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SELF-REGULATED LEARNING AND LEARNING EFFECTIVENESS: A CASE STUDY IN AN EIGHT-YEAR GRAMMAR SCHOOL

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ABSTRAKT

Táto štúdia skúma vzťah medzi sebariadeným učením a študijnou úspešnosťou žiakov strednej školy na gymnáziu v Budapešti. Sebariadené učenie bolo merané pomocou dotazníka Motivated Strategies for Learning Questionnaire (MSLQ) a študijná úspešnosť bola hodnotená na základe známok z matematiky a cudzieho jazyka. Analyzované boli údaje od 53 žiakov 7. a 11. ročníka. Viaceré zložky sebariadeného učenia – najmä regulácia úsilia, organizácia času a učebného prostredia, metakognitívna sebaregulácia a výkonové ciele – preukázali významné súvislosti so študijnou úspešnosťou. Testová úzkosť bola u starších žiakov negatívne spojená so študijnými výsledkami. Zistenia poukazujú na význam sebariadeného učenia pre školský úspech a na jeho rozdiely medzi vekovými skupinami a predmetmi.

Keywords: *sebariadené učenie, efektívnosť učenia, študijná úspešnosť, stredná škola, Maďarsko*

ABSTRACT

This study examines the relationship between self-regulated learning and academic achievement among secondary school students in a Budapest grammar school. Self-regulated learning was measured using the Motivated Strategies for Learning Questionnaire (MSLQ), and academic achievement was assessed through grades in mathematics and foreign language. Data from 53 7th and 11th grade students were analysed. Several components of self-regulated learning – particularly effort regulation, time and study environment, metacognitive self-regulation, and performance goals – showed significant associations with academic achievement. Test anxiety was negatively related to achievement among older students. The findings highlight the importance of self-regulated learning in academic success and its variation across age groups and subjects.

Keywords: *self-regulated learning, learning effectiveness, academic achievement, secondary school, Hungary*

Main work

Introduction

Accordingly, both national and international education policy have made the establishment of lifelong learning a central strategic objective, one of the fundamental prerequisites of which is the acquisition of self-regulated learning skills (Gál, 2020). Lifelong learning is based on students' ability to continue learning after leaving the institutional framework of schooling. This

requires learners to regulate several components of the learning process independently, such as selecting an appropriate learning environment, managing their time effectively, and setting learning goals. In addition, various forms of distance education have become increasingly widespread, and their successful completion likewise depends on learners' self-regulated learning abilities. Self-regulation therefore enables learning to take place even in less controlled contexts following formal education (Bacsa, 2012).

These tendencies were already evident prior to the outbreak of the coronavirus pandemic in 2020; however, the introduction of distance education as a result of lockdown measures further intensified the relevance of this issue. Both the pedagogical structure of distance education and the digital learning environment itself rely heavily on self-directed and self-regulated learning (Papp-Danka, 2014). As face-to-face education has now been reinstated in all secondary educational institutions, a key challenge for contemporary education lies in exploring and analysing the experiences gained during periods of remote learning. Looking to the future, this is essential, as online education drew attention to numerous problematic areas in need of development, as well as to additional unresolved questions. Among these relevant issues is students' capacity for self-regulation, as learners often lack adequate self-regulatory strategies and learning motivation – deficits that may have been further amplified by the digital learning environment (Szőke-Milinte, 2021). The experiences of online education have therefore further reinforced the central role and contemporary relevance of self-regulated learning within education.

However, the importance of self-regulated learning is not confined to situations beyond the school context, adulthood, or extraordinary circumstances such as the COVID-19 lockdowns. It also plays a crucial role within traditional, face-to-face institutional education, as experts in the field have identified relationships between the level of development of self-regulated learning skills and academic achievement (Dávid et al., 2016; Garcia & Pintrich, 1994; Józsa & D. Molnár, 2013; Richardson et al., 2012; Wang et al., 2013). From the outset, one of the most significant questions in this line of research has been whether the development of students' self-regulated learning abilities can lead to improvements in learning effectiveness.

Within the Hungarian academic literature, only a limited number of studies have examined the relationship between self-regulated learning and academic outcomes, and these have identified weak but positive correlations (e.g. Bacsa, 2012; Kárpáti & Molnár, 2004). At the same time, there is a lack of recent data on these relationships, particularly from the period following the coronavirus pandemic.

Nevertheless, this remains a highly significant area of research within the study of self-regulated learning. More precise knowledge of which components of self-regulated learning are associated with academic achievement, as well as which additional factors influence this relationship – such as differences related to gender or age group – would be extremely valuable for researchers, educators, and students alike.

In the present study, we conducted a case study addressing the above-mentioned aspects. Through the presentation of the research findings and the anticipated publication of this thesis,

we aim to contribute to the investigation of self-regulated learning and to the ongoing academic discourse surrounding it, a field of considerable relevance in contemporary education.

1. Theoretical background

1.1 The concept of self-regulated learning

Self-regulated learning has been studied for several decades, with numerous theoretical models emerging during the 1980s and 1990s to describe its structure and components. The concept refers to a complex phenomenon situated at the intersection of multiple research domains, each employing distinct terminology and theoretical perspectives (Boekaerts, 1999). Consequently, neither Hungarian nor international scholarship has established a single, unified definition, and even the terminology used to describe the concept varies.

Although definitions of self-regulated learning differ and reflect scholars' theoretical assumptions (Zimmerman, 1990), several recurring elements can be identified. Based on the work of Paul R. Pintrich, Molnár Éva (2014) summarises these as four fundamental conditions: learners' active and constructive role in learning, their capacity to monitor and regulate cognition, motivation, and behaviour, goal- and criterion-oriented organisation of learning, and the mediating function of self-regulation between individual actions and environmental expectations. These conditions correspond to the three core components central to most models of self-regulated learning – cognition, metacognition, and motivation (Vandevelde et al., 2013)

1.2 Models of self-regulated learning

The structure of self-regulated learning has been modelled by numerous scholars, most notably Zimmerman (1990), Winne and Hadwin (1998), and Boekaerts (1999). These models show substantial overlap; for instance, Pintrich's framework incorporates several assumptions common to other theoretical approaches (Schunk, 2005). Pintrich played a central role in the field as a leading theorist and researcher (Schunk, 2005), and his model conceptualises self-regulated learning as a dynamic process consisting of four phases: planning and goal setting, monitoring, control, and reflection. These phases are not assumed to follow a linear sequence but may occur flexibly and in parallel during the learning process (Molnár, 2014; Schunk, 2005).

In the planning phase, learners set goals, develop learning plans, select appropriate strategies, and activate prior knowledge, either automatically or deliberately (Molnár, 2014; Schunk, 2005). The monitoring phase corresponds to the learning process itself, during which learners track progress and make necessary adjustments (Molnár, 2002, 2014). The control phase involves regulating attention, applying coping strategies to manage anxiety or negative emotions, and engaging in help-seeking behaviour when difficulties arise (Molnár, 2014; Pintrich, 1991). The final phase, reflection, entails evaluating performance in relation to previously set goals and outcomes (Molnár, 2014).

Across all phases, Pintrich distinguishes four domains in which self-regulation may occur: cognition, motivation and emotion, environment, and behaviour. However, not all learning activities require self-regulation in every domain (Schunk, 2005). A defining feature of self-regulated learning theories is the integration of motivation and learning strategies within a

coherent framework, emphasising their mutual dependence rather than treating them as independent components (Bacsa, 2012; Zimmerman, 1990)

1.3 Self-regulated learning and learning effectiveness

Multiple components of self-regulated learning influence learning outcomes both independently and through their continuous interaction, supporting learning via the structured application of strategies that facilitate knowledge acquisition and retention (Broadbent & Poon, 2015, p. 2). Despite its importance, the relationship between self-regulated learning and academic achievement has received limited attention in Hungarian research, even though enhancing learning effectiveness is considered one of its central educational functions (Molnár, 2014, p. 41). Earlier studies nevertheless indicate that self-regulated learning plays a substantial role in academic performance (Kárpáti & Molnár, 2004), with subsequent research confirming modest but significant associations between self-regulated learning and school achievement (Bacsa, 2012).

Examining self-regulated learning at the level of its individual components is therefore essential, as certain components may be more strongly related to learning effectiveness than others. International research has frequently highlighted the importance of cognitive strategies, which have been shown to improve academic performance across subjects and grade levels (Garcia & Pintrich, 1994). In addition, effort regulation and self-regulation more broadly have been found to influence achievement independently of performance goals (Palos et al., 2019). Hungarian research similarly identifies cognitive and metacognitive factors as particularly influential, while also recognising the explanatory role of motivational factors such as interest and the perceived value of learning (Bacsa, 2012).

Goals constitute a central element of self-regulation, as students who understand their goal preferences are better able to regulate motivation and effort (Bacsa, 2008). Different goal orientations are associated with different learning strategies, depending on whether students prioritise understanding or high grades (Palos et al., 2019). Normative goal theory distinguishes between mastery goals, oriented towards learning and skill acquisition, and performance goals, which emphasise comparison and outcomes (Bacsa, 2008). Although originally conceptualised as opposites, research has shown that both goal types may coexist within the learning process (Pintrich, 2003, cited in Bacsa, 2008) and may lead to positive outcomes (Bacsa, 2008). Nevertheless, mastery goals are generally associated with more effective self-regulation than performance goals, which tend to focus on short-term outcomes rather than sustained development (Linnenbrink & Pintrich, 2001, cited in Molnár, 2014). Consequently, prioritising mastery goals is widely regarded as essential for creating an optimal learning environment (Bacsa, 2008).

1.4 Measuring learning effectiveness through grades

Learning effectiveness can be measured in various ways, and different assessment forms may relate differently to self-regulated learning (Dent & Koenka, 2016). In Hungary, students' grades and grade point averages remain the most commonly used indicators of academic success. Grades serve to inform teachers, parents, and students about progress and play a key role in secondary and higher education admissions. As such, grading is expected to meet criteria of objectivity, reliability, and validity (Csapó, 2002b). However, grading is influenced by

factors beyond test performance, including classroom participation and teachers' subjective judgements (McMillan & Workman, 1998).

Although learning effectiveness is primarily assessed by teachers, some standardised assessments – such as language examinations or the National Assessment of Basic Competencies – are centrally regulated. Nonetheless, substantial variation exists in assessment practices, including differences in grading standards and thresholds across assessment contexts. Csapó (2002a) identifies several sources of bias in teacher-based assessment, including local value systems, teachers' individual attitudes, perceptual inaccuracies, and student characteristics, all of which may affect the measurement of learning effectiveness.

Grade-based assessment also has limited comparability across schools, as grading is inherently relative and few standardised measures are used in Hungarian education (Lannert, 2006; Csapó, 2002b). Consequently, the educational context plays a decisive role in evaluation, as classroom- and school-level factors interact differently across settings (Lannert, 2006).

Assessment practices are further shaped by subject-specific characteristics. In humanities subjects, affective factors tend to play a stronger role, while task structure and solution variability also influence evaluation (Csapó, 2002a). Mathematics has been shown to display the strongest alignment between test performance and grades (Csapó, 2002a). From the perspective of self-regulated learning, subject-specific differences are likewise evident: foreign language grades have been found to relate to several self-regulated learning components, whereas history shows fewer associations (Bacsa, 2012). Students' motivation and learning strategies also vary by subject, highlighting the subject-specific nature of self-regulated learning processes (Credé & Phillips, 2011, cited in Palos et al., 2019).

For these reasons, subject-related differences must be carefully considered when examining both self-regulated learning and learning effectiveness

2. Methodology

2.1 Aim of the research

In the present study, we conducted a case study in an eight-year grammar school in Budapest with the aim of exploring and gaining a deeper understanding of the relationship between academic achievement and self-regulated learning.

Within Hungarian academic literature, several studies have drawn attention to the potential relationship between self-regulated learning skills and academic outcomes, including the work of Kárpáti and Molnár (2004), Bacsa (2012), Józsa and D. Molnár (2013), and Dávid et al. (2016). Nevertheless, this topic has not been extensively researched in Hungary, and further empirical investigations are required to substantiate the performance-enhancing effects of developing self-regulated learning skills (Dávid et al., 2016). In addition, there is a particular need for up-to-date data in this area, especially from the period following the coronavirus pandemic and the widespread implementation of distance education.

The primary objective of this research is to examine which components of self-regulated learning are associated with academic achievement. In order to enhance academic performance,

it is essential to identify which aspects of self-regulated learning and which specific strategies are most influential, as well as the factors that facilitate their effective use (Dent & Koenka, 2016). Moreover, additional factors – such as age group, gender, and subject area – may also affect these relationships and therefore play an important role in the present study.

In line with these objectives, the following research questions were examined:

1. Is there a relationship, within a given unit of analysis (class), between students' grade point averages and their use of cognitive and metacognitive learning strategies? If so, what is the nature of this relationship?
2. Is there a relationship, within a given unit of analysis, between students' grade point averages and the regulation of their motivation? If so, what is the nature of this relationship?
3. Are subject-specific differences observable in students' patterns of self-regulated learning?
4. Are age-related differences observable in students' patterns of self-regulated learning?
5. Are gender-related differences observable in students' patterns of self-regulated learning?

2.2 Methods

Given the topic of the study, a case study design was selected as the research methodology on the basis of several considerations. Due to the specific characteristics of grades as indicators of learning effectiveness, as well as certain features of self-regulated learning, it was considered important to examine the learning process within a clearly delimited context. The development of self-regulated learning is influenced not only by innate factors (such as temperament) but also by environmental factors, more specifically by both micro- and macro-level contexts (Molnár, 2014). For this reason, assessing students' self-regulated learning skills within a more narrowly defined environment may yield particularly informative results. In addition, learning effectiveness – another central aspect of the present research – is likewise strongly shaped by the learning environment. Accordingly, students' grades were analysed within the context of their specific classes and subjects and were examined in relation to their self-regulated learning skills.

Beyond these considerations, the case study approach was also chosen because, alongside large-scale surveys, examining the relationship between self-regulated learning and academic achievement through the unique characteristics of a specific case can provide valuable insights. The case study methodology allows the complexity of the given case to be foregrounded.

The research employed a single case study design focusing on an eight-year grammar school located in Budapest's Third District. The school is a state-run institution and has consistently ranked among the top 15 grammar schools nationally over the past decade based on competency assessment results and school-leaving examination outcomes. According to its pedagogical programme, the school's primary objective is to prepare students for the school-leaving examination and, consequently, for higher education. The participants were therefore students of an urban grammar school; as such, the findings are not representative of the student population as a whole.

Data collection was conducted within two units of analysis at the school: one seventh-grade class and one eleventh-grade class. Almost all respondents have been enrolled at the school since the fifth grade, meaning that they have attended the grammar school for either three or seven years at the time of data collection.

2.3 Measurement tool

In this study, the Motivated Strategies for Learning Questionnaire (MSLQ) – a questionnaire developed by Pintrich and colleagues – was used to measure self-regulated learning (Pintrich et al., 1991). Among the instruments designed to assess self-regulated learning, the MSLQ is one of the most frequently applied and widely accepted tools, and it has been validated across multiple studies (András et al., 2016; Broadbent & Poon, 2015; Palos et al., 2019).

Although no official Hungarian-language translation of the questionnaire exists, it has been employed in several Hungarian studies, and the Hungarian versions have demonstrated stable reliability in previous empirical research (András et al., 2016; D. Molnár, 2013; Phavadee & Tóth, 2024). Accordingly, in the present study we drew on the Hungarian-language versions already available when compiling the questionnaire, and we also assessed the clarity and comprehensibility of the translation by administering a pilot version to fellow students enrolled in teacher training programmes.

In addition to demographic questions, the MSLQ consists of two main sections: the first examines motivation, while the second focuses on learning strategies. Table 1. presents the subscales used in the present study, along with the number of items included in each subscale.

<table>
<tr><th rowspan="2">1. Motivation scale</th><th colspan="2">2. Learning strategies scale</th></tr>
<tr><th>2.1 Cognitive and metacognitive scale</th><th>2.2 Resource management strategies</th></tr>
<tr><td>1.1 Performance goals
(4 items)</td><td>2.1.1 Organisation
(2x 4 items)</td><td>2.2.1 Time and study environment
(2x 4 items)</td></tr>
<tr><td>1.2 Beliefs about learning and the regulation of these beliefs
(4 items)</td><td rowspan="2">2.1.2 Metacognitive self-regulation
(2x 12 items)</td><td>2.2.3 Effort regulation
(2x 4 items)</td></tr>
<tr><td>1.3 Test anxiety
(5 items)</td><td>2.2.4 Help-seeking
(2x 4 items)</td></tr>
</table>

Table 1. Subscales applied in the study and the number of items included in each subscale

The original measurement instrument (MSLQ) was supplemented with two self-developed items in order to facilitate a deeper exploration of the relationships examined in the study and to support a more nuanced interpretation of the responses obtained. These additional items were as follows:

- *44. In your opinion, what/who most strongly influences academic achievement?*

(multiple-choice item; more than one option could be selected)
    - myself
    - the teacher
    - textbooks and other supplementary materials
- *45. In your opinion, to what extent do your grades realistically reflect your level of knowledge? (7-point Likert scale)*

Including these two additional items, the questionnaire consisted of a total of 70 items. Of these, 69 items were rated using a 7-point Likert scale, while one item required respondents to choose from three predefined options. During completion of the questionnaire, students first responded to demographic questions (2 items), followed by general, subject-independent statements related to learning (18 items). Subsequently, the same statements were evaluated first in relation to mathematics (25 items) and then in relation to the foreign language(s) studied by the respondents (25 items).

In addition, learning effectiveness was operationalised – using the approach described above – by calculating the average of students' grades in the subjects examined in the study (mathematics and foreign language). For each subject, grades awarded at mid-year and at the end of the previous academic year (2023/2024) were taken into account, along with the most recently awarded grade from the current academic year (2024/2025). For each subject, the mean of these three grades was used in the analyses.

2.4 Data collection, sample

The questionnaire on self-regulated learning was administered online via the Microsoft Forms platform. Data collection took place in November 2024. Participation in the survey was entirely voluntary, and the data were based on self-report; that is, students were required to describe and reflect on their own independent learning processes.

Following data cleaning, responses from a total of 53 participants were retained for analysis. Of these, 26 respondents were students in the seventh grade, while 27 respondents were enrolled in the eleventh grade. Accordingly, the sample comprised two age groups: 12–13-year-old and 16–17-year-old students. The gender distribution of the sample is presented in Table 2. The proportion of male and female participants was almost identical, reflecting the approximately equal gender distribution within the classes involved in the study.

	7. grade	11. grade	total
girl	12	16	28
boy	14	11	25
total	26	27	53

Table 2. Gender distribution of the research sample by grade level (n=53)

The choice of the subjects examined in the present study – namely mathematics and foreign language – was also motivated by the fact that students in the sample study these subjects for a relatively high number of weekly lessons. In the seventh-grade class, students study foreign

language for four lessons per week and mathematics for five lessons per week, while in the eleventh-grade class, foreign language instruction amounts to ten lessons per week (six lessons for the first foreign language and four lessons for the second foreign language), and mathematics is taught for three lessons per week. As eleventh-grade students are scheduled to take an early school-leaving examination in their first foreign language (English or German) at the end of the current academic year, and in mathematics in the following year, assessing their self-regulated learning abilities is particularly timely in relation to both subjects, as preparation for these examinations is characterised by intensive independent learning.

It is also important to note that, as the case study was conducted in a grammar school located in Budapest, the academic averages of the participating students are generally above average in the subjects examined. Among eleventh-grade respondents, grade point averages ranged between 3.00 and 5.00 in mathematics and between 4.00 and 5.00 in foreign language. For seventh-grade respondents, grade point averages in both mathematics and foreign language fell between 4.00 and 5.00. Across the entire sample, the mean grade was 4.49 in mathematics (SD = 0.50) and 4.77 in foreign language (SD = 0.29).

3. Results

Statistical analyses were conducted using the software package JASP version 0.18.3. In addition to descriptive statistical analyses, correlation analyses and independent-samples t-tests were performed, and normality was assessed using the Shapiro–Wilk test. To examine potential differences between subjects, paired-samples t-tests were applied when the relevant variables followed a normal distribution; when the assumption of normality was violated, the Wilcoxon signed-rank test was used. Differences between genders and age groups were analysed using independent-samples t-tests for normally distributed variables, and the Mann–Whitney U test when normality was not met. Effect sizes were calculated using Cohen's d, and in the case of Mann–Whitney tests, rank-biserial correlation coefficients were reported (Takács, 2016).

The presentation of the results begins with the responses to the two additional items included by the author in the questionnaire, as these are considered helpful for contextualising and further refining the interpretation of the subsequent findings.

In response to the question concerning what or who most strongly influences academic achievement, respondents were able to select multiple options. When responses from the two grade levels were analysed jointly, the most frequently indicated factor was "the teacher", which was selected on 42 occasions (40.78%). The second most frequently selected factor was "myself", indicated 37 times (35.92%). These two response options were most often selected together in both grade levels, with 10 respondents (37.04%) in the eleventh grade and 8 respondents (30.77%) in the seventh grade selecting both factors simultaneously.

It is important to note, however, that notable differences emerged between the two grade levels when examining this item. Among eleventh-grade students, "the teacher" was the most frequently selected factor (42,31%), followed by "myself" (32,69%). In contrast, among seventh-grade students, "the teacher" and "myself" were selected with equal frequency (39,22% each).

In addition, while only a single eleventh-grade respondent (3.70%) selected “myself” as the sole factor influencing academic achievement – indicating that they believed their results were influenced exclusively by their own actions – this response pattern was considerably more frequent among seventh-grade students. In the seventh grade, six respondents (23.08%) identified “myself” as the only factor affecting their academic performance.

The second additional item examined students’ perceptions of how accurately their grades represent their actual knowledge and performance, that is, the extent to which grades can be considered a reliable indicator of learning effectiveness.

In the case of this item, a substantial difference emerged between the two grade levels. Among eleventh-grade respondents, more than one third (37.04%) indicated that their grades were rather unrealistic or only slightly realistic, suggesting that they believed their grades often fail to reflect their true level of knowledge. In contrast, no seventh-grade respondents selected the option indicating that grades were rather unrealistic, and only 7.69% reported that their grades were only slightly realistic. The vast majority of seventh-grade respondents (84.61%) considered their grades to be rather realistic, largely realistic, or completely realistic indicators of their knowledge.

Despite these differences, the proportion of students who selected the response option “completely realistic” was similar across the two grade levels: 11.54% among seventh-grade students and 11.11% among eleventh-grade students (Figure 1.).

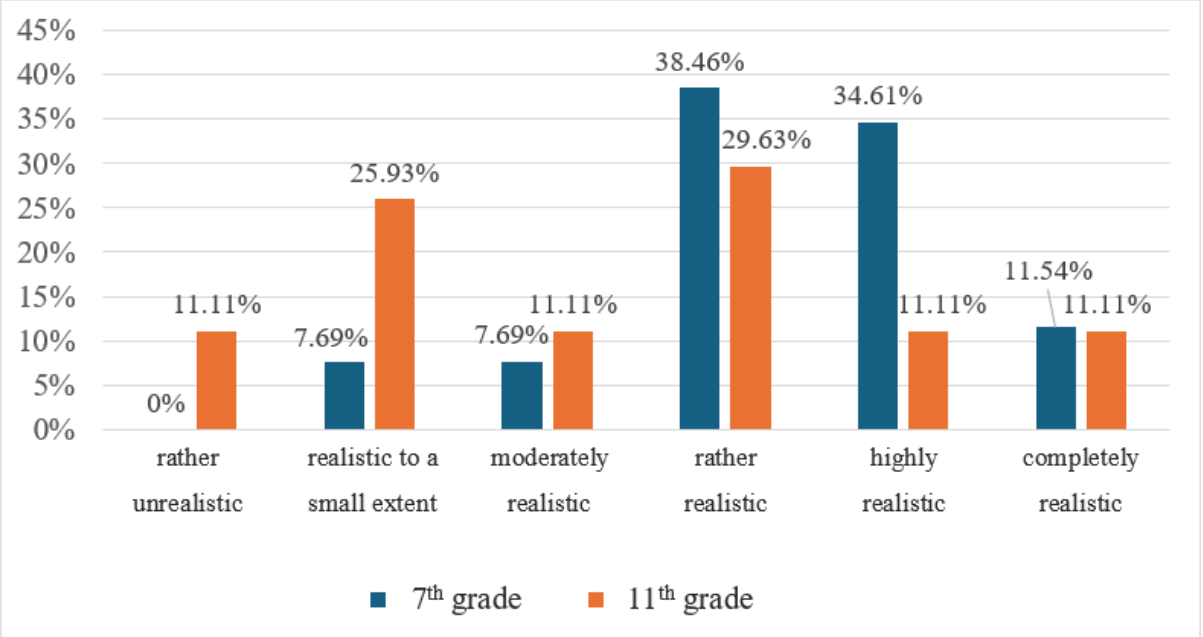


Figure 1. „In your opinion, to what extent do your grades accurately reflect your level of knowledge? (n = 53)

When these responses were compared with students' academic performance, it can be observed that those who indicated that their grades completely reflect their level of knowledge all achieved a grade point average of 5.00 in the subjects examined, with a single exception among seventh-grade students, whose average was 4.66.

At the same time, respondents with the lowest academic averages also tended to express positive views regarding this item, with most selecting the response option rather realistic. Those who selected the lowest value – that is, rather unrealistic – were all eleventh-grade students, and their grade point averages ranged between 4.33 and 4.83; therefore, they did not belong to the group with the lowest academic performance.

3.1 Self-regulated learning and learning effectiveness

To explore the relationships between the level of self-regulated learning and academic achievement, data obtained from the MSLQ questionnaire were correlated with the participating students' grade point averages in the relevant subjects.

The presentation of the results begins with the seventh-grade cohort, for whom statistically significant correlations were identified between grades and several subscales. Two of these subscales were examined independently of specific subjects, meaning that the corresponding questionnaire items were answered in a general sense rather than in relation to a particular subject.

One such subscale was performance goals, which is related to how students interpret their own role and participation in the learning process and the types of goals that guide their behaviour (e.g. grades, rewards, or others' evaluations). The assumption of normality, tested using the Shapiro–Wilk test, was not violated ($W = 0.95$, $p = 0.201$); therefore, Pearson's correlation analysis was conducted. This revealed a statistically significant, moderate positive relationship between performance goals and grade point average ($r = 0.52$, $p = 0.007$). These findings support assumptions present in the relevant literature, suggesting that performance goals may positively influence learning effectiveness. However, it should be noted that from the perspective of self-regulation, performance goals are generally considered less effective than mastery goals.

Another subject-independent subscale that demonstrated a statistically significant relationship was effort regulation. The distribution of this variable did not deviate from normality ($W = 0.97$, $p = 0.632$), and Pearson's correlation indicated a strong positive relationship between scores on this subscale and academic achievement ($r = 0.63$, $p < 0.001$).

In the case of the metacognitive self-regulation subscale, the assumption of normality was significantly violated ($W = 0.85$, $p = 0.001$); therefore, Kendall's tau-b correlation coefficient was applied. A statistically significant, moderate positive relationship was identified between metacognitive self-regulation and mathematics grades, as well as mathematics grade point average ($\tau = 0.35$, $p = 0.026$). In contrast, for the other subject examined – foreign language – the relationship observed on this subscale was not statistically significant ($r = 0.33$, $p = 0.099$).

Turning to the data from the eleventh-grade cohort, several components also showed correlations with academic achievement. However, only one component was common to both

age groups: effort regulation. Following the normality test ($W = 0.88$, $p = 0.005$), a statistically significant, moderate positive relationship was likewise observed among eleventh-grade students between effort regulation and grade point average ($\tau = 0.37$, $p = 0.013$).

In addition, scores on the time and study environment subscale among eleventh-grade respondents demonstrated a moderate, positive correlation with learning effectiveness ($r = 0.47$, $p = 0.013$).

A further notable finding concerns test anxiety. When examining the foreign language subject, a statistically significant, strong negative correlation was identified ($\tau = -0.54$, $p < 0.001$). This result may indicate that students with higher academic achievement experience lower levels of stress during tests and examinations; alternatively, it is also possible that poorer academic performance contributes to increased levels of anxiety.

In summary, the components of self-regulated learning that showed significant correlations with academic achievement in at least one of the two grade levels are presented in Table 3.

	Academic achievement	
Components of self-regulated learning	7th grade	11th grade
Performance goals	0,52**	n.s.
Metacognitive self-regulation (mathematics)	0,47*	n.s.
Effort regulation	0,63**	0,42*
Time and study environment	n.s.	0,47*
Test anxiety (foreign language)	n.s.	-0,63**

*Note: ** p<0,01, * p<0,05*

Table 3. Significant correlations between components of self-regulated learning and learning effectiveness (n= 53)

3.2 Self-regulated learning across subject areas

The various components of self-regulated learning were also compared across the two subjects examined in order to identify potential differences.

At the eleventh-grade level, a statistically significant difference between mathematics and foreign language was identified for one component of self-regulated learning, namely test anxiety. The distribution of this variable deviated from normality ($W = 0.77$, $p < 0.001$); therefore, the Wilcoxon signed-rank test was applied. The results revealed a statistically significant difference between the two subjects ($W = 274.50$, $p < 0.001$). Further descriptive statistics related to the test anxiety subscale are presented in Table 4.

	Test anxiety - Mathematics	Test anxiety – Foreign language

N	27	27
Mean	3,36	2,56
SD	1,74	1,52

Table 4. Test anxiety subscale across the examined subjects (n = 27)

The observed difference in test anxiety indicates that participating students experience significantly higher levels of anxiety during assessments in mathematics than in foreign language subjects.

This finding may be related to the students' grades, as a statistically significant difference was identified between eleventh-grade students' foreign language and mathematics grades ($W = 2.50$, $p < 0.001$). Furthermore, as demonstrated by a previously presented result, a statistically significant and strong negative correlation was found at this grade level between test anxiety and academic achievement in foreign language ($\rho = -0.63$, $p < 0.001$). In other words, students with higher academic averages are likely to experience lower levels of stress and anxiety during assessments.

Consequently, the difference in grades between the two subjects may help to explain why a subject-specific difference in test anxiety emerged among eleventh-grade students. By contrast, in the seventh grade, the present analyses did not reveal any statistically significant differences between the examined subjects for any of the self-regulated learning subscales.

3.3 Self-regulated learning skills across age groups

The study also examined potential differences in self-regulated learning skills between the two age groups investigated (seventh and eleventh grade). For variables that followed a normal distribution, independent-samples t-tests were applied, while the Mann–Whitney U test was used in cases where the assumption of normality was violated. For one subscale, the assumption of homogeneity of variances was not met according to Levene's test ($p = 0.031$); therefore, Welch's t-test was applied in this case.

The subscales for which statistically significant differences between age groups were identified are summarised in Table 5.

Components of self-regulated learning	Type of test applied	Result	Effect size
Organisation and learning organisation (mathematics)	Mann-Whitney U test	W = 484,00*	r = 0,38
Time and study environment	Mann-Whitney U test	W = 516,00**	r = 0,47
Effort regulation	Mann-Whitney U test	W = 544,00**	r = 0,55
Performance goals	Independent-samples t-test	t(51) = 3,09**	d = 0,85
Metacognitive self-regulation (foreign language)	Welch's t-test	W= 2,053*	d = 0,57

*Note: ** p<0,01, * p<0,05*

Table 5. Subscales showing significant differences between age groups (n = 53)

The strategies associated with the organisation and learning organisation subscale support learners in selecting relevant information and establishing connections between the elements to be learned (Pintrich, 1991). These strategies include, for example, identifying key concepts, creating outlines, and producing graphical representations or tables. For this subscale, a statistically significant difference emerged between the age groups, favouring seventh-grade students (Table 6.).

Age group	7th grade	11th grade
N	26	27
Median	3,36	2,75
Mean	3,962	3,222
SD	1,498	1,129

Table 6. Organisation and learning organisation (Mathematics) by age group (n = 53)

When examining the same subscale in relation to the foreign language subject, the mean score of seventh-grade students was likewise higher; however, this difference was not statistically significant ($t(51) = 0.65$, $p = 0.521$).

A further noteworthy finding related to the organisation subscale is that, in both age groups, students reported very limited use of graphical representations. As shown in Table 7., the most frequent response to the item assessing the use of graphical diagrams was the lowest scale value (1) among seventh-grade students (48.15%), while among eleventh-grade students the most common response was also low, namely 2 (38.46%).

Age group	7th grade	11th grade
N	26	27
Mean	2,58	1,96
SD	1,84	1,19

Table 7. „During independent study, I create tables, diagrams, or other graphical representations in order to organise information.” (n = 53)

A statistically significant difference was also observed between the two age groups with regard to the performance goals subscale, with seventh-grade students again demonstrating higher mean scores (Table 8.).

Age group	7th grade	11th grade
N	26	27
Mean	5,54	4,60
SD	1,01	1,19

Table 8. Performance goals by age group (n = 53)

One item within this subscale (Item 6) specifically examined whether students aim to perform well in order to prove themselves to others (such as family members, friends, or teachers). Analysis of this item revealed one of the largest differences between the mean scores of the two age groups, again favouring seventh-grade students (Grade 7: n = 26, M = 5.08, SD = 1.83; Grade 11: n = 27, M = 3.37, SD = 1.67).

In addition, statistically significant differences between the age groups were identified for the time and study environment, effort regulation, and metacognitive self-regulation in foreign language subscales.

3.4 Self-regulated learning skills by gender

With regard to gender, statistically significant differences emerged for several components, favouring female students. One such subscale was organisation and learning organisation; in the context of the foreign language subject, significant gender differences were identified in both age groups, with large effect sizes (Table 9.). As shown in Table 10., female students exhibited significantly higher mean scores in both age groups.

Age group	t-value (df)	Significance level	Effect siye
7th grade	t(25) = 2,30	p = 0, 031	d = 0,90
11th grade	t(24) = 3,44	p = 0,002	d = 1,35

Table 9. Results of the independent-samples t-test and effect sizes (n = 53)

Age group	7th grade		11th grade	
Gender	girls	boys	girls	boys
N	12	14	16	11
Mean	4,56	3,27	4,17	2,82
SD	1,39	1,47	1,02	0,98

Table 10. Organisation and learning organisation (Foreign language) by age group and gender (n = 53)

In mathematics, no statistically significant gender differences were found on this subscale (Grade 7: t(24) = 1.84, p = .077; Grade 11: t(25) = 0.84, p = .407); however, female students demonstrated higher mean scores in both age groups (Table 11.).

Age group	7th grade		11th grade	
Gender	girls	boys	girls	boys
N	12	14	16	11
Mean	4,52	3,48	3,38	3,00
SD	1,52	1,35	1,21	1,00

Table 11. Organisation and learning organisation (Mathematics) by age group and gender (n = 53)

A further statistically significant gender difference emerged for another component of self-regulated learning, though only among eleventh-grade students. In the case of performance goals, female students again demonstrated significantly higher mean scores than males (t(25) = 2.84, p = .009), with a large effect size (d = 1.12).

Discussion

The primary aim of this study was to examine the relationship between self-regulated learning and academic achievement. The findings indicate that several components of self-regulated learning are moderately to strongly and positively associated with students' grades. Among cognitive and metacognitive strategies, time and study environment, effort regulation, and metacognitive self-regulation in mathematics showed significant relationships with academic performance. Within the motivational domain, performance goals were also significantly related to grades.

In the eleventh grade, test anxiety demonstrated a strong negative association with academic achievement ($\rho = -0.63$, $p < .001$), suggesting that higher-achieving students experience less anxiety in assessment situations. At the same time, prior research indicates that this relationship may also operate in the opposite direction, as poorer performance can increase anxiety, which in turn impairs concentration, problem-solving, and working memory (Roszik, 2022).

This finding is closely related to subject-specific results: while no such pattern emerged in the seventh grade, eleventh-grade students reported significantly higher test anxiety in mathematics than in foreign language. This difference may be explained by achievement levels, as eleventh-grade students performed significantly better in foreign language than in mathematics. Apart from test anxiety, no significant subject-related differences were found in the development of self-regulated learning.

Age-group comparisons revealed several significant differences, all favouring seventh-grade students. One key component was performance goals, linked to external motivation. Previous research suggests that extrinsic motivation tends to decline with age (Józsa, 2000; Gaskó, 2009),

and the present findings support this trend. Moreover, a significant relationship between performance goals and academic achievement was observed only in the seventh grade, indicating a stronger influence of external motivational factors at younger ages.

Gender differences were also examined. Significant differences emerged for organisation and learning organisation in foreign language and, among eleventh graders, for performance goals, with female students scoring higher in all cases. These results align with earlier findings suggesting that girls are more responsive to external expectations and achievement-related feedback.

The study has several limitations. Self-report questionnaires inherently rely on students' reflective abilities, which may bias responses, particularly in the domain of self-regulated learning. Additionally, limited variability in grades restricted the range of academic achievement. While some sources of bias related to grading were controlled by examining classes within a single school, subjective elements of assessment could not be fully eliminated.

Future research should involve larger and more diverse samples, include additional age groups, and adopt longitudinal designs. Combining questionnaires with qualitative methods such as interviews or think-aloud protocols could provide a more comprehensive understanding of self-regulated learning processes.

Overall, the findings underline the central role of self-regulated learning in contemporary education and highlight the importance of supporting students in developing these skills – an essential task for educators both now and in the future.

References

ANDRÁS, I. – RAJCSÁNYI-MOLNÁR, M. – BACSA-BÁN, A. – CSERNÉ ADERMANN, G. – JUHÁSZ, L. Z. – NÉMETH, I. P. 2016. A hallgatói önszabályozott tanulás vizsgálata. *Dunakavics*, IV(5), s. 49–80.

BACSA, É. 2008. A tanulási célok vizsgálata az angol nyelvtanulás tükrében. *Iskolakultúra*, 18(7–8).

BACSA, É. 2012. Általános iskolások önszabályozott tanulását mérő kérdőív adaptálása. *Alkalmazott Pszichológia*, 4, s. 53–80.

BROADBENT, J. – POON, W. L. 2015. Self-regulated learning strategies and academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education*, 27, s. 1–13.

CSAPÓ, B. 2002a. Az iskolai tudás felszíni rétegei: Mit tükröznek az osztályzatok? In: CSAPÓ, B. (ed.). *Az iskolai tudás*. Budapest: Osiris Kiadó.

CSAPÓ, B. 2002b. Az iskolai értékelés kérdései. Budapest: Osiris Kiadó.

D. MOLNÁR, É. 2013. *Tudatos fejlődés. Az önszabályozott tanulás elmélete és gyakorlata*. Budapest: Akadémiai Kiadó.

DÁVID, M. – TASKÓ, T. – HÉJJA-NAGY, K. – MESTER, D. – DORNER, L. – ESTEFÁNNÉ VARGA, M. 2016. Az önszabályozó tanulás fejlettségének összefüggései a tanulási eredményességgel és az IKT-használat gyakoriságával. *Magyar Pszichológiai Szemle*, 71(1), s. 197–225.

DENT, A. L. – KOENKA, A. C. 2016. The relation between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. *Educational Psychology Review*, 28(3), s. 425–474.

FÉNYES, H. – GÁL, E. 2020. A nemi különbségek megjelenése az általános iskolában. *KAPOCS*, 3(2).

GÁL, M. 2020. Az önszabályozó tanulás és az önhatékonyság tudományelméleti alapjainak és pedagógiai megközelítésének vizsgálata. *Eruditio-Educatio*, 15(2), s. 5–22.

GARCIA, T. – PINTRICH, P. R. 1994. Regulating motivation and cognition in the classroom: The role of self-schemas and self-regulatory strategies. In: *Issues and Educational Applications*, vol. 15, s. 127–154.

GASKÓ, K. 2009. Az önszabályozás és a tanulási motivációk szerepe serdülőkorban. *Pedagógusképzés*, 7(2–3).

HEIRWEG, S. – DE SMUL, M. – DEVOS, G. – VAN KEER, H. 2019. Profiling upper primary school students' self-regulated learning through self-report questionnaires and think-aloud protocol analysis. *Learning and Individual Differences*, 70, s. 155–168.

JÓZSA, K. 2000. Az iskola és a család hatása a tanulási motivációra. *Iskolakultúra*, 10(8), s. 69–82.

JÓZSA, K. – D. MOLNÁR, É. 2013. The relationship between mastery motivation, self-regulated learning and school success: A Hungarian and wider European perspective. In: *Educational Psychology*, s. 265–304.

KÁRPÁTI, A. – MOLNÁR, É. 2004. Esélyteremtés az oktatási informatika eszközeivel: A Roma Oktatási Informatikai projekt első tanéve. *Iskolakultúra*, 14(12).

LANNERT, J. 2006. Az iskolaeredményességi kutatások nemzetközi tapasztalatai. In: NAGY, M. – LANNERT, J. (eds.). *Eredményes iskola: Adatok és esetek*. Budapest: Országos Közoktatási Intézet, s. 17–42.

McMILLAN, J. H. – WORKMAN, D. 1998. Classroom assessment and grading practices: A review of the literature. Nashville: Metropolitan Educational Research Consortium.

MOLNÁR, É. 2002. Az önszabályozott tanulás. *Iskolakultúra*, 9, s. 3–17.

MOLNÁR, É. 2014. Az önszabályozott tanulás pedagógiai jelentősége. In: *Tanulmányok a neveléstudomány köréből, 2013. Tanulás és környezete*. Budapest: MTA Pedagógiai Tudományos Bizottság, s. 29–54.

PALOS, R. – MAGUREAN, S. – PETROVICI, M. C. 2019. Self-regulated learning and academic performance – The mediating role of students' achievement goals. *Revista de Cercetare si Interventie Sociala*, 67, s. 234–249.

PAPP-DANKA, A. 2014. *Az online tanulási környezettel támogatott oktatási formák tanulásmódszertanának vizsgálata*. Budapest: ELTE Eötvös Kiadó.

PHAVADEE, S. – TÓTH, P. 2024. Validating the Hungarian versions of MSLQ and MAI intended for use with Hungarian minority students in Slovakia. *Pedagógusképzés*, 23(1), s. 55–82.

PINTRICH, P. R. 1991. *A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ)*. Ann Arbor: University of Michigan.

RICHARDSON, M. – ABRAHAM, C. – BOND, R. 2012. Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), s. 353–387.

ROSZIK, D. 2022. A tesztszorongás hatása az iskolai teljesítményre. *Módszertani Közlemények*, 62(1), s. 34–46.

SCHUNK, D. H. 2005. Self-regulated learning: The educational legacy of Paul R. Pintrich. *Educational Psychologist*, 40(2), s. 85–94.

SZŐKE-MILINTE, E. 2021. Digitális tanulás és tanulási motiváció. In: BALÁZS, L. (ed.). *Digitális kommunikáció és tudatosság*. Budapest: Hungarovox Kiadó, s. 9–23.

TAKÁCS, S. 2016. *Bevezetés a matematikai statisztikába*. Budapest: Antarész Kiadó.

VANDEVELDE, S. – VAN KEER, H. – ROSSEEL, Y. 2013. Measuring the complexity of upper primary school children's self-regulated learning: A multi-component approach. *Contemporary Educational Psychology*, 38(4), s. 407–425.

WANG, C.-H. – SHANNON, D. M. – ROSS, M. E. 2013. Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. *Distance Education*, 34(3), s. 302–323.

WINNE, P. – HADWIN, A. 1998. Studying as self-regulated learning. In: *Metacognition in Educational Theory and Practice*, vol. 93, s. 277–304.

ZIMMERMAN, B. J. 1990. Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, 25, s. 3–17.

Résumé: Self-regulated learning is widely recognised as a key determinant of academic success and a fundamental prerequisite for lifelong learning. As contemporary education increasingly requires students to learn autonomously, understanding how self-regulated learning relates to academic achievement has become particularly important. However, empirical research on this relationship remains limited within the Hungarian secondary education context. This study addresses this gap by examining the associations between self-regulated learning components and academic performance, while also considering age, gender, and subject-specific differences. By exploring these patterns within a real school setting, the research aims to contribute to a more nuanced understanding of how self-regulated learning develops and influences achievement. The findings are intended to support educators in identifying key areas for intervention and to reinforce the importance of fostering self-regulated learning skills as a central educational goal.

Résumé (Slovakian): Sebariadené učenie je všeobecne považované za kľúčový determinant študijného úspechu a za základný predpoklad celoživotného vzdelávania. Keďže súčasné vzdelávanie čoraz viac vyžaduje, aby sa žiaci učili autonómne, porozumenie vzťahu medzi sebariadeným učením a študijnou úspešnosťou nadobúda osobitný význam. Empirický výskum tohto vzťahu však zostáva v kontexte maďarského stredoškolského vzdelávania obmedzený. Táto štúdia reaguje na uvedenú medzeru skúmaním súvislostí medzi jednotlivými komponentmi sebariadeného učenia a študijným výkonom, pričom zohľadňuje aj vekové, rodové a predmetovo špecifické rozdiely. Analýzou týchto vzťahov v reálnom školskom prostredí sa výskum usiluje prispieť k hlbšiemu porozumeniu vývinu sebariadeného učenia a jeho vplyvu na školskú úspešnosť. Zistenia majú slúžiť ako podpora pre pedagógov pri identifikovaní kľúčových oblastí intervencie a zároveň zdôrazňujú význam rozvíjania sebariadeného učenia ako centrálneho cieľa vzdelávania.

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