

**REVIEW OF DOCTORAL DISSERTATION  
“EXECUTIVE FUNCTIONS AND SCHOOL  
SUCCESS IN PRIMARY SCHOOL  
CHILDREN”**

**(social Sciences, psychology, 06S)  
PREPARED BY LAURYNĄ RAKICKIENĖ**

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The main idea of the doctoral dissertation prepared by Lauryna Rakickienė came from the burning practical issue, which makes this work applicable and significant from the practical point of view. The author rationally substantiates the significance of the dissertation with the research questions (that replace the subgoals) and defensible statements. The defensible statements highlight that executive functions of primary school children may be described by the structure of three interrelated factors – working memory updating, mental set shifting and response inhibition. These three factors are differently associated with achievement in primary school: working memory updating is related to achievement directly and through cognitive mediators while response inhibition – through behavioural mediators. Together with other defensible statements it allowed to formulate the rational research objective. The work is well illustrated – there are 8 tables, 21 figures and 11 appendices that depict results of the research and other relevant information that complements them.

The author revealed why the topic of the dissertation is not yet explored well enough. She also flawlessly formulated and adequately highlighted the relevance, scientific novelty and practical value of the work. In pursuit of her goal – “to determine the structure of executive functions and their role in academic success of primary school children”, the author formulated adequate research questions, replacing the subgoals of the research.

The theoretical part of the dissertation is based on the newest psychological literature. The author introduces the reader to the variety of researches, masters the vast data flow, highlighting the most significant facts that are related to the goals of the research. In the literature review the author clarified the concept of executive function, reviewed its development, revealed conceptual and methodological problems associated with it, appropriately analysed the structure of an executive function, provided the characteristics of both the executive function and other related cognitive functions. The author attempted to relate executive functions of primary school children to school success and viewed these phenomena through the light of academic achievement and social success. That actualised the scientific significance of the work. This way the author demonstrated her ability to find a novel and meaningful niche for her work. After studying the theoretical part of the dissertation, I positively evaluate the author's analytical competencies.

While providing information on the research methods, the author properly introduced the reader to the structure and methodological background of the empirical study, adequately selected research methods, organisation of the study and statistical analysis. The method may be characterised by a large variety of various research instruments. Positive is the fact that age appropriate tasks for executive functions were developed by the author.

Thanks to the rational selection and creative application of research methods in the empirical part of the study, the author was able to answer the following research questions: to what extent the three-factor (response inhibition, mental set shifting, working memory updating) structure is characteristic of the executive function in primary school children; how executive function predicts intellectual ability, verbal and performance intelligence in primary school children; how executive function predicts achievement in math, reading, writing and natural sciences in primary school children; how executive functions and achievement are related – directly or through other cognitive or behavioural variables; how executive functions predict peer relations among primary school children; how executive functions and peer relations are linked – directly or through other cognitive or behavioural variables.

The research results are sufficiently interpreted in context of adjacent empirical studies carried out in other countries and latest theoretical

works in psychology. The knowledge and insights provided in the conclusions follow logically from the arguments given in the thesis and answer the research questions, formulated in the introduction. The analysis, carried out in the research, and the conclusions answer to the defensible statements and are sufficiently grounded and reliable.

Positive is the fact that the author of the thesis pointed out the limitations of the study and provided guidelines for a further research.

The analysis of the provided publications shows that the scientific papers published by the author reflect the main idea of the research, key statements, results and findings of the thesis. The summary of the doctoral dissertation sufficiently reflects the dissertation. It should be noted that after receiving rich and socially relevant information the author of the research prepared recommendations, enhancing the practical significance of the work.

In the end of the work the author formulates clear, concise and empirically grounded conclusions, which should be of interest to psychologists from different areas.

1. Executive functions of primary school-age children are best explained by the internal structure of three partly related factors (response inhibition, working memory updating and mental set shifting). The inhibition of dominant response is the most differentiated executive function, which is not related to working memory updating and mental set shifting in primary school-age children.
2. Working memory updating predicts verbal intelligence, performance intelligence and *g* factor of intelligence in primary school children.
3. Working memory updating is an important predictor of academic achievement in primary school:
  - The ability to efficiently update representations in working memory predicts better achievement in reading and writing directly;
  - Updating predicts achievement in mathematics through performance intelligence: children who are better at updating representations in working memory have higher intellectual abilities, and nonverbal intelligence is a direct predictor of achievement in reading and writing.

4. Dominant response inhibition predicts achievement in mathematics and nature not directly, but through the symptoms of hyperactivity: children who find it more difficult to suppress the dominant, but in the current situation inadequate response, are more prone to hyperactive behaviour; while achievement of children who are less able to manage their activity and attention is rated lower by the teachers.
5. The relationship between executive functions and achievement in mathematics differs depending on the way of assessing achievement: teacher ratings are predicted by working memory updating but performance on achievement tasks is predicted by inhibition of prepotent responses.
6. When executive functions and intelligence are included together in the prognostic models of achievement of primary school children, executive functions predict achievement better than intelligence does:
  - Performance intelligence is a mediator of the relationship between working memory updating and achievement in mathematics, but does not predict achievement in reading, writing or nature;
  - Verbal intelligence does not predict achievement in any of the studied areas of academic achievement.
7. Prognostic relationship between any of the executive functions and peer relationships of primary school-age children has not been found.

Psychologists, as well as educators, will be interested in practical recommendations provided by Lauryna Rakickienė:

The work revealed the importance of the executive functions for the academic success of primary school-age children. This is important information for the educators and psychologists working in the field of education. The results of the study allow considering that importance of intelligence for academic achievement of elementary school children is possibly overestimated. When executive functions and behavioural variables (learning-related behaviour and hyperactivity) are included into the prognostic models of academic achievement, neither verbal nor performance IQ does not predict evaluations of primary school children's achievement provided by the teachers in reading, writing or natural

science. Working memory updating is a much more reliable cognitive predictor of achievement, while response inhibition is related to a higher achievement through the behavioural mediator: teachers are prone to view math and natural science achievement of children who show less symptoms of hyperactivity as higher and children with better response inhibition show fewer symptoms of hyperactivity.

Given the exceptional significance of working memory updating for school achievement it is assumed that teaching in primary school is too much based on memory, so we would like to recommend teachers use alternative tasks that are less dependent on memory more often. However, it should be borne in mind that the updating in working memory is fundamentally different from passive memorization and reproduction of information. It is the basic executive function, necessary for completion of virtually all cognitive tasks (this is confirmed by a strong correlation between memory updating and general intellectual abilities), so it is not possible to avoid relying on working memory updating in the process of education.

As difficulties in executive functioning and especially in updating of representations in working memory may be related to poor academic achievement in elementary school, the problem of assessing executive skills in practice becomes topical. No instruments of assessment of executive functions are included in the current process of assessment of cognitive abilities in Lithuania; the intelligence scale showing cognitive strengths and difficulties of the child is used in most cases. However, having in mind that working memory updating predicts both academic achievement and intelligence scale scores of primary school children we can consider that, in some cases, assessment of working memory would be no less informative and more appropriate as well as less troublesome and less expensive than intelligence testing. While assessing cognitive abilities of children it would also be worthwhile to pay attention to their ability to inhibit inappropriate responses which may affect achievement of students not directly, but through the effect on their behaviour. This could be especially important for children characterized by excessive activity and difficulty in concentrating. Although the scientific community recognizes that these symptoms have cognitive basis, teachers often still equate the hyperactivity of children with the lack of discipline and believe that such children could change their behaviour with willpower.

The linkage of symptoms of hyperactivity with difficulties in a particular field of cognitive activity could help change this notion and open up opportunities of effective aid for the student.

Finally, it is worthwhile to consider training of executive functions, efficacy of which has been proven by recent research (Espinete et al., 2013; Diamond et al., 2011). Children with weaker executive abilities should be identified and attempts to strengthen their executive functions should be made before the onset of school, so that the children's chances for high achievement could be maximised.

An exclusive feature of the Lauryna Rakickienė dissertation is a particularly strong and analytical theoretical part where the author views the results of other researchers through the prism of critical thinking, raises original assumptions and provides rational interpretations which indicate scientific maturity of the defendant. The author is an expert in the field of her research, being able to correctly apply adequately selected research methods and evaluate their limitations, as well as to convincingly present her findings to academic community in publications.

Lauryna Rakickienė's doctoral dissertation "Executive Functions and School Success in Primary School Children" is a topical, independent, complete academic work of lasting theoretical and practical value, corresponding to the requirements of Research Council of Lithuania, so the author deserves to receive a doctoral degree (Social sciences, Psychology 06S).

## **LAURYNOS RAKICKIENĖS DISERTACIJOS „PRADINIO MOKYKLINIO AMŽIAUS VAIKŲ VYKDOMOSIOS FUNKCIJOS IR MOKYKLINĖ SĖKMĖ“ (PSICHOLOGIJA 06 S) RECENZIJA**

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**Santrauka.** Pagrindinė Laurynos Rakickienės daktaro disertacijos idėja kyla iš labai aktualios praktinės problemos, tad šis mokslinis darbas svarbus ir vertingas praktiniu požiūriu. Disertacijoje pagrįstas mokslinis idėjos aktualumas bei naujumas, pateikta naujausios mokslinės literatūros analizė, pagrįsti ginamieji teiginiai, tinkamai atliktas tyrimas, mokliškai pagrįstos išvados, naudingos rekomendacijos. Analizuojamos ir recenzijos autoriaus įžvalgos. Disertacijoje pateikti duomenys gali būti naudingi ir mokytojų veikloje.