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The Relationship Between Locus of Control, Metacognition, and Academic Success

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Abstract

The previous research on locus of control or metacognition suggested that they are closely related to academic performance and can be taught to students to improve their academic and non-academic success. These variables were often examined separately in order to explain and predict performance and rarely in a university setting. The integration of these variables into a common framework could provide a deeper understanding of university students' learning process. This study examined the relationship between locus of control, metacognition, and academic success in a university setting and is based on a hypothesis that the relationship between locus of control and academic success is fully mediated by metacognition. The present study also examined whether metacognition and internal or external locus of control are predictors of academic success. Correlations and regression analyses were used to examine mediation effects of metacognition in the relationship between locus of control and academic performance. The participants were 282 undergraduates of Tomas Bata University in Zlín. The results showed that internal locus of control influences directly both academic success and metacognition; however, external locus of control does not influence performance directly or through metacognition. The direct relationship between internal locus of control and academic success was not significant with metacognition in the equation. The findings from this research may support training programs instructing students on how to adopt effective metacognitive skills and strategies and learn how to perform well if they have a better control of their behavior.

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1. Theoretical background

Researchers in the field of educational psychology have long promoted the importance of metacognition for regulating and supporting student learning. Self-regulated skills of students are considered in strategy documents (OECD, 2004; UNESCO, 1996) to be one of the life and career skills necessary to prepare students for education and the workforce.

The theory of “thinking about thinking” was first described by Flavell in the 1970s as metacognition. It means knowledge of one's own cognitive processes, i.e. knowledge of how one learns and acts (*metacognitive knowledge*) as well as control of these processes by the person who learns and acts in various situations

(*metacognitive regulation*). Several frameworks have been developed for categorizing types of knowledge of cognition. For example, Flavell (1979) defined metacognitive knowledge as knowledge about one's own cognitive strengths and limitations, including the factors (internal and external) that may interact to affect cognition. The knowledge refers to one's own personality (*person knowledge*) including all beliefs about the nature of human beings as cognitive processors, about the nature of the task (*task knowledge*), which includes knowledge about the demands of different tasks, and about strategies (*strategy knowledge*), which is the knowledge about various types strategies that are likely to be most useful. Metacognitive knowledge is labelled by many authors as declarative, procedural and conditional knowledge (Brown, 1987; Schraw, 1998). The difference between these types of knowledge (Švec, 2005) may be explained from the viewpoint of their applicability as “*what*” knowledge (*declarative*), “*how*” knowledge (*procedural*) and “*why*”, “*where*” and “*when*” knowledge (*conditional*).

Declarative knowledge includes general knowledge about how one learns, how he processes information, and individual knowledge about himself, about the process of his own learning and about factors influencing his learning result. For example, students know their own limits (limits of memory, span of attention, etc.) and organize their learning in accordance with this knowledge. Procedural knowledge refers to the use of strategy and processes in learning. They are applied in situations when the student is learning being connected with the knowledge of procedure, e.g. how to sort out and categorize information. Conditional knowledge is about how, why and in what circumstances declarative and procedural knowledge may be used. Conditional knowledge enables the student to choose an adequate strategy and to adjust his learning to changing requirements of learning tasks.

Metacognition may then be understood as a set of abilities and skills to recognize one's own cognitive (learning) activities, to plan, to monitor and to evaluate procedures that he has applied in his learning (Hrbáčková, 2011).

Metacognition does not include only the knowledge about cognitive processes (metacognitive knowledge) but also processes of monitoring, controlling and regulating one's own cognitive processes that are connected under the term of metacognitive skills. These include the prediction skill (foresight), planning, monitoring and self-evaluation. The prediction includes an analysis of preconditions for successful learning. It enables the student to proceed more slowly and prudently if he comes across a new or difficult task, and, on the contrary, to proceed more quickly if the task is a familiar or easy one. The student estimates the level of difficulty of the task using the skill of foresight for setting the degree of involvement in the fulfilling the task. Due to this skill he may make an adequate effort and adequately focus on the fulfilling of the task. Planning involves a thought-out activity of the student who thinks of how, when and why he performs the task. This activity takes place before the activity itself (learning) and its result is a considerate sequence of steps which leads, according to the student, to the fulfilling of the learning task. Monitoring may be regarded one's own control (“*on-line*”) of effectiveness of the use of cognitive strategies. The student proceeds in compliance with the plan checking its fulfilling. In case he comes across a problem or thinks that that the plan does not lead to the desired goal he modifies it. We label self-evaluation as a retrospective (“*off-line*”) judgment on the result and the course of the learning (Desoete, 2001).

At present, the concept of metacognition is understood more broadly. Simons (Desoete, Royers, Buysse, 2001) adds a third element including metacognitive belief to the two-element conception of metacognition (knowledge and regulation of cognition). He says that the two-element conception of metacognition must be enlarged by studying attributions. It was found out that metacognitive interventions may be successful if the so-called attributive re-learning is included in them. Students who have problems with learning attribute success and failure more often to external factors, which may impede effectiveness of learning to a considerable extent.

Success and failure are among the most important motivation factors. The perception of causes (causality) that the students use for explaining their performances, or success or failure, is called attributive belief. This belief plays an important role in levels of motivation of the student to learning. In theories of causal attributions a number of attributive models can be found. The well-known models include, for example, Weiner's model of causal attributions. The basis of Weiner's approach is a unique classification of causes explaining success and failure of an individual from the viewpoint of locus, stability and control. In our paper we focused on the locus dimension. This dimension concerns whether a cause is perceived as being internal or external to the individual. Historically, the most common application of this dimension was the work of Rotter (1966) on locus of control. Individuals with the external locus of control believe that their actions have a minimum influence on the outcomes and there is little they can do to alter them. People with the internal locus of control believe that their results are conditioned by their actions and largely under their control. Internal control students believe that their school results (success or failure)

depend on their abilities, skills or efforts whereas external control students think that their school results are just a function of luck, teachers or another external factor (Schunk, Pintrich, Meece, 2008). Internality and externality play an important role in the student's perception of responsibility for his own process of learning.

We hold the view that locus of control considerably influences to what extent students are engaged in their process of learning as far as cognition and especially metacognition are concerned, which subsequently influences the rate of their school success (Schraw, Moshman, 1995). Of course, we are aware of the fact that the process of influencing is far more complex as more factors are involved there including motivation and other non-cognitive processes.

The research on metacognition points out that it is a significant predictor of academic performance (Dunning et al. 2003; Thiede et al. 2003). Students with a higher degree of metacognition achieve a higher level of academic performance than those with a lower level of metacognition. It appears that metacognition is teachable. Students provided with metacognitive training are likely to improve their performance scores much more than students who do not receive metacognitive training (Kohler, 2002; Nietfeld, Schraw, 2002; White, Frederiksen, 1998). There appears to be a relationship between metacognition and certain personality variables including motivation and locus of control (Landine, Stewart, 1998). Locus of control relates to both metacognition and motivation (Bergan, 1990; Grote, James, 1991; Harter, 1981) because it implicitly includes the student's belief that he or she is able to perform a task.

An issue of particular importance to educators is whether metacognition is general by nature or rather domain specific (Veenman et al. 2006). Schraw (1998) describes metacognition as a multidimensional set of general, rather than domain-specific skills. However, it is possible that metacognition is general among younger students but gradually becomes more domain-specific for older students (Lai, 2011). For this issue there is no general agreement.

Even if we pointed out the connection between locus of control, metacognition and academic achievement, it is not clear whether the relationship between locus of control and academic achievement is fully mediated by metacognition. **We presuppose that perception of internality or externality may considerably influence metacognitive processes of the student and subsequently his or her academic success.** We want to examine this relationship in a very specific context, i.e. in the university setting focused on humanities in the field of accompanying professions, and the research is not concerned with a major subject (from the area of "soft" disciplines) but with quite a specific one in the given context (from the area of "hard" disciplines).

2. Method

Our goal was to examine the relationship between locus of control, metacognition, and academic success in a university setting. We draw on a hypothesis that the relationship between locus of control and academic success is fully mediated by metacognition. We wanted to find out whether metacognition and internal or external locus of control are predictors of academic success.

The participants were 282 university students of the third year of the full-time bachelor programme and of the first year of the full-time master programme in humanities in Zlín region who specialise in helping professions. Most respondents were females ($n = 270$) whereas males ($n = 12$) were represented in the research sporadically (reflecting the overriding interest of women in training to work in the helping professions). The average age was 22.48 years ($SD = 1.38$). The students completed a self-report questionnaire which focused on finding out the perceived degree of externality or internality (locus of control) and the degree of metacognition in the given field of learning in the subject of methodology of social-pedagogical research. The subject was also deliberately chosen because of the fact that in the previous years it was a certain problem for the students and became a reason of their study failure. Humanities are generally referred to as "soft" disciplines while social research can be seen as a part of the bordering "hard" disciplines.

Academic success. The students' performance in individual subjects was assessed through their final evaluation at the end of the 2011 winter semester. The evaluation was conducted according to the system of ECTS labels - A (5), B (4), C (3), D (2), E (1), F (0).

Metacognition. In order to measure metacognition we used 30 items in the questionnaire. The scales of the questionnaire comprised the seven-point Likert type statements ranging from (1), the least accurate, to (7) the most accurate. Responses to negatively stated items ($n = 7$) were reversed so that the highest score for all items was an

indicative of a positive rating. The items were developed on the basis of MSLQ (Pintrich et al., 1993), MAI (Schraw, Dennison, 1994) and SRSI-SR (Cleary, 2006). Cronbach's alpha for all items reached the value of $\alpha = .85$. The questionnaire has already been tested in the previous research of the authors (Hrbáčková et al. 2010) and the items in the questionnaire examined to what extent the students have knowledge of cognition and to what extent they regulate their cognition (e.g. "If I don't fulfill the task as I intended to, I try to catch up", "I do not know how to study to understand the subject", "Home preparation for this subject causes significant troubles to me", "In this course I have set my own goals", "I often test myself to make sure that I understand the subject", "I know exactly what to do to master the subject").

Locus of control. For measuring locus of control 12 items in the questionnaire were used relating to the expected outputs/requirements from the subject of methodology of social-pedagogical research (e.g. to propose a design of the research, to assess and to verify the quality of measuring, to analyze the qualitative data, etc.). In each output the students were to decide what the degree of their success or failure depends on (if it depends on them alone or on other hardly ascertained circumstances). Each output was then assessed separately from the viewpoints of internality and externality. The students put their answers on a scale from 1 to 10. A higher value indicated the position of the most/the best and a lower value stood for the least/the worst.

Correlations and regression analyses were used to examine mediation effects of metacognition in the relationship between locus of control and academic performance. When processing data, we used the statistical software IBM SPSS Statistics 19.0.

3. Results

Table 1 presents the correlations among internal and external locus of control, metacognition and academic success. Metacognition strongly correlated with academic success ($r = .89$, $p = .001$) and also with internal locus of control ($r = .226$, $p = .001$) unlike external locus of control ($r = .113$, $p = .057$). It means that students with a higher level of metacognition attributed the results of their learning to internal reasons whereas students who attributed the results of their learning to external reasons may or may not have a higher level of metacognition (we have not found any connection between metacognition and external locus of control).

Table 1. The Pearson Correlation

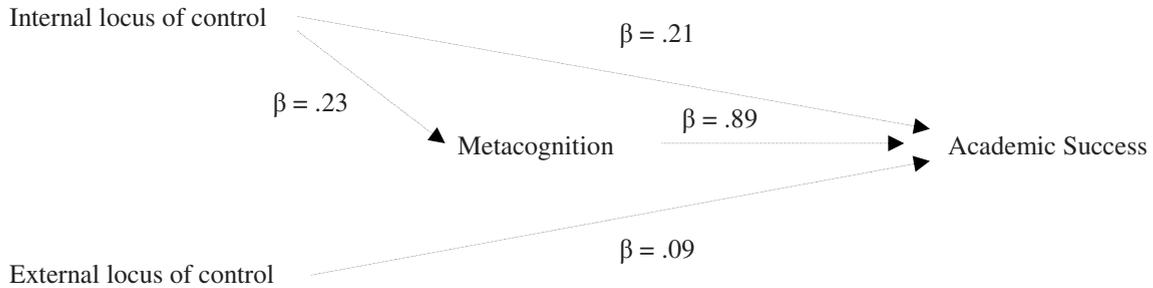
	Academic success	Metacognition	Externality	Internality
Academic success	1	,890**	,089	,210**
Metacognition	,890**	1	,113	,226**
Externality	,089	,113	1	,267**
Internality	,210**	,226**	,267**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Academic success was not connected too much with external locus of control ($r = .089$, $p = .135$) but it correlated with internal locus of control ($r = .21$, $p = .001$). It means that the students who saw reasons of their success or failure in themselves (influencing the results of learning was within their power) were academically more successful whereas we cannot infer anything about academic success in students with external locus of control.

Regression analysis verified to what extent we may explain the academic success of students from locus of control and their level of metacognition (Figure 1). Internal locus of control was positively related to academic success $F(1, 280) = 12.867$, $p = .001$, $\beta = .21$ and also to metacognition $F(1, 280) = 15.114$, $p = .001$, $\beta = .226$. Metacognition was a strong predictor of academic success $F(1, 280) = 1067.716$, $p = .001$, $\beta = .89$. External locus of control was unrelated to academic success $F(1, 280) = 2.250$, $p = .135$, $\beta = .089$ and also to metacognition $F(1, 280) = 3.641$, $p = .057$, $\beta = .113$.

Figure 1. Relationship between internal and external locus of control, metacognition, and academic success



We were trying to find model that includes the variables that are important in the prediction and excludes the ones that have only a trivial effect on academic success of students. Using the Stepwise method has been produced model to predict academic success (Table 2). We found out that out of all examined variables metacognition is the only predictor of academic success (perception of internality or externality does not contribute to the overall variability of academic success).

Table 2. Multiple regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-2,624	,172		-15,279	,000
Metacognition	1,467	,045	,890	32,676	,000

a. Dependent Variable: Academic success

Even if we found out a direct influence between internal locus of control and academic success and also between internal locus of control and metacognition and between metacognition and academic success, no connection between internal locus of control and academic success with metacognition in the equation was proved, which means that the relationship between internal locus of control and academic success is not mediated by metacognition.

The results of our research concern only the given setting and the addressed students and may be very specific regarding the fact that they are connected with the area of learning which is not related to the major subjects of the studied field (from the area of “soft” disciplines). If we examined the same issue in a different context the results could quite different. Also, we used a technique that examined the perceived level of metacongnition and locus of control of students (which may be regarded as an indirect indicator of their real level).

4. Conclusion

The results of our analysis showed that if students believe that academic success (mastering specific skills in a specific context) depends on themselves they may achieve a higher level of metacognition. Internal locus of control accounts for 23% of the variance in the overall level of students’ metacognition. It may be concluded that metacognition, which strongly influences academic success, is affected by a large number of other factors (not only

internal locus of control), e.g. their motivation, perceived personal competence, will, emotions, attitudes, study habits, the environment for learning and others.

We proved that metacognition is a strong predictor of academic success amounting to almost 90% of its variability. To the contrary, it does not influence students' academic success or the level of their metacognition if they attribute reasons of their academic failure to external factors. The more students attribute reasons of academic success to internal factors (to themselves) the more successful they may be in learning.

Findings from this research may support training programs instructing students on how to adopt effective metacognitive skills and strategies and learn how to perform well if they have a better control of their behavior.

Regarding the fact that metacognition plays a key role in academic successfulness of students it would be appropriate to focus on factors that may influence the metacognitive process of students. We think that it will be a whole complex of factors an analysis of which should test a comprehensive model with all variables which have not been tested previously and structural equating modeling could be used.

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