UNIVERSITY OF SZEGED
DOCTORAL SCHOOL OF EDUCATION

RÓBERT CSÁNYI

TEST-TAKING ENGAGEMENT IN LOW-STAKES CONTEXT: AN EDUCATIONAL DATA SCIENCE APPROACH

PHD SUMMARY

SUPERVISOR:
PROF. DR. GYÖNGYVÉR MOLNÁR
PROFESSOR OF EDUCATION

SZEGED
2025

Introduction

The digital transformation of education has enabled the massive collection of student data, fostering the rise of educational data science (EDS) – an interdisciplinary field that combines education and data science to better understand and support learning. One key innovation is the use of process data, which captures not only students' responses but also their behavior during computer-based assessments (Provasnik, 2021).

A critical challenge in this context is interpreting test-taking behavior, especially in low-stakes assessments where students may not fully engage. Disengagement can distort assessment results and mask students' true abilities (Wise et al., 2014). Despite increasing interest in test-taking engagement and digital assessment, limited research has addressed how behavioral indicators – such as response time or strategy use – relate to complex problem-solving (CPS) performance.

The primary aim of this dissertation is to investigate test-taking engagement in technology-based assessments through the lens of educational data science. Based on three empirical studies, it examines how process data and response patterns can provide insights into students' engagement during assessments. The dissertation seeks to enhance the validity and interpretability of assessment results in digital environments.

The dissertation addresses three main research gaps in the study of test-taking engagement in technology-based assessments. First, while both self-reported and response time-based indicators are commonly used to measure engagement, few studies have examined these approaches simultaneously or systematically compared their outcomes. Second, although previous research has identified various predictors of test-taking engagement, the results have been partly contradictory and many studies have ignored the multilevel structure of the data, limiting the robustness of their conclusions. Third, while students' problem-solving behavior, especially when using the VOTAT strategy, has been widely studied, the role of test-taking engagement in these behaviors has not been taken into account. By addressing these gaps, the dissertation contributes to a more comprehensive understanding of engagement in low-stakes digital assessment contexts.

Based on the identified research gaps the general research questions (RQs) of the dissertation are the following.

RQ1: Which of the methods tested is the most appropriate and valid response time-based method for measuring students' test-taking effort in interactive, complex problem-solving situations?
RQ2: What is the relationship between self-reported effort and response time effort?
RQ3: How does test-taking effort change as the test progresses based on response time effort?
RQ4: What are the person- and item-level factors that predict disengaged responses?
RQ5: What is the role of test-taking effort in the use of exploration strategies in complex problem solving?

Methods

The sample consisted of first-year full-time students from the University of Szeged. The assessment was conducted shortly after the start of their studies. Although participation was voluntary, students who successfully completed the test received a course credit as an incentive.

A total of 1,748 students (46.2% of the target population) took part in the study (mean age = 19.80 years, SD = 1.92 years), 53.0% of whom were female.

Ten CPS tests with fictional problems developed using the MicroDYN approach were used in the project. The MicroDYN problems can be solved in a relatively short time, are not based on prior school knowledge (Greiff, Wüstenberg, Molnár, et al., 2013; Funke, 2014), and are reliable and valid forms of CPS assessment (Greiff, Wüstenberg, Molnár, et al., 2013; Greiff et al., 2018; Molnár & Csapó, 2018).

The tasks consisted of two distinct phases, knowledge acquisition and knowledge application phase (Greiff, Wüstenberg, Molnár, et al., 2013). In the first phase students had to explore the relationships between input and output variables by interacting with the test environment. They could manipulate the input variables and then observe how these changes affected the output variables. In the second phase, students had to apply the knowledge they had acquired in the first phase by changing the values of the input variables to obtain predefined values of the output variables. The problems became increasingly complex, that is, they involved more and more relations between input and output variables. The easiest problems had two input variables and one output variable with two relationships, while the most difficult problems had three input variables, three output variables and three relationships. The test reliability was good ($\alpha = .88$)

The assessment was conducted through the eDia system (Csapó & Molnár, 2019), and the testing procedure was supervised by proctors. Those who enrolled for the survey were given two two-hour sessions to complete the CPS tests and other cognitive tests. At the beginning of the test, participants were familiarised with the user interface and completed a warm-up exercise. After logging into eDia, they had 60 minutes to complete all the exercises and questionnaires. After completing the test, they received immediate feedback on their average performance and detailed feedback a week later.

In the first study, students' test-taking effort was examined by integrating and comparing traditional self-report questionnaire data and students' test-taking behavior, based on the analysis of process data. Previous research has developed several methods based on process data to identify disengaged responses. These methods produce different results on the same sample (e.g. Goldhammer et al., 2016), so we aimed to investigate the optimal method. We analyzed the relation between test performance, time on task, number of clicks and test-taking effort. Finally, previous research suggest that the test-taking profile of students depends on a number of factors, and studies have found different results. The number and characteristics of groups vary depending on the task, the sample and the variables included in the analysis. Therefore, we used k-means cluster analysis to group students based on the data generated during the test completion and to examine the characteristics of the clusters. These findings have provided the basis for further investigation of how individual and item-related factors contribute to test-taking behavior.

The second study examined the item- and person-level factors that influence test-taking disengagement. Research results suggest that test-taking effort depends on many factors. Some factors are under-researched, such as working memory capacity, while studies have found contradictory results for other factors, such as item difficulty, ability level and gender. Furthermore, many studies have not taken into account the multilevel nature of data, as they have focused on either the item or the person being studied. As a consequence, multilevel modelling was used to identify item- and person-level factors that influence test-taking disengagement.

Building on these results, the third study focused on how test-taking effort is related to learners' behavioral patterns in complex problem-solving tasks.

The aim of the third study was to investigate the role of test-taking effort in knowledge acquisition via problem exploration behavior used in complex problem-solving environment. Several studies have investigated how students can be classified using their problem-solving strategy. Previous research has produced different results and has not always been able to explain the different characteristics of different groups. Therefore, we investigated the role of test-taking effort in the problem-solving strategy used, specifically in the knowledge acquisition phase of the problem-solving process. Students' exploration behavior was coded based on the VOTAT strategy, and latent class analysis was used to identify students' behavioral and learning profiles. Then the extent and variation of test-taking effort in the different groups was examined. This allowed a deeper understanding of the interaction between test-taking engagement and problem-solving behavior in low-stakes digital assessment contexts.

The dissertation contributes to a deeper understanding of test-taking engagement in technology-based assessments by combining process data with traditional self-report measures, and by applying innovative analytical approaches. Despite the increasing availability of process data in technology-based testing, relatively few studies have systematically compared behavioral and self-reported indicators of disengagement. Furthermore, the research addresses methodological gaps by accounting for the multilevel structure of assessment data and exploring under-investigated predictors such as working memory. The third study adds to the field by integrating test-taking effort into the analysis of complex problem-solving behavior, an aspect largely ignored in previous research. Together, these studies offer a novel, data-driven perspective on how students engage with assessment tasks, and provide valuable insights for improving the validity and interpretation of test results in educational measurement.

This dissertation is presented in a *study-based format*. The main part of the dissertation contains three empirical studies published in D1 and Q1 journals:

(1) Csányi, R., & Molnár, G. (2023). How do test-takers rate their effort? A comparative analysis of self-report and log file data. *Learning and Individual Differences*, *106*, 102340. https://doi.org/10.1016/j.lindif.2023.102340

(2) Csányi, R., & Molnár, G. (2024). Item- and person-level factors in test-taking disengagement: Multilevel modelling in a low-stakes context. *International Journal of Educational Research Open*, *7*, 100373. https://doi.org/10.1016/j.ijedro.2024.100373

(3) Csányi, R., & Molnár, G. (2025). Looking beyond students' exploration and learning strategies: The role of test-taking effort in complex problem-solving. *Intelligence*, *109*, 101907. https://doi.org/10.1016/j.intell.2025.101907

Results and discussion

The aim of the dissertation is to investigate test-taking engagement in complex problem-solving tasks, with a focus on its measurement, predictors, and effects on learners' behavior and performance. This chapter discusses and summarizes the results of three empirical studies that contribute to a deeper understanding of test-taking engagement from different perspectives. The first study focuses on comparing self-report and behavioral indicators of engagement, the second uses multilevel modeling to examine person- and item-level predictors, and the third examines

how engagement influences students' exploration strategies in problem-solving tasks. The aim of this chapter is to integrate these findings, interpret them on the basis of existing research, and highlight their theoretical and practical implications.

The first study focused on measuring test-taking effort, a construct most often captured using self-report or behavioral indicators such as response time. There are several operationalizations of response time-based measures, of which we examined six to determine the most appropriate for our research. Validation criteria was used to select the optimal response time-based method (Goldhammer et al., 2016). The optimal method is the one that best separates correct responses identified as disengaged from those identified as engaged. Among the methods, the *proportion correct greater than zero* P+>0% method was found to be the most accurate based on the validation criterion used, which is consistent with results reported in Goldhammer et al. (2016). To determine a threshold of P+>0%, the responses and their corresponding response times are sorted in ascending order of response time. The threshold is the shortest response time at which the proportion of correct responses is greater than zero. Previous studies have investigated different methods based on response time and found that item-specific thresholds result in higher accuracy than constant thresholds (e.g. Wise & Ma, 2012). Our study supports this finding and found that a relatively rarely used method proved to be the most accurate for problem-solving tasks. To ensure the validity of the tests, it is important to use the proper method to identify disengaged responses.

The results also highlighted important differences between self-reported and behavioral measures of effort. Although both were positively correlated with test performance, the correlation was significantly stronger for the response time-based effort ($r = .37$) than for self-reported effort ($r = .10$). These results suggest that self-reported and behavioral indicators may capture different constructs of engagement - a finding supported by previous meta-analyses Silm et al. (2020).

While a multiple-choice test can be solved by clicking on the correct option, the complex problem-solving tasks used in the test require interactions with the test environment, and the students have to explore possible relationships between variables. There was a high correlation between response time and the number of interactions ($r = .62$, $p < .01$), meaning that if someone put in a lot of effort, they needed more time. Students who completed a sufficient number of interactions were able to achieve high scores on the test. Test performance was significantly correlated with the number of interactions, but not with the response time. This highlights the task-specific importance of the different indicators: in CPS contexts, success depends primarily on active interaction and systematic exploration, and response time becomes a function of these.

To further investigate the effort of test-takers, cluster analysis was used to identify distinct groups of students. The response time and the number of interactions are indicators of the effort exerted in completing the test. The results show that test-taking behavior was not consistent with self-reported data for all clusters, i.e. participants' responses did not fully reflect their actual testing behavior, indicating limitations of self-report questionnaires.

If we analyze groups of students (clusters) rather than the whole population, it gives a more accurate insight into the details. A positive correlation between test-taking effort and test performance is obtained for all students, but this represents only the overall picture. A more accurate insight is obtained by examining the relationships for each cluster. Students in some clusters achieve the same results with less effort than students in other clusters. This suggests that

good results do not require maximum effort, but only a certain amount of effort. This is in line with the results of Gignac et al. (2019). Goldhammer et al. (2017) found that higher-ability students needed less effort to solve problems successfully, which is also consistent with our results.

Study 1 established the foundation for subsequent studies by providing validated indicators of test-taking effort that take into account the unique requirements of CPS tasks. It also highlighted the limitations of self-report methods and emphasized the need for analysis of process data to better understand engagement behavior.

Building on the methodological foundations of the previous study, the second study used a multilevel modelling approach to examine predictors of disengaged behavior at both person and item levels. We considered the hierarchical structure of the data - item responses embedded in the person tested - which allowed for more precise estimation of measures of variance.

In our research, test-taking disengagement increased with the increase in item position and for more difficult items. These suggest that more attention should be paid to the development of low-stakes tests. Previous research has identified a number of interventions that can be used to increase test-taking engagement. Rios (2021) categorized these factors into four main categories: (1) modifying the test design, (2) providing feedback, (3) modifying the relevance of the test, and (4) providing external incentives.

Among the person-level factors, test-taking disengagement was predicted by gender, entrance score, working memory capacity and self-reported effort. Among women, the percentage of disengaged responses was higher. People with lower entrance scores, lower working memory capacity and lower self-reported effort also had a higher proportion of disengaged responses. A fundamental question is whether there is a correlation between academic ability and test-taking disengagement. Previous results are mixed and of significant practical importance, i.e. how to deal with disengaged behavior.

Previous research suggests that working memory capacity is crucial for students' problem-solving performance (e.g. Lindner et al., 2017). Our study showed that examinees with higher working memory capacity had lower test-taking disengagement. However, research has demonstrated that working memory capacity is not fixed and can be developed in different ways (Brady et al., 2016). Developing students' working memory may be a good method to increase test-taking engagement.

Motivational filtering is a widely used method for dealing with disengaged responses and can be applied in two ways. It is possible to remove (1) disengaged responses or (2) all data from disengaged examinees and leave only the engaged data in the sample and only these are analyzed. Rios et al. (2017) developed the term response-level filtering to refer to the former type of motivation filtering and examinee-level filtering to refer to the latter. Examinee-level filtering is based on the assumption that disengaged response behavior is unrelated to examinees' true ability. If this assumption is not correct, then deleting examinees with higher or lower ability leads to bias (Rios et al., 2017). In our study, lower ability examinees showed higher disengagement, suggesting that there is a relationship between academic ability and test-taking disengagement. This implies that item-level filtering is preferable to examinee-level filtering.

Taken together, the first two studies show that test-taking disengagement is a complex phenomenon, influenced by cognitive, motivational and contextual factors. They also suggest that

it is important to use sophisticated, psychometrically founded methods to identify disengaged behavior in digital assessments.

While the first two studies focused on the measurement and predictors of engagement, the third study addressed the functional role of test-taking engagement in shaping learning behavior. Using a person-centered approach, four latent profiles of learners were identified based on their use of the VOTAT (vary-one-thing-at-a-time) strategy: (1) rapid learners, (2) non-performers, (3) proficient explorers and (4) ineffective learners. Previous research has shown that time on task and number of clicks are indicators of effort. Therefore, we analyzed these variables and students' test performance based on their latent class membership.

The majority of participants were proficient explorers, i.e. they consistently used optimal exploration strategies throughout the test and were the most successful in interpreting information extracted from the problem environment. They performed most of the interactions in the test over a moderately long period of time and thus performed best.

Rapid learners showed low to moderate performance in exploration behavior at the beginning of the test, then learned quickly and used high quality exploration strategies in the second half of the test. In the first part of the test, rapid learners interacted with the test environment as many times as proficient explorers, but for a longer period of time. In the second part of the test, as the tasks became more difficult, rapid learners spent the same amount of time on the tasks as proficient explorers, but interacted less. If we consider only their test performance, we could characterize them as average problem solvers, but their test-taking and exploration behavior fine-tunes their characteristics.

Ineffective learners used the VOTAT strategy at a medium level at the beginning of the test, and then quickly dropped to a low level. Over a long period of time, they interacted moderately and scored low on the test.

A minority of students were non-performers who made very limited use of the VOTAT strategy during the test. They had few interactions with the test environment in a short period of time, their results were similar to ineffective learners, but their test-taking and exploration behavior differed.

Our research is in line with the findings reported by Molnár & Greiff (2023). There is a difference between efficient test-taking behavior for low and high complexity tasks. For low and medium complexity tasks, efficient explorers are able to perform the same number of interactions in less time than their less efficient counterparts. In more complex tasks, however, efficient explorers performed the most interactions and spent more time on them. Less efficient explorers showed little change in response time and number of interactions, regardless of task complexity. It also underlines the importance of the number of interactions with the test environment in effective problem solving.

To better understand the different latent profiles, we examined the extent of test-taking effort and its change during the test. At the beginning of the test, the test-taking effort of all four profiles was very high. Test-taking effort for rapid learners and proficient explorers was high during the test and only minimally decreased at the end of the test. Test-taking effort of ineffective learners declined from the middle of the test, while that of non-performers declined steeply from one-third of the test. Our results are consistent with a number of previous studies showing that test-taking effort decreases as the test progresses (e.g. Wise, 2006). The novelty of our research is that we examined change by profile rather than overall, and showed that change varies significantly by

profile. While there was little decrease for rapid learners and proficient explorers, there was a significant decrease for ineffective learners and non-performers, presumably influencing the use or non-use of an effective exploration strategy.

A number of prior studies have investigated students' exploration strategies in CPS and the role of test-taking effort in low-stakes contexts, but, to our knowledge, these have not been studied in tandem. The results shed new light on the interpretation of students' exploration strategy usage in the problem-solving process. Our results suggest that successful problem solvers put in enough time and effort to solve problems. A sufficient amount of effort does not guarantee a successful outcome, but success is not possible without it. Therefore, practitioners should place considerable emphasis on using methods that improve students' test-taking effort.

Limitations

The dissertation has several limitations. One is that the test consisted exclusively of complex problem-solving items. The most commonly used multiple-choice items were therefore not investigated, nor were the tasks related to a specific subject, because the fictional context of the CPS test was unfamiliar to everyone. Research has found that subject matter has an effect on test-taking disengagement, so it is conceivable that we would obtain different results for different subject matter. Another important limitation is that convenience sampling was used at university level and the sample consisted exclusively of first-year university students who were willing to participate in the study. A further limitation is that test-taking disengagement was investigated in the knowledge acquisition phase, whereas this phase is not applicable to most tests, which mainly involve the knowledge application phase. A final limitation is that the test was in a low-stakes context.

Conclusions

The three studies are linked by their focus on testing in complex problem solving in low-stakes digital environment, while each adds a distinct layer of understanding. Study 1 addressed how to accurately measure engagement. Study 2 highlighted who tends to be disengaged and under what circumstances. Study 3 examined test-taking engagement in complex problem-solving in latent groups of students. Together, the studies provide a comprehensive picture of test-taking engagement as a measurable construct and as a behavioral phenomenon with real-life consequences.

From a theoretical point of view, this research contributes to the discussion on the nature of participation in technology-based assessments. It is consistent with multidimensional models that conceptualize engagement as comprising behavioral, cognitive and emotional components, and operationalizes this construct using self-report and process data. It also extends the literature on test-taking engagement and the assessment of latent behavioral profiles in assessment contexts.

From a practical point of view, the results have implications for test design and implementation. Designers of digital assessments should consider integrating process indicators (e.g. response time, number of clicks) and item-level measures of effort to track engagement. Test developers should avoid over-relaying on self-report metrics and use adaptive testing strategies that reduce disengagement in later test phases. Educators should be cautious when interpreting performance data without consideration of engagement, especially in low-stakes contexts.

Finally, this research suggests that targeted interventions - such as training in strategic exploration or support for improving working memory - can help reduce disengagement and improve performance. Future work should test such interventions experimentally and examine their impact across different student populations and subject areas.

References

Brady, T. F., Störmer, V. S., & Alvarez, G. A. (2016). Working memory is not fixed-capacity: More active storage capacity for real-world objects than for simple stimuli. *Proceedings of the National Academy of Sciences of the United States of America*, *113*(27), 7459–7464. https://doi.org/10.1073/pnas.1520027113

Csapó, B., & Molnár, G. (2019). Online diagnostic assessment in support of personalized teaching and learning: The eDia system. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01522

Funke, J. (2014). Analysis of minimal complex systems and complex problem solving require different forms of causal cognition. *Frontiers in Psychology*, *5*, 1–3. https://doi.org/10.3389/fpsyg.2014.00739

Gignac, G. E., Bartulovich, A., & Salleo, E. (2019). Maximum effort may not be required for valid intelligence test score interpretations. *Intelligence*, *75*, 73–84. https://doi.org/10.1016/j.intell.2019.04.007

Goldhammer, F., Martens, T., Christoph, G., & Lüdtke, O. (2016). Test-taking engagement in PIAAC. *OECD Education Working Papers*, *133*. https://doi.org/https://doi.org/10.1787/5jlzfl6fhxs2-en

Goldhammer, F., Naumann, J., Rölke, H., Stelter, A., & Tóth, K. (2017). Relating product data to process data from computer-based competency assessment. In *Competence assessment in education: Research, models and instruments* (pp. 407–425). https://doi.org/10.1007/978-3-319-50030-0

Greiff, S., Molnár, G., Martin, R., Zimmermann, J., & Csapó, B. (2018). Students' exploration strategies in computer-simulated complex problem environments: A latent class approach. *Computers and Education*, *126*(February), 248–263. https://doi.org/10.1016/j.compedu.2018.07.013

Greiff, S., Wüstenberg, S., Molnár, G., Fischer, A., Funke, J., & Csapó, B. (2013). Complex problem solving in educational contexts — something beyond g: Concept, assessment, measurement invariance, and construct validity. *Journal of Educational Psychology*, *105*(2), 364–379. https://doi.org/10.1037/a0031856

Lindner, C., Nagy, G., Ramos Arhuis, W. A., & Retelsdorf, J. (2017). A new perspective on the interplay between self-control and cognitive performance: Modeling progressive depletion patterns. *PLoS One*, *12*(6), e0180149. https://doi.org/10.1371/journal.pone.0180149

Molnár, G., & Csapó, B. (2018). The efficacy and development of students' problem-solving strategies during compulsory schooling: Logfile analyses. *Frontiers in Psychology*, *9*(MAR), 1–17. https://doi.org/10.3389/fpsyg.2018.00302

Molnár, G., & Greiff, S. (2023). Understanding transitions in complex problem-solving: Why we succeed and where we fail. *Thinking Skills and Creativity*, *50*. https://doi.org/10.1016/j.tsc.2023.101408

Provasnik, S. (2021). Process data, the new frontier for assessment development: rich new soil or a quixotic quest? *Large-Scale Assessments in Education*, *9*(1). https://doi.org/10.1186/s40536-020-00092-z

Rios, J. A. (2021). Improving test-taking effort in low-stakes group-based educational testing: A meta-analysis of interventions. *Applied Measurement in Education*, *34*(2), 85–106. https://doi.org/10.1080/08957347.2021.1890741

Rios, J. A., Guo, H., Mao, L., & Liu, O. L. (2017). Evaluating the impact of careless responding on aggregated-scores: To filter unmotivated examinees or not? *International Journal of Testing*, *17*(1), 74–104. https://doi.org/10.1080/15305058.2016.1231193

Silm, G., Pedaste, M., & Täht, K. (2020). The relationship between performance and test-taking effort when measured with self-report or time-based instruments: A meta-analytic review. *Educational Research Review*, *31*(100335). https://doi.org/10.1016/j.edurev.2020.100335

Wise, S. L. (2006). An investigation of the differential effort received by items on a low-stakes computer-based test. *Applied Measurement in Education*, *19*(2), 95–114. https://doi.org/10.1207/s15324818ame1902_2

Wise, S. L., & Ma, L. (2012). Setting response time thresholds for a CAT item pool: The normative threshold method. *Paper Presented at the 2012 Annual Meeting of the National Council on Measurement in Education*, *March*, 1–24.

Wise, S. L., Ma, L., & Theaker, R. A. (2014). Identifying non-effortful student behavior on adaptive tests: Implications for test fraud detection. In N. Kingston & A. Clark (Eds.), *Test Fraud: Statistical Detection and Methodology* (Issue January 2014, pp. 175–185). Routledge.

AUTHOR'S PUBLICATION

No	Articles	Indexing
1.	Csányi, R., & Molnár, G. (2025). Looking beyond students' exploration and learning strategies: The role of test-taking effort in complex problem-solving. *Intelligence*, *109*, 101907. https://doi.org/10.1016/j.intell.2025.101907	SJR Q1
2.	Csányi, R., & Molnár, G. (2024). Item- and person-level factors in test-taking disengagement: Multilevel modelling in a low-stakes context. *International Journal of Educational Research Open*, *7*, 100373. https://doi.org/10.1016/j.ijedro.2024.100373	SJR Q1
3.	Csányi, R., & Molnár, G. (2023). How do test-takers rate their effort? A comparative analysis of self-report and log file data. *Learning and Individual Differences*, *106*, 102340. https://doi.org/10.1016/j.lindif.2023.102340	SJR D1
4.	Csányi, R., & Molnár, G. (2024). Az önértékelés buktatói: a tesztmegoldási erőfeszítés kérdőíves és logadatalapú elemzése. *Scientia et Securitas*, *5*(2), 86–95. https://doi.org/10.1556/112.2024.00167	
5.	Csányi, R., Lőrincz, M. M., & Molnár, G. (2024). Egy felnőttképzési MOOC-programon részt vevők aktivitási adatainak elemzése. *Információs Társadalom*, *24*(1), 34. https://doi.org/10.22503/inftars.xxiv.2024.1.2	SJR Q3
6	Csányi, R., & Molnár, G. (2021). A tesztmegoldási motiváció kérdőíves és logadat alapú mérésének összehasonlító elemzése alacsony téttel rendelkező interaktív problémamegoldó környezetben. *Magyar Pedagógia*, *121*(3), 281–307. https://doi.org/10.17670/mped.2021.3.281	
7.	Csányi, R., & Molnár, G. (2022). A tesztmegoldási motiváció szerepe az alacsony téttel rendelkező tesztek eredményeinek értékelésében. *Iskolakultúra*, *32*(1), 44–63. https://doi.org/10.14232/ISKKULT.2022.1.44	
	Conference papers	
8.	Csányi, R., & Molnár, G. (2024). A tesztmegoldási erőfeszítés mérése a feladattal töltött idő és a kattintások száma alapján alacsony téttel bíró teszteken. In A. Habók & M. T. Nagy (Eds.), *XX. Pedagógiai Értékelési Konferencia = 20th Conference on Educational Assessment* (pp. 67–67). Szegedi Tudományegyetem Neveléstudományi Doktori Iskola.	
9.	Csányi, R., & Molnár, G. (2023). How do test-takers rate their effort? A comparative analysis of self-report and log file data. In *EARLI 2023. Education as a Hope in Uncertain Times : Book of Abstracts* (pp. 287–287).	
10.	Csányi, R., Lőrincz, M., & Molnár, G. (2023). A lemorzsolódás csökkentésének kulcsa a korai beavatkozás: egy felnőttképzési IT MOOC résztvevőinek tanulási profilelemzése. In L. Kasik & Z. Gál (Eds.), *XIX. Pedagógiai Értékelési Konferencia = 19th Conference on Educational Assessment : PÉK 2023 = CEA 2023* (pp. 58–58). Szegedi Tudományegyetem Neveléstudományi Doktori Iskola.	

11.	Csányi, R., & Molnár, G. (2023). A tesztmegoldás során azonosított motiválatlan válaszok feladat- és személy szintű vizsgálata elsőéves egyetemisták körében. In A. Bajzáth, K. Csányi, & J. Győri (Eds.), *Elkötelezettség és rugalmasság: a neveléstudomány útjai az átalakuló világban: Absztraktkötet* (pp. 260–260). MTA Pedagógiai Tudományos Bizottság, ELTE Pedagógiai és Pszichológiai Kar (ELTE PPK).
12.	Csányi, R., & Molnár, G. (2022). A tesztmegoldási erőfeszítés önértékelő kérdőíven alapuló és logadat alapú mérésének összehasonlító vizsgálata. In J. Steklács & Z. Molnár-Kovács (Eds.), *21. századi képességek, írásbeliség, esélyegyenlőség : XXII. Országos Neveléstudományi Konferencia. Absztraktkötet* (pp. 313–313). MTA Pedagógiai Tudományos Bizottság, Pécsi Tudományegyetem Bölcsészet- és Társadalomtudományi Kar, Neveléstudományi Intézet.
13.	Csányi, R., & Molnár, G. (2022). A tesztmegoldási motiváció mérési lehetőségeinek összehasonlító elemzése alacsony téttel rendelkező tesztek esetén. In J. B. Fejes & A. Pásztor-Kovács (Eds.), *XVIII. Pedagógiai Értékelési Konferencia = 18th Conference on Educational Assessment: program és összefoglalók = program and abstracts* (p. 78). Szegedi Tudományegyetem, Neveléstudományi Doktori Iskola.
14.	Csányi, R., & Molnár, G. (2021). A tesztmegoldási motiváció szerepe az alacsony téttel bíró tesztek eredményeinek értékelésében. In G. Molnár & E. Tóth (Eds.), *A neveléstudomány válaszai a jövő kihívásaira: XXI. Országos Neveléstudományi Konferencia Szeged, 2021. november 18-20.: program, előadás összefoglalók* (p. 690 pp. 522–522). MTA Pedagógiai Tudományos Bizottság, SZTE BTK Neveléstudományi Intézet.