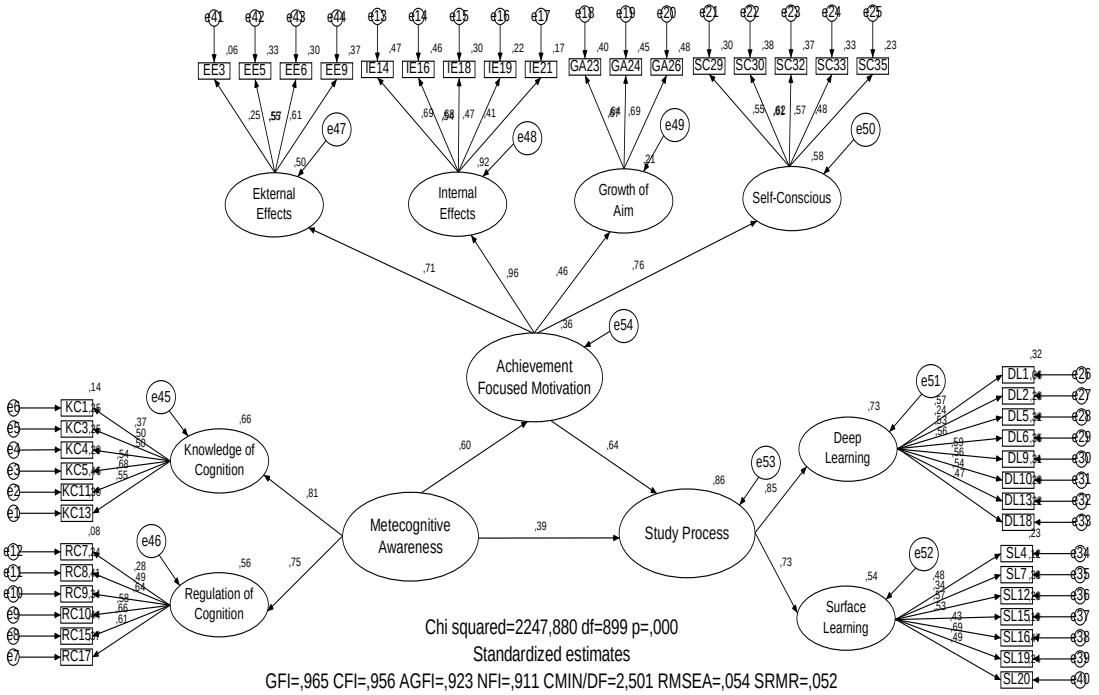

Figure 5. Structural equation modelling and analysis results of hypothesis

The fit index of the model built was obtained as follows. RMSEA=.054; SRMR=.052; CMIN\DF=2,501; GFI=.965; CFI=.956; AGFI=.923; NFI=.911; Chi squared=2247,8800; df=889 and p=.000. This result illustrates that the model fit index is at an acceptable and desired level.

The metacognitive awareness inventory has two latent variables and 12 observed variables. Latent variable of knowledge of cognition has a correlation (effect) coefficient of .81 and regulation of cognition has .75. Observed variables that are situated in the latent variable of knowledge of cognition have correlation coefficients ranging between .68 and .37; observed variables within the latent variable of regulation of cognition have a correlation coefficient ranging between .66 and .28.

The Scale of Achievement Focused Motivation has four latent variables and 17 observed variables. The latent variable of external effects has a correlation coefficient of .71, the latent variable of internal effects is .96, the latent variable of the growth of aim is .46 and the latent variable of self-awareness is .76.

Moreover, observed variables within the latent variable of external effects have correlation coefficients ranging between .61 and .25, observed variables within the latent variable of internal effects have ranges between .69 and .41, observed variables within the latent variable of the growth of aim have ranges between .69 and .64 and observed variables within the latent variable of self-conscious have correlation coefficients that range between .62 and .48.

The study process questionnaire consists of two latent and 15 observed variables. The latent variable of deep learning has a correlation coefficient of .85 and the latent variable of surface learning has a correlation coefficient of .73. Observed variables within the latent variable of deep learning have correlation coefficients ranging between .59 and .24 and observed variables within the latent variable of surface learning have correlation coefficients ranging between .69 and .34.

Taking the research hypotheses into consideration, the following outcomes were attained:
As also seen in the model which was obtained as a result of research and is situated in Figure 5, it was detected that metacognitive awareness affected achievement focused motivation significantly and positively at a level of .60. This outcome shows the accuracy of the hypothesis that appears in H1 "Metacognitive awareness of teacher candidates affects achievement focused motivation positively and significantly". In addition, metacognitive awareness contributes to achievement focused motivation at a ratio of 36%. In other words, the change that takes place in achievement focused motivation of teacher candidates can be said to depend on their metacognitive awareness at a ratio of 36%. This outcome verifies the hypothesis that appears in H2 "Metacognitive awareness of teacher candidates explains achievement focused motivation significantly".

With regard to the third research hypothesis, metacognitive awareness appeared to significantly and positively affect the study process at a level of .39. This outcome reached asserts the accuracy of the hypothesis stated in H3 "Metacognitive awareness of teacher candidates affects study process positively and significantly". However, as seen in the model in Figure 5, it was concluded that the hypothesis which has the lowest level in terms of the degree of effect, is H3. This situation puts forward the notion that metacognitive awareness affects the study process less than achievement focused motivation.

The result that metacognitive awareness and achievement focused motivation together affect the study process significantly and positively at a level of .64 is also present among the research outcomes. This result shows the accuracy of the hypothesis stated in H4 "Teacher candidates' metacognitive awareness and achievement focused motivation together affect study process positively and significantly". With regard to the last research hypothesis, it was detected that the latent variables of metacognitive awareness and achievement focused motivation together explain the latent variable of study process significantly at a ratio of 86%. In other words, the change that takes place in the study process of teacher candidates turned out to depend upon their metacognitive awareness and achievement focused motivation at a ratio of 86%. This result verifies the hypothesis that appears in H5 that "Teacher candidates' metacognitive awareness and achievement focused motivation together explain study process significantly".

4. Discussion

The effect of metacognitive awareness, achievement focused motivation and study process on each other and causality ratios (levels) of each other were tested in the scope of this research. For this, five hypotheses were developed in light of theoretical information by reviewing the literature first. In this section of research, results obtained by taking the order of hypotheses into account are discussed and compared with other research results attained regarding the subject.

With regard to the first research hypothesis, metacognitive awareness of teacher candidates turned out to affect their achievement focused motivation positively and significantly. Furthermore, regarding the second research hypothesis, it was detected that metacognitive awareness of teacher candidates contributed significantly to their achievement focused motivation. These emerging results overlap with

other research results related to the subject. As a matter of fact, research conducted concerning the subject put forward the notion that there is a significant correlation between academic achievement level and metacognitive skills (Case, Harris & Graham, 1992; Cautinho, 2007; Deseote & Roeyers, 2002).

With regard to the third research hypothesis, metacognitive awareness of teacher candidates was found to affect their study process significantly and in a positive direction. Research conducted regarding the subject reached similar results. In their study, Burchard and Swerdzewski (2009) assessed a practiced strategy education program. This inventory was applied to students, who participated and did not participate in the program, as pre-test and post-test. Statistically significant increases occurred in the metacognitive awareness level of students who participated in the program. Metacognitive awareness of students developed during strategy instruction. Also, metacognitive awareness of students who attended this program and defined themselves as insufficient increased as well. In another research study, Hekkila and Lonka (2006) investigated the level of correlation between the learning approaches of students, and self-regulated learning and using cognitive strategies. The research was carried out on 366 university students and as a result, a correlation was found among learning approaches, regulation of learning (self-regulation), cognitive approaches and achievement.

With regard to the fourth research hypothesis, it was detected that teachers' metacognitive awareness and achievement focused motivation together affect their study process positively and significantly. Outcomes of research conducted on motivation and study processes have a characteristic that supports the accuracy of these hypotheses. As a matter of fact, Cakiroglu (2007) researched the correlation between metacognitive strategy use and reading comprehension level. It was inferred from the research that metacognitive strategy instruction is effective in increasing students' reading comprehension levels and developing metacognitive reading comprehension skill levels. A significant correlation was found between metacognitive skills and standard achievement test scores of junior students among results of a study conducted by Sperling, Howard, Miller and Murphy (2004). As a result of research conducted by Sen (2006) on 198 university students, a positive-direction significant correlation emerged between learning and the application of study strategies of teacher candidates and their academic perception of self. Besides, there is a lot of research that presents a positive correlation between academic achievement and motivation (Boyd, 2002; Broussard, 2002; Busato, Prins, Elshout & Hamaker, 2000; Yunus & Wan-Ali, 2009).

With regard to the fifth research hypothesis, the result came out that metacognitive awareness and achievement focused motivation of teacher candidates together explain the study process significantly. The results of some research conducted regarding the subject have a characteristic that supports outcomes obtained from the fifth hypothesis. A study called "a model study exploratory of correlation between metacognition and motivation-related control of students and their metacognitive experiences in problem solving" was performed by Asik (2009). As a result of this study, a significant correlation was detected between metacognition and motivation-related control, and metacognitive experiences and mathematical problem solving performance. In his study Ozcan (2007) examined which factors are the most influential in terms of encouraging teachers to use strategies which develop metacognitive skills in courses. According to the results attained from this study, a positive-direction significant correlation came out between teachers using their metacognitive skills and strategies that develop metacognitive skills. In addition, determining the correlation between student perceptions regarding academic quality and their study approaches and achievement constituted the objective of the research conducted by Richardson in 2003. The research sample consisted of 400 students with ages ranging between 18 and 85. As a result of the research, a positive correlation occurred among the academic achievements of students and their perception regarding course quality and their strategic approach scores, while a negative correlation occurred between academic achievement of students and their use of a surface learning approach. Wolters (1999), who investigated the correlations among motivation strategies and learning strategies and performance and academic achievement, carried out his study with 88 students. At the end of this research, it was determined that the motivational strategies used by students were different and that there

was a strong correlation among motivation strategies and cognitive and metacognitive strategies, performance and achievement.

In conclusion, it appeared that metacognitive awareness and achievement focused motivation together significantly affect and explain the study process. In other words, it was detected that metacognitive awareness and achievement focused motivation are important predictors of the study process. Based on this result, a change in positive or negative direction that will take place in metacognitive awareness and achievement focused motivation of teacher candidates can be said to affect their study processes in the same direction as well. The outcome arising from the research demonstrates that measures to be taken to increase metacognitive awareness and achievement focused motivation of teacher candidates will also further activate their study processes.

References

Annevirta, T. & Vauras, M. (2006). Developmental changes of metacognitive skilling elementary school children, *The Journal of Experimental Education*, 74(3), 197-225.

Asik, G. (2009). *A model study to examıne the relatıonshıp between metacognıtıve and motıvatıonal regulatıon and metacognıtıve experıences durıng problem solvıng ın mathematıcs,* Unpublished Master's Thesis, Boğaziçi University, Graduate School in Secondary Science and Mathematics Education, Turkey, Number of Thesis: 255876

Aydin, U. & Ubuz, B. (2010). Turkish version of the junior metacognitive awareness inventory: the validation study, *Education and Science*, 35(157), 30-45.

Balcikanli, C. (2010). *The effects of social networking on pre-service English teachers' metacognitive awareness and teaching practice*, Unpublished PhD Thesis, Gazi University, Institute of Educational Sciences, Turkey, Number of Thesis: 279670.

Barnert, M. (2006). Effects of reflection prompts when learning with hypermedia, *Journal of Educational Computing Research*, 35(4), 359-375.

Batha, K. & Carroll, M. (2007). Metacognitive training aids decision making, *Australian Journal of Psychology*, 59(2), 64-69.

Bayram, N. (2010). *Yapısal eşitlik modellemesine giriş, AMOS uygulamaları, (Introduction to structural equation modeling, AMOS applications),* Bursa, Ezgi Pub.

Biggs, J., Kember, D. & Leung, D. Y. P. (2001). The revised two-factor study process questionnaire: R-SPQ-2F, *British Journal of Educational Psychology*, 71(1), 133-141.

Boyd, F. B. (2002). Motivation to continue: Enhancing literacy learning for struggling readers and writers, *Reading and Writing Quarterly*, 18(3), 257-277.

Broussard, S. C. (2002). *The relationship between classroom motivation and academic achievement in first and third graders,* Unpublished Master's Thesis, Louisiana State University, Louisiana.

Brown, A. (1987). *Metacognition, executive control, self-regulation, and other more mysterious mechanisms,* F. Weinert and R. Kluwe (Eds.), *Metacognition, motivation, and understanding*, 65-116, NJ.Erlbaum: Hillsdale.

Burchard, M. S. & Swerdzewski, P. (2009). Learning effectiveness of a strategic learning course, *Journal of College Reading and Learning*, 40(1), 14-21.

Busato, V. V., Prins, F. J., Elshout, J. J. & Hamaker, C. (2000). Intellectual ability, learning style, personality, achievement motivation and academic success of psychology students in higher education, *Personality and Individual Differences*, 29(6), 1057-1068.

Buyukozturk, S. (2007). *Sosyal bilimler için veri analizi el kitabi (Handbook of data analysis for social sciences),* Ankara, Pegem A Pub.

Byrne, B. M. (2001). *Structural equation modeling with AMOS,* Mahwah, N. J.: Lawrence Erlbaum Associates.

Caliskan, M. (2010). *The effects of learning strategies instruction on metacognitive knowledge, metacognitive skills and achievement,* Unpublished PhD Thesis, Selçuk University, Institute of Educational Sciences, Turkey, Number of Thesis: 264337

Case, L. P., Harris, K. R. & Graham, S. (1992). Improving the mathematical problem solving of students with learning disabilities: Self-regulated strategy development, *The Journal of Special Education,* 26(1), 1-19.

Cautinho, S. A. (2007). The relationship between goals, metacognition, and academic success, *Educate,* 7(1), 39-47.

Chalmers, D. & Fuller, R. (2009). Research and a professional development programme on teaching learning strategies as part of course contents, *International Journal for Academic Development,* 4(1), 28-33.

Corlis, S. B. (2005). *The effects of reflective prompts and collaborative learning in hypermedia problem-based learning environments on problem solving and metacognitive skills,* Unpublished PhD Thesis, The University of Texas, Austin.

Dart, B. C., Burnet, P. C., Purdie, N., Boulton-Lewis, G., Campbell, J. & Smith, D. (2000). Students' conceptions of learning, the classroom environment, and approaches to learning, *The Journal of Educational Research,* 93(4), 262-270.

Dean, D. K. D. (2004). Metacognition: A bridge between cognitive psychology and educational practice, *Theory in Practice,* 43(4), 268-273.

Desoete, A. & Roeyers, H. (2002). Off-line metacognition – A domain-specific retardation in young children with learning disabilities. *Learning Disability Quarterly,* 25(2), 123–139.

Desoete, A., Roeyers, H. & Clercq, A. (2003). Can offline metacognition enhance mathematical problem solving? *Journal of Educational Psychology,* 95(1), 188-200.

Duit, R. & Treagust, D. (2003). Conceptual change: A powerful framework for improving science teaching and learning, *International Journal of Science Education,* 25(6), 671-688.

Entwistle, N. J. (1987). A model of the teaching-learning process. In J.T.E. Richardson, M.W. Eysenck and D. Warren Piper, (eds.), *Student Learning: Research in Education and Cognitive Psychology.* Milton Keynes: SRHE and Open University Press, 13-28.

Fergusson, J. Y. (2003). *A Regression analysis of problem-based learning student variables,* Ph.D. Thesis, University of Nebraska.

Flavell, J. H. (1987). *Speculations about the nature and development of metacognition,* In F. Weinert and R. Kluwe (Eds.), *Metacognition, motivation, and understanding* (pp. 21-29), Lawrence Erlbaum: Hillsdale, NJ.

Flavell, J. H. (1976). *Metacognitive aspects of problem solving,* In Resnick, L.B. (Ed.), *The nature of intelligence* (pp. 231–235). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Garrett, A. J., Mazzocco, M. M. & Baker, L. (2006). Development of the metacognitive skills of prediction and evaluation in children with or without math disability, *Learning Disabilities Research & Practice,* 21(2), 77-88.

Ge, X. & Land, S. (2003). Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions, *Educational Technology Research and Development,* 51(1), 21-38.

Hart, J. W., Stasson, M. F., Mahoney, J. M. & Story, P. (2007) The big five and achievement motivation: Exploring the relationship between personality and a two-factor model of motivation, *Individual Differences Research,* 5(4),267–274.

Hekkila, A. & Lonka, K. (2006). Studying in higher education: students approaches to learning, self-regulation, and cognitive strategies, *Studies in Higher Education*, 31(1), 99-117.

Jacobs, J. E. & Parıs, S. G. (1987). Children's metacognition about reading: issues in definition, measurement, and instruction, *Educational Psychologist,* 22(3-4), 255-278.

Jansen, E. P. W. A. & Bruinsma, M. (2005). Explaining achievement in higher education, *Educational Research and Evaluation,* 11(3), 235-252.

Joreskog, K. G. & D. Sorbom (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language,* Chicago, IL: Scientific International Software.

Karasar, N. (2012). *Bilimsel araştırma yöntemi, (Scientific research methods),* Ankara, Nobel Pub.

Kline, B. R. (2005). *Principles and Practice of Structural Equation Modeling,* New York, The Guılford Press, 2nd ed.

Lee, O. & Brophy, J. (1996). Motivational patterns observed in sixth-grade science classrooms, *Journal of Research in Science Teaching,* 33(3), 585-610.

Madran, D. (2006). *The effects of achievement motivational the academic achievement of university English preparation class students,* Unpublished Master's Thesis, Dokuz Eylül University, Turkey, Number of Thesis: 205870

Marton, F. & Saljo, R. (1976a). On qualitative differences in learning I: Outcome and process, *British Journal of Educational Psychology,* 46(1), 4-11.

Marton, F. & Saljo, R. (1976b). On qualitative differences in learning II: Outcome as a function of the learner's conception of the task, *British Journal of Educational Psychology*, 46(2), 115-127.

Mayya, S. S., Rao, A. K. & Ramnarayan, K. (2004). Learning approaches, learning difficulties and academic performance of undergraduate students of physiotherapy, *The Internet Journal of Allied Health Sciences and Practice,* 2(4), 1-6.

Morgan, C. T. (1984). *Psikolojiye giriş ders kitabı (Introduction to psychology textbook),* Ankara, Meteksan Pub.

Onder, I. & Besoluk, S. (2010). Adaptation of revised two-factor study process questionnaire (R-SPQ-2F) to Turkish, *Education and Science,* 35(157), 55-67.

Oner, Y. I. (2008). *The factors that affect the learnıng approaches of the hıgh school students,* Unpublished Master's Thesis, Yeditepe University, Institute of Educational Sciences, Turkey, Number of Thesis: 220548

Ormrod, J. E. (1999). *Human learning,* (Third Edition), USA: Prentice-Hall, Inc.

Ozcan, Z. C. (2007). *Investigation of primary school teachers use of metacognitive strategies in their lessons,* Unpublished PhD Thesis, Marmara University, Institute of Educational Sciences, Turkey, Number of Thesis: 206211

Pifarre, M. & Cobos, R. (2009). Evaluation of development of metacognitive knowledge supported by the know cat system, *Educational Technology Research and Development,* 57(6), 787-799.

Premuzic, C. T. & Furnham, A. (2008). Personality, intelligence and approaches to learning as predictors of academic performance, *Personality and Individual Differences,* 44(7), 1596-1603.

Ramsden, P. (2003). *Learning to teach in higher education*, London and New York: Routledge Farmer.

Reisinger, Y. & Mavondo, F. T. (2006) Structural equation modelling: Critical issues and new development, *Journal of Travel and Tourism Marketing,* 21(4), 41-72.

Richardson, J. T. E. (2003). Approaches to studying and perceptions of academic quality in a short web-based course, *British Journal of Educational Technology,* 34(4), 433–442.

Rollnick, M., Davidowits, B., Keane, M., Bapoo, A., & Magadla, L. (2008). Student's learning approach profiles in relation to their university experience and success, *Teaching in Higher Education,* 13(1), 29-42.

Schermelleh-Engel, K. & Moosbrugger, H. (2003). Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures, *Methods of Psychological Research Online,* 8(2), 23-74.

Schraw, G. & Dennıson, R. S. (1994). Assessing metacognitive awareness, *Contemporary Educational Psychology,* 19(4), 460-475.

Schunk, D. H. (2009). *Öğrenme teorileri (Learning theories),* Ankara, Nobel Pub.

Segers, M., Gijbels, D. & Thurlings, M. (2008). The relationship between student's perception of portfolyo assesment practice and their approaches to learning, *Educational Studies,* 34(1), 35-44.

Selvarajah, C., Chelliah, J., Meyer, D., Pio, E. & Anurit, P. (2010). The impact of social motivation on cooperative learning and assessment preferences, *Journal of Management & Organization*, 16(1), 113-126.

Semerci, C. (2010). Developing a scale of achievement focused motivation, *e-Journal of New World Sciences Academy,* 5(4), 2123-2133.

Sen, B. (2006). *The relation between the attitudes of candidates of teachers and learning and studying strategies*, Unpublished Master's Thesis, Marmara University, Institute of Educational Sciences, Turkey, Number of Thesis: 191650

Simsek, O. F. (2007). *Yapısal Eşitlik Modellemesine Giriş Temel İlkeler ve Lisrel Uygulamaları, (Introduction to structural equation modeling, LISREL applications),* Ankara, Ekinoks Pub.

Sperling, R. A., Howard, B. C., Miller, L. A. & Murphy, C. (2002). Measures of children's knowledge and regulation of cognition, *Contemporary Educational Psychology,* 27(1), 51-79.

Thompson, T. L. & Mintzes, J. J. (2002). Cognitive structure and the affective domain: On knowing and feeling in biology, *International Journal of Science Education,* 24(6), 645-660.

Trigwell, K. & Prosser, M. (1991). Relating approaches to study and the quality of learning outcomes at the course level, *British Journal of Educational Psychology,* 61(3), 265-275.

Turmo, A. (2004). Scientific literacy and socio-economic background among 15-year-olds-A Nordic perspective, *Scandinavian Journal of Educational Research,* 48(3), 287-305.

Ulgen, G. (1994). *Eğitim psikolojisi: Kavramlar, ilkeler, yöntemler, kuramlar ve uygulamalar, (Educational psychology: Concepts, principles, methods, theories and practices),* Ankara, Lazer Ofset Pub.

Vansteenkiste, M., Lens, W. & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation, *Educational Psychologist,* 41(1), 19-31.

Veenman, M. V. J., Van Hout-Wolters, B. H. A. M. & Afflerbach, P. (2006). Metacognition and Learning: Conceptual and Methodological Considerations, *Metacognition and Learning*, (1), 3-14. DOI 10.1007/s11409-006-6893-0

Wang, C. K. J. & Liu, W, C. (2008). Teacher's motivation to teach national education in Singapore: A self-determination theory approach, *Asia Pacific Journal of Education*, 28(4), 395-410.

Weaver, G. C. (1998). Strategies in K-12 science instruction to promote conceptual change, *Science Education*, 82(4), 455-472.

Wilson, K. & Fowler, J. (2005). Assessing the impact of learning environment on students approaches to learning: Comparing, conventional and action learning designs, *Assesment & Evaluation in Higher Education*, 30(1), 87-101.

Wolters, C. A. (1999). The relation between high school student's motivational regulation and their use of learning strategies, effort and classroom performance, *Learning and Individual Differences*, 11(3), 281-301.

Yunus, A. S. & Ali, W. Z. W. (2009). Motivation in the Learning of Mathematics, *European Journal of Social Sciences*, 7(4), 93-101.