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Early learning, tutoring, and STEM motivation: Impact on Korean students' mathematics achievement

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Abstract

The impact of motivational beliefs, such as self-efficacy and intrinsic value, on academic achievement has been well documented in previous studies. In the current study, we extend the previous literature by taking individual learning experiences, such as early learning and tutoring experiences, into account. This allows us to gain a comprehensive understanding of the association between academic motivation and achievement. We analyzed a total of 3,614 Korean student data from the 2019 TIMSS (Trends in International Mathematics and Science Study) dataset to examine the mediating role of mathematics motivation. Our path analysis reveals that mathematics self-efficacy mediates the relationship between tutoring experiences and mathematics achievement. The results of this study provide implications for supporting students' mathematics motivation, which can serve as a gateway to enhance engagement and perseverance in STEM fields.

Keywords: STEM motivation, TIMSS data, expectancy-value theory, self-efficacy, intrinsic value, mathematics achievement

INTRODUCTION

Ranking second in the trends in international mathematics and science study (TIMSS) 2019 and fifth in program for international student assessment (PISA) 2018, Korean students scored substantially high in mathematics in international standardized assessments (Mullis et al., 2020; OECD, n. d.). Stemming from a strong cultural emphasis on education, private tutoring has been pointed out as one of the contributing factors to Korean students' outperformance in mathematics (Han & Suh, 2023). Given the significance of mathematics in academic achievement and college admissions, Korean parents actively pursue opportunities for their children to receive supplementary mathematics instruction beyond the regular school curriculum (Lee, 2005). The pursuit of educational opportunities (e.g., numeracy, literacy) begins even before school entry, which can have an enduring impact on students' academic achievement (Hooper et al., 2013). Despite the importance of parents' provision of educational opportunities, students' individual motivation in mathematics also plays a crucial role in explaining their mathematics achievement (Rosenzweig et al., 2019).

Compared to parents' heavy investment and students' high performance in mathematics, Korean students' motivation for mathematics has been reported to be relatively low (Cho, 2022). In the current study, we aim to explore how Korean students' mathematics achievement is explained by their experience in private and early education and their motivation for mathematics. We used TIMSS 2019 database to investigate the effect of mathematics tutoring and early education experiences on students' mathematics motivation and achievement.

BACKGROUND & LITERATURE REVIEW

We begin by discussing how mathematics achievement is contextualized in the Korean educational setting. Drawing on the expectancy-value theory (EVT) as a guiding framework, we then examine the role of

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Contribution to the literature

- Our findings align with previous studies based on EVT, which emphasizes that mathematics self-efficacy has a positive influence on mathematics achievement.
- This study delves into how the socially constructed educational context in Korea reflects the current situation regarding mathematics tutoring and early education.
- By solidifying the intermediary role of mathematics self-efficacy between previous mathematics tutoring experiences and mathematics performance, our study provides practical recommendations for educators to create a learning environment that enhances students' confidence in their mathematics ability.

mathematics motivation in relation to students' educational experiences and mathematics achievement.

Mathematics Tutoring & Early Education Experiences

South Korea is very well-known for its education fever, and Korean parents' zeal toward their children's education is immense. Education fever in Korea is a social phenomenon characterized by parents' intense focus on their in children's academic achievement, driven by the belief that educational success is essential for social advancement in a highly competitive society (Ha & Park, 2017; Lee et al., 2004). Believing that their children need extra educational experiences beyond formal schooling to outclass other children, many Korean parents seek private tutoring opportunities (Lee, 2005). Private tutoring in mathematics is particularly prevalent in Korea because of the high importance placed on mathematics in university admissions criteria (Han & Suh, 2023). In the college scholastic ability test in Korea (*Soo-neung*), mathematics accounts for 18% (80 out of 440) of the total score. The emphasis on mathematics sets off a reinforcing loop, whereby high mathematics achievement in school becomes a doorway to reputational universities, which in turn leads to prestigious jobs. When Korean students were asked about their private tutoring experiences, they reported that mathematics was the subject, where they spent the most time in comparison to other subjects (Lee, 2007).

Korean parents start seeking supplementary educational opportunities even before school entry expecting that the pre-primary education experience will lead students to better school readiness and later academic achievement (Ersan & Rodriguez, 2020; OECD, 2017). In Korean society, the concept of school readiness encompasses not only the nurturing of socio-emotional skills but also the acquisition of academic competencies such as literacy and numeracy, reflecting the culture's emphasis on early preparation for success (Cha et al., 2010; Kim et al., 2003). From an early age, students are provided with diverse educational activities (e.g., reading and writing in Korean, basic arithmetic and scientific problem-solving activities, English lessons) through the national-level curricula including the Nuri curriculum (ages 3-5) and the standard care curriculum (ages zero-two), as well as private lessons (Chung, 2018; Siraj-Blatchford & Nah, 2014). Such educational experiences are considered to be critical for cognitive development, which lays the foundation for children's preparedness for learning language arts and mathematics upon school entry (Chang & Kim, 2018; Murray & Harrison, 2011).

Motivation for Learning Mathematics

Linkage between impact of a cultural phenomenon on parents' provision of educational opportunities (e.g., private tutoring and early education) and students' academic achievement is supported by theoretical and empirical grounding. EVT advocates for a comprehensive understanding of student academic achievement, underscoring the need to consider student motivation alongside distal factors such as cultural milieu and socializers' beliefs and behaviors (Eccles & Wigfield 2020). EVT postulates that students' motivational beliefs–expectancy and values–act as mediators between social influences and their academic performance.

Expectancy is defined as one's belief about the extent to which they can successfully carry out a task (Wigfield et al., 2006). Given that expectancy implies a future-oriented belief, we use the term self-efficacy (i.e., one's confidence in their ability to accomplish a task), which tended to load on a single factor in multiple empirical studies (Eccles & Wigfield, 1995; Fredricks & Eccles, 2005). Motivational beliefs in EVT also include subjective values, which explain the reasons behind one's engagement in the task. In the current study, we focus on intrinsic value, which refers to one's internal satisfaction or enjoyment when engaging in the task. According to EVT, students tend to have higher academic achievement when they have higher self-efficacy and intrinsic value (Eccles & Wigfield, 2020). Despite their exceptional performance in mathematics, Korean students tended to show comparatively lower levels of motivation towards mathematics learning. In PISA 2012, Korean students scored 58th in intrinsic motivation for learning mathematics among 65 participating OECD countries, whereas they recorded the top rank in mathematics performance (OECD, 2013). To elucidate intricate interplay between Korean students' mathematics motivation and academic performance, we investigate potential contributions of both private tutoring and early educational experiences.

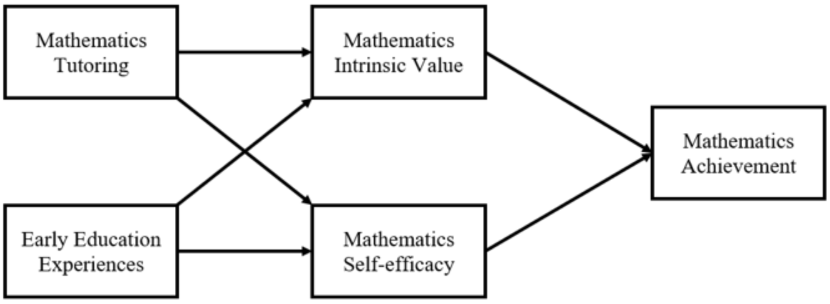

Figure 1. Hypothesized path analysis model (Source: Authors' own elaboration)

Table 1. Variable information

Variable	Number of items	Scale	Sample description
Mathematics tutoring (ASBH08BA)	1	4-point Likert scale (did not attend–more than 8 months)	For how many of least 12 months has your child attended *extra lessons or tutoring*? (*mathematics*)
Early learning experiences (ASBH04B)	1	6-point Likert scale (did not attend–4 years or more)	Approximately, how long was your child in these programs altogether?
Mathematics self-efficacy (ASBGSCM)	Transformed scale score of 9 items (ASBM05A~ASBM05I)	4-point Likert scale (disagree a lot–Agree a lot)	e.g., I usually do well in mathematics.
Mathematics intrinsic value (ASBGSLM)	Transformed scale score of 9 items (ASBM02A~ASBM02I)	4-point Likert scale (disagree a lot–Agree a lot)	e.g., I enjoy learning mathematics.
Mathematics achievement (ASMMAT)	Five PVs (ASMMAT01~ASMMAT05)		

METHODOLOGY

In our study, we hypothesize that

(1) mathematics tutoring and early education experiences have a positive effect on students' mathematics motivation (self-efficacy and intrinsic value),

(2) students' mathematics motivation has a positive effect on their mathematics achievement, and

(3) mathematics motivation mediates the relations between mathematics tutoring and early education experiences and mathematics achievement.

Figure 1 shows hypothesized path analysis model.

Data & Variables

The data of 3,614 4th grade students from South Korea in TIMSS 2019 were analyzed. Those samples were selected using a stratified two-stage cluster sampling design. For the first stage, a sample of schools was selected, and the second stage comprised a single class selected randomly from sampled schools (Fishbein et al., 2021). We collected parent surveys, student surveys, and student mathematics achievement tests for our study.

In terms of mathematics tutoring (ASBH08BA), it was measured with the description that "For how many of the last 12 months has your child attended extra lessons or tutoring?" Early learning experiences (ASBH04B) were measured with the statement "approximately, how long was your child in these programs altogether?" This variable asked participants about general early education experiences, not domain-specific experiences. Students' mathematics motivations, including self-efficacy (ASBGSCM) and intrinsic value (ASBGSLM), were analyzed using their transformed scores. The reliability of mathematics self-efficacy items was a=0.880 and mathematics intrinsic value items was a=0.950. For student mathematics achievement, its scoring reliability was shown 99% agreement across items. Mathematics achievement, which consisted of three cognitive domains including knowing, applying, and reasoning, five plausible values (PVs) provided by TIMSS were utilized. PVs represent what the performance of an individual on the entire assessment might have been, had it been observed. They help to ensure the accuracy of estimates of the proficiency distributions for TIMSS populations (Martin et al., 2016). So, for this reason, the five PVs (ASMMAT) were used as a proxy for mathematics achievement. The variables used in this model are presented in **Table 1**.

Data Analysis

The hypothesized path model was analyzed using STATA software. To deal with missing values in the scales, the maximum likelihood with missing values procedure was employed. In addition, to avoid the bias related to population characteristics, the provided total student weight (TOTWGT) was adopted and used (Rutkowski et al., 2010).

Table 2. Descriptive statistics & correlations for variables (n=3,614)

Variable	Correlation						
	1	2	3	4	5	Mean	Standard deviation
1. Mathematics tutoring	1					2.92	1.325
2. Early learning experiences	.102**	1				5.47	.815
3. Mathematics self-efficacy	.144**	.009	1			9.20	1.616
4. Mathematics intrinsic value	.113**	-.016	.648**	1		8.95	1.910
5. Mathematics achievement	.051**	.028	.469**	.310**	1	603.34	66.713

Note. ***p*<.001

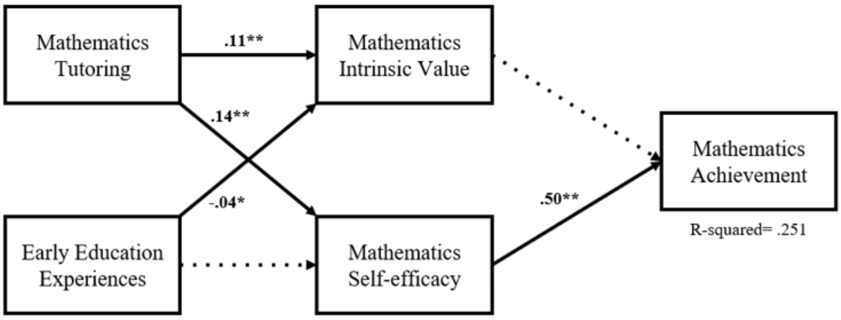

Figure 2. Path analysis results (**p*<.050; ***p*<.001; solid lines represent significant relationships; & dotted lines represent non-significant relationships) (Source: Authors' own elaboration)

RESULTS & DISCUSSION

Table 2 presents the descriptive information of variables and the correlations between them. The correlations between students' mathematics tutoring and mathematics self-efficacy (*a*=.144) and mathematics intrinsic value (*a*=.113) showed significant correlations (*p*<.001). On the other hand, there were no significant correlations between early learning experiences and motivations. The correlation between mathematics achievement and mathematics self-efficacy (*a*=.469) was slightly higher than the correlation between mathematics achievement and mathematics intrinsic value (*a*=.310). Overall goodness-of-fit of hypothesized model met the criteria (CFI=.999; TLI=.996; RMSEA=.020) for a good model fit (Little, 2013).

Figure 2 indicates the path analysis results of the hypothesized model. The provided coefficients were standardized in that variables had different scales of measurement.

Regarding the first hypothesis, results revealed that mathematics tutoring had a positive effect on mathematics intrinsic value (β=.11, *p*<.001) and mathematics self-efficacy (β=.14, *p*<.001). On the other hand, students' early learning experiences did not influence mathematics self-efficacy (β=-.02, *p*=.370). Rather, it negatively affected students' mathematics intrinsic value (β=-.04, *p*<.050). In other words, the longer the students received mathematics tutoring, the more confident and interested they tended to be in mathematics. However, students' early learning experiences did not have a significant effect on their competence beliefs in mathematics and rather had a minimal negative on their interest in mathematics.

In alignment with our second hypothesis, students' mathematics self-efficacy had a positive effect on their mathematics achievement (β=.50, *p*<.001). However, there was no significant relationship between mathematics intrinsic value and mathematics achievement (β=.00, *p*=.973). These results indicated that students showed higher performance in mathematics achievement when they had higher competence beliefs in mathematics.

Lastly, we investigated the mediation role of mathematics motivation between students' tutoring and early education experience and their achievement. For indirect effects, the results showed that mathematics tutoring indirectly influences mathematics achievement through mathematics self-efficacy (β=.07, *p*=.019). In addition, mathematics self-efficacy accounted for 25% of the variance in mathematics achievement (R^2=.251). This result suggested that in the Korean context, 4th grade students' mathematics achievement was only affected by students' mathematics tutoring through their mathematics self-efficacy.

As we hypothesized, there were positive associations between mathematics tutoring and mathematics motivation. Korean 4th graders showed higher mathematics performance when they had more experience in attending private mathematics lessons. Learning mathematics via private tutoring can provide students with more chances to have mastery experience in mathematics activities, which may have contributed to higher self-efficacy levels in mathematics (Schunk, 2012). This lies in accordance with EVT, which explains that previous achievement experience has a positive influence on students' enjoyment of the subject (Eccles & Wigfield, 2020).

In contrast, we found that early education experience had a minimal negative effect on mathematics intrinsic value and did not have a significant effect on mathematics self-efficacy. This discrepancy in the effects of mathematics tutoring and early educational experiences can be explained in several ways. First, at an early age, the decision to provide early educational experiences is highly likely to be made by the parents (Chang & Kim, 2013; Hwang, 2003). In other words, students are likely to perceive low autonomy (i.e., a sense of initiative in one's actions), which can diminish their intrinsic motivation for learning (Ryan & Deci, 2020). Second, temporal proximity can be one of the reasons. While the item about mathematics tutoring asked about their experience within a year, the item about early education encompassed their experiences under age three and until school entry. As a result, the effect of tutoring experience on mathematics motivation could have been stronger due to the recency in experience. The third reason can be the domain-specificity of the item. The item about students' early education experience asked about their general educational experiences rather than those in a particular domain. On the other hand, the tutoring experience item specifically asked them about their mathematics tutoring experiences. Provided that the motivation variables included in our study were self-efficacy and intrinsic value in mathematics, domain-specificity may have played a role.

In accordance with EVT and previous empirical studies, our study found that mathematics self-efficacy positively influenced mathematics achievement. Students' higher confidence in their mathematics ability had a positive effect on their performance in mathematics. Interestingly, in our study, mathematics intrinsic value did not have a significant effect on mathematics achievement incompatible with EVT (Eccles & Wigfield, 2020). This result may be partially due to the participants' characteristics of our study. As the early elementary curriculum tends to cover a broad and wide range of subjects, 4th graders may have lacked the opportunity to develop inherent enjoyment for learning mathematics (Ministry of Education, 2015). Finally, our study results revealed that mathematics self-efficacy was a significant mediator between students' mathematics tutoring experience and mathematics achievement in accordance with EVT (Eccles & Wigfield, 2020). This result emphasizes the role of mathematics self-efficacy with respect to increasing students' mathematics achievement alongside the positive effect of the tutoring experience. Further in-depth research is needed to better understand how to support students in enhancing motivation to learn through educational policy and support within specific social contexts and educational situations.

In summary, our findings align with previous studies based on EVT, which emphasizes that mathematics self-efficacy has a positive influence on mathematics achievement. Additionally, this study delves into how the socially constructed educational context in Korea reflects the current situation regarding mathematics tutoring and early education. By solidifying the intermediary role of mathematics self-efficacy between previous mathematics tutoring experiences and mathematics performance, our study provides practical recommendations for educators to create a learning environment that enhances students' confidence in their mathematics ability.

CONCLUSIONS

This study has implications in that it empirically examined the impact of tutoring and early education on mathematics motivation and achievement in the Korean context, confirming the mediating role of mathematics motivation. Meanwhile, the premise that parents' beliefs that early education will ensure students' high academic achievement may lack definitive evidence to support its validity according to our study results. This is because general early education experiences did not show a meaningful influence on students' motivation, which can affect their achievements. In addition, our study results supported the mediating role of mathematics motivation between students' previous mathematics tutoring experiences and their mathematics achievement in accordance with EVT. Since the results of this study showed the mediating role of students' mathematical motivation such as intrinsic value and self-efficacy, it may suggest finding educational methods to stimulate adaptive motivation and interest to improve students' mathematics achievement. Previous research on STEM education has advanced with emphasis on cognitive variables. Our study results implying the effects of non-cognitive variables (e.g., motivation) on student achievement recommend that educators should take students' social-emotional learning into account in STEM education research.

The results of this study can suggest the following studies. First, it is suggested to examine the effectiveness of domain-specific early educational experiences provided that TIMSS 2019 survey questionnaire regarding early education was focused on general educational experiences before school entry. It would be interesting to find if there might be any difference in the results when students are asked about their early education experiences in the mathematics domain. Second, it is necessary to investigate the dimensions of mathematical achievement in detail. In TIMSS 2019 data, mathematics achievement tests consisted of three cognitive dimensions: knowing, applying, and reasoning. Since these three areas are hierarchical, there is a possibility that academic achievement will show different patterns depending on participants' development. Third, future studies comparing the results across different grade levels and cultural contexts are suggested to gain a deeper understanding of the interplay among students' educational experiences, mathematics motivation, and mathematics achievement.

As a final point, future mathematics achievement or STEM education research can benefit from detailed motivational measures reflecting the motivational viewpoint. From EVT perspective specifying motivation as ability beliefs and four subjective values, for example, can provide us with a more comprehensive view of the relationship between mathematics educational experiences and achievement.

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Ethical statement: The authors stated that the study did not require IRB approval as we used the public TIMSS (Trends in International Mathematics and Science Study) 2019 dataset from the National Center for Education Statistics. The authors further stated that this study was designed and analyzed ethically by using secondary data.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

Cha, S., Kim, J., Park, S., Jeon, K., Min, B., Kim, S., & Choi, B. (2010). *An analysis of supplemental education and its influence in early childhood education*. Korean Educational Development Institute.

Chang, M., & Kim, S. (2018). Parents' perceptions, actual condition and support plan for elementary school children. *Korean Journal of Early Childhood Education, 38*(3), 263-287. https://doi.org/10.18023/kjece.2018.38.3.011

Cho, S. (2022). A comparative study on the factors affecting middle school students' participation in private supplementary education in mathematics between Korea and the USA using the TIMSS 2019 data. *Journal of Educational Evaluation, 35*(2), 219-246. https://doi.org/10.31158/JEEV.2022.35.2.219

Chung, H. (2017). 83% of five-year-olds receive private tutoring. *Korea Times*. https://www.koreatimes.co.kr/www/nation/2023/11/113_221663.html

Eccles, J. S., & Wigfield, A. (1995). In the mind of the achiever: The structure of adolescents' academic achievement related-beliefs and self-perceptions. *Personality and Social Psychology Bulletin, 21*, 215-225. https://doi.org/10.1177/0146167295213003

Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology, 61*, 101859. https://doi.org/10.1016/j.cedpsych.2020.101859

Ersan, O., & Rodriguez, M. C. (2020). Socioeconomic status and beyond: A multilevel analysis of TIMSS mathematics achievement given student and school context in Turkey. *Large-Scale Assessments in Education, 8*, 15. https://doi.org/10.1186/s40536-020-00093-y

Fishbein, B., Foy, P., & Yin, L. (2021). *TIMSS 2019 user guide for the international database*. TIMSS & PIRLS International Study Center.

Fredricks, J. A., & Eccles, J. S. (2005). Family socialization, gender, and sport motivation and involvement. *Journal of Sport and Exercise Psychology, 27*(1), 3-31. https://doi.org/10.1123/jsep.27.1.3

Ha, Y., & Park, H. J. (2017). Can after-school programs and private tutoring help improve students' achievement? Revisiting the effects in Korean secondary schools. *Asia Pacific Education Review, 18*, 65-79. https://doi.org/10.1007/s12564-016-9451-8

Han, S. & Suh, H. (2023) The effects of shadow education on high school students' creative thinking and academic achievement in mathematics: The case of the Republic of Korea. *Educational Studies, 49*(2), 314-333. https://doi.org/10.1080/03055698.2020.1850427

Hooper, M., Mullis, I. V. S., & Martin, M. O. (2013). TIMSS 2015 context questionnaire framework. In I. V. S. Mullia, & M. O. Martin (Eds.), *TIMSS 2015 assessment frameworks* (pp. 61-82). TIMSS & PIRLS International Study Center.

Hwang, H. (2003). The very early education and parents' perceptions. *The Journal of Yeolin Education, 11*(2), 69-85.

Kim, J., Lee, Y. S., Suen, H., & Lee, G. S. (2003). A Delphi study of young children's readiness in Korea: Challenges and implications for early childhood schooling. *Educational Research and Evaluation, 9*(4), 345-355. https://doi.org/10.1076/edre.9.4.345.17811

Lee, C. J. (2005). Korean education fever and private tutoring. *KEDI Journal of Educational Policy, 2*(1), 99-107.

Lee, J. (2007). Two worlds of private tutoring: The prevalence and causes of after-school mathematics tutoring in Korea and the United States. *Teachers College Record, 109*(5), 1207-1234. https://doi.org/10.1177/016146810710900507

Lee, J., Kim, Y., & Yoon, C. (2004). The effects of pre-class tutoring on student achievement: Challenges and implications for public education in Korea. *KEDI Journal of Educational Policy, 1*(1), 25-42.

Martin, M., von Davier, M., & Mullis, I. V. (2020). *Methods and procedures: TIMSS 2019 technical report*. TIMSS & PIRLS International Study Center.

Ministry of Education. (2015). *The national curriculum for the primary and secondary schools*. https://ncic.re.kr/english.dwn.ogf.inventoryList.do#

Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). TIMSS 2019 international results in mathematics and science. *TIMSS & PIRLS International Study Center*. https://timssandpirls.bc.edu/timss2019/international-results/

Murray, E., & Harrison, L. J. (2011). The influence of being ready to learn on children's early school literacy and numeracy achievement. *Educational Psychology, 31*(5), 529-545. https://doi.org/10.1080/01443410.2011.573771

OECD. (2013). *PISA 2012 results: Ready to learn (volume III): Students' engagement, drive and self-beliefs*. OECD Publishing. https://doi.org/10.1787/9789264201170-en

OECD. (2017). *Strong performers and successful reformers in education lessons from PISA for Korea*. Korea Institute for Curriculum and Evaluation. https://doi.org/10.1787/9789264209619-ko

OECD. (n. d.). *Education GPS*. https://gpseducation.oecd.org

Rosenzweig, E. Q., Wigfield, A., & Eccles, J. S. (2019). Expectancy-value theory and its relevance for student motivation and learning. In K. A. Renninger, & S. E. Hidi (Eds.), *The Cambridge handbook of motivation and learning* (pp. 617-644). Cambridge University Press. https://doi.org/10.1017/9781316823279.026

Rutkowski, L., Gonzalez, E., Joncas, M., & von Davier, M. (2010). International large-scale assessment data: Issues in secondary analysis and reporting. *Educational Researcher, 39*(2), 142-151. https://doi.org/10.3102/0013189X10363170

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology, 61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Schunk, D. (2012). Social cognitive theory. In K. R. Harris, S. Graham, & T. Urdan (Eds.), *APA handbook of educational psychology: Theories, constructs, and critical issues* (pp. 101-123). APA. https://doi.org/10.1037/13273-005

Siraj-Blatchford, I., & Nah, K. O. (2014). A comparison of the pedagogical practices of mathematics education for young children in England and South Korea. *International Journal of Science and Mathematics Education, 12*, 145-165. https://doi.org/10.1007/s10763-013-9412-1

Wigfield, A., Eccles, J. S., Sciefele, U., Roeser, R. W., & Davis-Kean, P. (2006). Development of achievement motivation. In N. Eisenberg (Ed.), *Handbook of child psychology* (pp. 933-1002). John Wiley. https://doi.org/10.1016/b978-012750053-9/50008-5