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Fantastic GRIT: Celebrating the determination of Tamil National Type Primary School (SJKT) Students in Mathematics Learning

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Abstract
Grit is defined as passion and perseverance for long-term and meaningful goals. In the subject of Mathematics in primary school, there is a need for students to persevere to get answers. Grit encourages students to continue working hard despite difficulties or failures and this trait is very important in the workplace. However, there are not many discussions that debate issues related to grit in Mathematics in the context of Tamil National Primary School (SJKT) students. There are three main issues that cause the grit issues expressed in this concept paper: (i) an attitude of giving up when solving high-level math problems; ii) no clear goals due to a lack of interest in learning Mathematics, and (iii) the ambiguity of grit level measurement in Mathematics in the context of SJKT students. This concept paper is unique because it elaborates on grit issues in Mathematics, especially among Indian students. This study suggests that grit empowerment should be done from primary school at SJKT through an effective student development program. This paper needs to be given attention so that the community is more aware of the development of grit in Mathematics, especially in the Indian student community. The proposed solutions can be developed through the school's efforts to make students more persistent and not give up when solving difficult Mathematical problems.
Keywords: Grit, Mathematics, Learning, SJKT, Tamil National Type Primary, Issues

Introduction

When measuring learning abilities, a student's success is not only measured by the competence of answering a test or exam but also by limited academic abilities (Sternberg et al., 2012). Initially, high intellect was considered a milestone in determining a student's success (Allen & Bond, 2001; Kidd & Latif, 2003). However, after the 1970s, psychologists challenged this idea and discovered that academic achievement is more important than a high intellect (Poropat, 2009). As a result, many researchers have identified several characteristics and qualities that could facilitate higher academic achievement. One of the important criteria that a person must have includes the ability to survive and the characteristic of perseverance—a feature that is known as grit.

As defined by (Duckworth & Meindl, 2018) grit or tenacity as a non-cognitive trait that consists of two main dimensions, namely perseverance and consistency of interest for a long period of time. Grit is also related to one's ability to work hard in the face of challenges whilst

maintaining effort and interest despite many failures. Grit is a driver of achievement, success, and self-reliance, which contributes beyond one's talent and intelligence. Intelligence and innate talent are impressive; however, to succeed and thrive in life requires the ability to survive for a long time. Without grit, talent may be nothing more than unfulfilled potential. Only with effort can talent become a skill that is likely to lead a person to success (Duckworth, 2016).

The literature shows many studies that have been conducted in the field of education to examine grit levels and their relationship with academic achievement; however, the findings were not in line. Some studies emphasize the usefulness of measuring and monitoring grit in predicting students' academic achievement (Cross, 2013; Datu et al., 2018; Duckworth et al., 2007). On the other hand, some studies have also evidenced that grit does not contribute to the academic achievement of students (Bazelais et al., 2016; Dixson et al., 2017; Palisoc et al., 2017). These inconsistent findings indicate the need for further studies in different contexts. One of the subjects that requires tenacity in problem-solving is Mathematics. Thus, complex Mathematics questions and Higher Order Thinking Skills (HOTS) make grit studies more relevant, especially those involving primary school students, particularly the minorities such as SJKT students who are mostly Indians.

Literature Review

Grit can be defined as a characteristic or skill that includes focus, resilience, and determination in achieving challenging goals over a long period of time (Clark, 2017). In addition, several other definitions are also given such as personal qualities, deep interest, and tenacity in which grit is defined as the strength to patiently endure obstacles in any situation to achieve success (Bashant, 2014; Pappano, 2013; Rojas et al., 2012). Generally, grit can be interpreted as determination and perseverance to achieve long-term goals while having high resilience. In this regard, individuals with high levels of grit are given an analogy such as a marathon runner whose advantage lies in their high stamina in addition to maintaining a trajectory position. On the other hand, individuals with low levels of grit tend to find it difficult to maintain stamina and may deal with characteristics such as boredom and frustration (Hassan et al., 2022).

Grit studies in the context of Mathematics have proven the positive contribution of grit to mathematical achievement. These studies were conducted at all levels from primary school to university levels. Studies at the primary school level by (Barrington, 2017; Eryiğit & Kılıç, 2022; Kaya & Karakoc, 2022; Mulcahy-Dunn et al., 2018) have proven that grit makes a significant contribution to the mathematical achievement of students. Likewise, studies involving secondary school students have shown the same impact where grit was found to affect the mathematical achievement of students (Al-Mutawah & Fateel, 2018; Carson, 2020; Datu et al., 2021; Khan, 2018; Orogo, 2022; Yu et al., 2021). In addition, studies by (Bowen, 2018; Chen & Gong, 2021; Flanagan & Einarson, 2017; Miele et al., 2022), which were conducted on university students have also emphasized the importance of grit in the achievement of mathematics. Overall, the findings of past studies in relation to Mathematics education clearly show that grit has a significant impact on academic achievement in general and on Mathematics in particular. Unfortunately, studies in the context of SJKT are still highly insufficient and need to be explored further.

In the context of SJKT, most SJKT students are Indian students who come from a variety of socioeconomics. These socioeconomic background differences have a different impact on

academic achievement among SJKT students, especially in the subject of Mathematics. There is a huge gap between SJKT students and other school students in the achievement of Mathematics (Sia & Lim, 2020). In addition, based on the 2019 Primary School Assessment Reporting by the Ministry of Education (MOE), only 36.27 percent of students are at the excellent level, 46.86 percent of students are at the satisfactory level, and 16.87 percent of students have not reached the minimum level. From this data, it can be observed that only 25 percent of students are at an excellent level. Although the factors that influence the excellence of SJKT students in Mathematics can be caused by many things, students' tenacity in solving mathematical problems is very important as it involves intrinsic motivation. If students give up easily and have no resilience, they will easily get bored and will no longer want to continue solving mathematics questions, especially when they are still in primary school. In this regard, a student's resilience is described as an optimistic reaction to failure, which ultimately reflects the grit feature in facing adversity and rejection.

Studies related to grit have been conducted globally since it was introduced by (Duckworth, 2007). Some of the most recent studies on grit and Mathematics include those by (Al-Mutawah & Fateel, 2018; Chen & Gong, 2021; Datu et al., 2021; Eryiğit & Kılıç, 2022; Kaya & Karakoc, 2022; Miele et al., 2022; Orogo, 2022; Yu et al., 2021). Studies by (Eryiğit & Kılıç, 2022; Kaya & Karakoc, 2022) focus on primary school students towards Mathematics and grit thinking as well as grit and academic achievement during the pandemic. Meanwhile, studies by (Al-Mutawah & Fateel, 2018; Datu et al., 2021; Orogo, 2022; Yu et al., 2021) emphasize grit thinking and attitude towards mathematical achievement among high school students. In addition, studies related to the relationship between grit and the mathematical achievement of university students have also been carried out by (Chen & Gong, 2021; Miele et al., 2022).

In Malaysia, there are not many studies examining the grit level of primary school students and most of the studies have focused on secondary school students and students of higher learning institutions (Hassan et al., 2022; Farok & Mahmud, 2020; Matore et al., 2020; Mustaza & Kutty, 2022; Shariff et al., 2022; Jaafar & Maat, 2020). Thus, the discussion of this topic allows for the opportunities to identify issues related to grit aspects faced by SJKT students, especially those involving minorities such as Indian students. The issue of grit among them unfortunately seems to be of little concern as they are in primary school and are a minority in Malaysia. Therefore, further research will help to better explore grit issues among SJKT students.

Issues and Discussion

First Issue: Attitude of giving up when solving high-level mathematical problems

There are various causes for students' obstacles to solving high-level mathematical problems. One of the main causes is students' attitude to give up when solving high-level mathematical problems, which require a high understanding and take rather long to solve. Therefore, students believe that the subject of Mathematics is boring, and this makes them give up easily (Almerino et al., 2019). This situation not only occurs while answering high-level mathematics questions, but students also feel tensed to answer questions that require mastery of mathematical comprehension, and they give up easily on answering mathematics questions because they are weak in the subject. They also often have a negative perception of Mathematics (Hamukwaya & Haser, 2021). Students with low self-esteem often have problems learning Mathematics. Their attitude and perception are also the cause of these

problems at SJKT. Furthermore, students' attitude of giving up is most serious among Level Two students, i.e., Years 4, 5, and 6 students due to the content of Level Two DSKP subjects that begin to introduce new topics and focus on the mathematical process of problem-solving, reasoning, mathematical communication, representation, and more complex associations.

Second Issue: No clear goals due to a lack of interest in Mathematics

In addition, the second issue is that students do not have clear goals due to a lack of interest in Mathematics. The interest of students plays an important role in their learning process. If the subject is not of interest to the students, then they will not be interested in following the content of the subject. The issue of the lack of interest in Mathematics does not occur at times; however, even students who are not interested in Mathematics will always show no goal in learning the subject. Besides, students tend to feel uninterested in Mathematics because they are mentally unable to master mathematical skills (Larkin & Jorgensen, 2016). This will indirectly cause students to lose their perseverance to learn mathematical skills and their goal of studying Mathematics. Besides, the practice of teachers who do not prioritize a variety of learning and facilitation (PDPc) methods and only stick to traditional methods can also contribute to this problem (Iannone et al., 2019; Volk et al., 2018). This issue may often be faced by Level One students, i.e., Years 1, 2, and 3 students because they do not have a solid foundation in their knowledge and skills before entering primary school.

Third Issue: Ambiguity of grit level measurement in Mathematics in the context of SJKT students

The third issue is the ambiguity of grit level measurement in Mathematics in the context of SJKT students. In addition to existing conceptualization and operationalization (Duckworth & Meindl, 2018; Stoltz, 2014), not many specific grit concepts are explained in the context of SJKT students for Mathematics. As a result, the grit concept and term become too common and complicate the process of developing grit instruments in special clusters. There are several studies on the measurement of grit through the development of instruments via adaptation (Chisholm-Burns et al., 2019; Duckworth & Quinn, 2009; González-Bernal et al., 2022; Schmidt et al., 2019) or psychometric testing studies (Postigo et al., 2023).

Unfortunately, the studies were under-explored in the Malaysian context to an extent that the literature has mostly shown the development of grit instruments in the contexts of other countries. This gap is especially evident when grit studies in Malaysia are limited to certain contexts, such as among teachers in Johor (Ibrahim et al., 2018) and polytechnic students (Mohd Matore et al., 2020). Moreover, grit instruments are still insufficient in Malaysia due to the lack of awareness regarding the importance of grit in PdP. Researchers only think about sophistication and interactive pedagogical elements without emphasizing the resilience of students consistently. In addition, the focus on grit is only directed to youth groups such as by (Sigmundsson et al., 2020) compared to primary school students in the age range of 7 to 12 years. They may assume that this age is still too young and does not require grit-specific instruments or identification compared to older groups.

Accurate measurement items from the aspect of validity and ability of grit items enable future researchers to obtain more accurate data for the intervention of SJKT students in Mathematics. Since extensively common instruments will only result in further research to be carried out to identify problematic constructs in the future, the absence of a specific

instrument for measuring grit may cause difficulties in producing the grit profile of SJKT students. Hence, this instrument is preferably required in the pre- and post-phase of the learning process as well as in the evaluation of Mathematics. Resultantly, the grit score will show the strength of SJKT students in solving high-level mathematics questions. If a student's score is too low, then it is recommended that the student is guided and given counseling.

Suggestions for Improvement on the Issues

There are several strategies or suggestions for improvement to overcome grit issues among SJKT students in the subject of Mathematics. One of the suggestions for improvement on the first issue (the attitude of giving up when solving high-level mathematical problems) is the need to change the attitude and perception of the students themselves. Attitudes in mathematics refer to emotional reactions, beliefs, and behaviors toward Mathematics (Hart, 1989). SJKT students should change negative attitudes and perceptions of the subject and try to understand mathematical skills, especially high-level skills. The mastery of mathematical concepts at the beginning of learning is highly dependent on the interest and confidence of students to follow the learning in the early phases (Mirza, 2014). Students who are positive towards Mathematics can improve mathematical achievement compared to negative attitudes that hinder their learning. Indirectly, this will affect their level of grit. Students will not easily give up on their positive attitude toward Mathematics. Since a positive attitude can affect a student's ability and willingness to learn Mathematics, a positive attitude should, therefore, be inculcated in each student to ensure that they can improve their mathematical achievement. Additionally, students can also share the problems faced in Mathematics with their teachers or parents to find solutions to overcome their learning problems.

The suggestion for improvement on the second issue (no clear goals due to a lack of interest in Mathematics) is to foster a positive attitude towards Mathematics. Students can also strongly drive themselves to do better than yesterday because a positive attitude means believing in themselves and their capabilities. Furthermore, in order to develop a positive attitude and perspective towards Mathematics, students can also surround themselves with positive-minded peers in order to help and encourage their peers to work and solve high-level mathematical problems together. Consequently, this will increase the grit level of students. Moreover, students can also set their own learning goals to ensure a positive attitude towards the subject. Setting clear learning goals and tracking their development can stimulate mathematical achievement while increasing their level of grit. Evidently, the concept of peer learning is highly encouraged to strengthen the grit aspect because the study by (Naimnule et al., 2020) has shown that mathematical solving abilities based on the Adversity Quotient (AQ) element through the Problem-Based Learning Model can be improved through peer feedback activities. While AQ and grit have almost the same association from the defining aspect of resilience, grit has long been associated with resilience compared to AQ.

In essence, teachers play an important role in improving the attitude and interest of students toward Mathematics. Teachers should have the skills, understanding, methods, and high-quality teaching to deal with students with different patterns of skills, thinking, and abilities in the mathematics learning process. Teachers should focus on the presentation of concepts in Mathematics. A good mastery of concepts can build mathematical skills and will indirectly increase the attitude and interest of students toward the subject. A primary school is a place for students to build a solid foundation on the concept of Mathematics until secondary school

and ultimately at the university level. Therefore, teachers should focus on building a strong foundation to instill attitudes and interests that will increase the grit level of students. Their teaching methods should also stimulate analytical, systematic, critical, and creative thinking so that students can solve high-level mathematical problems. There are several teaching methods recommended by the Ministry of Education Malaysia (MOE), namely mastery learning, contextual learning, project-based learning, problem-based learning, simulation, inquiry-discovery, modular approach, and STEM approach. The use of various teaching methods can improve the interest and performance of students in Mathematics (Seliaman & Dollah, 2018), thus helping improve students' attitudes and interests as well as reducing their attitude of giving up and increasing their level of grit.

The suggestion for improvement on the third issue (ambiguity of grit level measurement in Mathematics in the context of SJKT students) includes three main steps, namely (a) building conceptualization and operationalization, specifically for SJKT students' grit in high-level Mathematics, (b) obtaining new constructs of grit measurements through Focus Group Discussion (FGD), and (c) calibrating grit measurement items with psychometric tests involving the classical test theory and modern theory. Other than only basing research on the existing definition of grit based on Western understanding, it is time for researchers to build new constructs in the local context, especially in the context of SJKT students when learning Mathematics. In the meantime, the new constructs must involve many psychologists and those who are proficient or well-versed in grit so that they can dive into and present a clear measurement concept for measuring primary school students, especially those involving grit for high-level question-solving. Finally, another suggestion for improvement also includes testing the measurement items with statistical analysis and underlying theories such as the classical and modern test theory. In-depth testing of validity and reliability can also provide strong empirical data to prove that the developed items reflect the conceptualization and operationalization of grit, which coincides with SJKT students in the context of Mathematics.

Grit Challenges in SJKT: Expectations of Future Momentum

In the author's opinion, grit issues in Mathematics will continue as recent studies are actively highlighting the issues of grit in Mathematics (Kaya & Karakoc, 2022; Orogo, 2022). The only thing that differentiates the focus of those studies with this concept paper is the cluster of respondents. Since it is expected that the complexity of the problem in the subject of Mathematics will increase, grit issues may also be exacerbated by the existence of several generations who studied online (during the Covid-19 pandemic), which diminishes their competency. Consequently, this reduces their confidence and weakens their long-term tenacity. In the next 10 years, urgent intervention is needed for the affected generation of students. The MOE needs to train students' emotions at a young age at the primary level with fun learning so that they want to continue learning consistently with strong intentions.

In addition to the issues mentioned, other challenges may also exist; therefore, the readiness of teachers is important not only to address the issues of grit among SJKT students but also to overcome grit issues. Government policies that provide the quality of education alone are not enough; thus, teachers should also take comprehensive action towards improving the quality of education. In addition, teachers should know the techniques for enhancing the strengths of students and minimizing their weaknesses, as this can help students to increase their perseverance toward Mathematics. The development of students' psychological level should

be in line with the development of teachers' skills so that the emphasis on educational progress does not only consider the intellectual aspect but also the psychological aspect.

In this era of globalization, to overcome grit issues in Mathematics, schools are not the only party to take responsibility; other parties such as the Ministry of Education (MOE), State Education Department (JPN), District Education Office (PPD), local community, and parents should also do the same. They can assist SJKT students by conducting continuous courses and training for teachers to develop grit-related knowledge in general. Parents must understand grit to form a sense of perseverance and interest in Mathematics in their children. Besides, society's view of education requires significant changes to focus not only on achievement but also on the increased effort, interest, resilience, and motivation of students.

As can be observed from studies around the world, the prospect of grit is already widespread and this problem is already creeping into many clusters. However, students in primary school and higher learning institutions are different as the life experience aspect aids in facing grit naturally. If we still do not care and continue to be complacent, then students will become victims of such ignorance. In the next 10 years, the level of questions is expected to be higher, and it would be a shame if the students' grit does not change or becomes lower. This is where the role of the students themselves takes place; teachers and institutions should also be more familiar with student grit instead of only focusing on the need to complete the syllabus.

Conclusion

This concept paper highlights issues as mentioned in Figure 1 such as the attitude of giving up when solving high-level mathematical problems, no clear goals due to a lack of interest in studying Mathematics, and ambiguity of grit level measurement in Mathematics in the context of SJKT students, in addition to some suggestions for improvement. In essence, this grit concept paper provides implications for enhancing the resilience of SJKT students in solving mathematical problems.

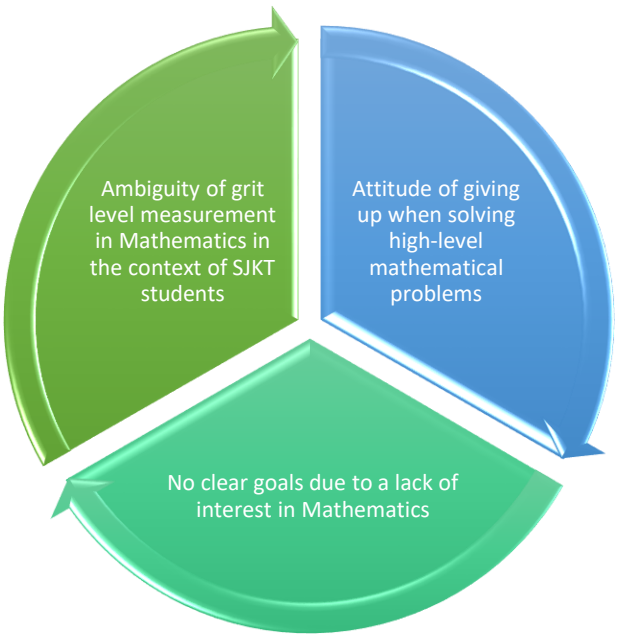

Figure 1: Grit issues in Mathematics of Tamil National Primary School (SJKT) students

At such an early age in primary school, their grit needs to be empowered as they grow into strong and resilient future graduates. Since the Mathematics syllabus in the future becomes more challenging, students need to stay consistent and extensively engage in try-and-error in solving Mathematics questions. This element here is what depicts grit in general, i.e., to remain steadfast in the search for answers. Without perseverance and consistency, students will easily give up and that is what we should avoid for today's generation.

This concept paper provides an interesting importance exciting opportunity to advance our significance knowledge of grit based on resilience in solving high order thinking skills questions. Therefore, these explanations make a major contribution to research on body of knowledge of grit by expanding the discussions with focusing on theoretical and contextual research by replicating the theory of grit into different context of institutions. Further research can be done by the Ministry of Education Malaysia (MOE) by providing grit empowerment modules for SJKT students in the context of high-level Mathematics learning. In addition, more efforts should be made to develop the conceptualization and operationalization of grit from the existing corpus of grit knowledge to suit the field of Mathematics and SJKT pedagogy.

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References

Allen, D. D., & Bond, C. A. (2001). Prepharmacy Predictors of Success in Pharmacy School: Grade Point Averages, Pharmacy College Admissions Test, Communication Abilities, and Critical Thinking Skills. *Pharmacotherapy*, *21*(7), 842–849. https://doi.org/10.1592/phco.21.9.842.34566

Almerino, Jr., P. M., Etcuban, J. O., de Jose, C. G., & Almerino, J. G. F. (2019). Students' Affective Belief as the Component in Mathematical Disposition. *International Electronic Journal of Mathematics Education*, *14*(3). https://doi.org/10.29333/iejme/5750

Al-Mutawah, M. A., & Fateel, M. J. (2018). Students' Achievement in Math and Science: How Grit and Attitudes Influence? *International Education Studies*, *11*(2), 97–105. https://doi.org/10.5539/ies.v11n2p97

Duckworth, A. (2016). *Grit: The Power of Passion and Perseverance* (1st Edition, Vol. 1). Scribner.

Barrington, M. M. (2017). *Assessing the Link Between Grit and Academic Achievement in Reading, Mathematics, and Writing Among 4 Th Graders: An Explanatory Sequential Mixed Methods Inquiry*. Texas A&M University.

Bashant, J. (2014). Developing Grit in Our Students: Why Grit is Such a Desirable Trait, and Practical Strategies for Teachers and Schools. *Journal for Leadership and Instruction*, 14–17.

Bazelais, P., Lemay, D. J., & Doleck, T. (2016). How Does Grit Impact College Students' Academic Achievement in Science? *European Journal of Science and Mathematics Education*, *4*(1), 33–43.

Bowen, R. I. P. (2018). *The Relationship between Grit and Remedial Math Success for Black Males*.

Carson, D. A. (2020). *Grit and Mathematics Achievement: A Possible Link in Guiding School Improvement*. St. Thomas University.

Chen, C., & Gong, X. (2021). How Does Grit Compare to Other Psychosocial Factors in Predicting University Students' Math Performance and Subjective Wellbeing? In *Multidisciplinary Perspectives on Grit* (pp. 29–53). Springer International Publishing. https://doi.org/10.1007/978-3-030-57389-8_3

Chisholm-Burns, M. A., Spivey, C. A., Sherwin, E., Williams, J., & Phelps, S. (2019). Development of an Instrument to Measure Academic Resilience Among Pharmacy Students. *American Journal of Pharmaceutical Education*, *83*(6), 1373–1390. https://doi.org/10.5688/ajpe6896

Clark, K. (2017). *Investigating A Novel Measure of Academic Grit*. Northern Illinois University.

Cross, T. M. (2013). *Staying The Course: Grit, Academic Success, and Non-Traditional Doctoral Students* [Pepperdine University]. https://digitalcommons.pepperdine.edu/etd

Datu, J. A. D., Yang, L., & Mateo, N. J. (2021). Are Gritty Students Academically Engaged in Math and Science? *School Psychology*, *36*(3), 190–195. https://doi.org/10.1037/spq0000433

Datu, J. A. D., Yuen, M., & Chen, G. (2018). The Triarchic Model of Grit is Linked to Academic Success and Well-Being among Filipino High School Students. *School Psychology Quarterly*, *33*(3), 428–438. https://doi.org/10.1037/spq0000234

Dixson, D. D., Roberson, C. C. B., & Worrell, F. C. (2017). Psychosocial Keys to African American Achievement? Examining the Relationship Between Achievement and Psychosocial Variables in High Achieving African Americans. *Journal of Advanced Academics*, *28*(2), 120–140. https://doi.org/10.1177/1932202X17701734

Duckworth, A. L., & Meindl, P. (2018). Clarifying Character Education Commentary on McGrath. *Journal of Character Education*, *14*(2), 37–38. https://doi.org/10.1080/17439760.2014.994222

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and Passion for Long-Term Goals. *Journal of Personality and Social Psychology*, *92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Duckworth, A. L., & Quinn, P. D. (2009). Development and Validation of the Short Grit Scale (Grit-S). *Journal of Personality Assessment*, *91*(2), 166–174. https://doi.org/10.1080/00223890802634290

Eryigit, K., & Kılıc, R. (2022). Predictors of Mathematics Achievement in Pandemic: Academic Grit and Technology Attitude. *OPUS Journal of Society Research*, *19*(49), 762–770. https://doi.org/10.26466//opusjsr.1170924

Flanagan, K. M., & Einarson, J. (2017). Gender, Math Confidence, and Grit: Relationships with Quantitative Skills and Performance in an Undergraduate Biology Course. *CBE—Life Sciences Education*, *16*(3), 1–11. https://doi.org/10.1187/cbe.16-08-0253

Gonzalez-Bernal, J., Gonzalez-Bernal, S., Salavera, C., Fernández-Ortega, C., Trigueros Ramos, R., Aguilar-Parra, J. M., & González-Santos, M. J. (2022). Adaptation and Testing of the Factorial Structure of the Physical Education Grit Scale for Use in Secondary Education

in Spain. *International Journal of Environmental Research and Public Health*, *19*(16), 1–9. https://doi.org/10.3390/ijerph191610008

Hamukwaya, S. T., & Haser, Ç. (2021). "It does not Mean that They Cannot Do Mathematics": Beliefs about Mathematics Learning Difficulties. *International Electronic Journal of Mathematics Education*, *16*(1), em0622. https://doi.org/10.29333/iejme/9569

Hart, J. (1989). Strategies for the New Head Teacer. *From the Office*, 8–10.

Hassan, H., Syed Sahil, S. A., & Kholis, R. (2022). Hubungan Grit dan Prokrastinasi dengan Pencapaian Akademik dalam Kalangan Remaja Kurang Berkemampuan. *Persidangan Antarabangsa Sains Sosial Dan Kemanusiaan*, *7*, 1210–1224.

Iannone, L. F., Preda, A., Blottière, H. M., Clarke, G., Albani, D., Belcastro, V., Carotenuto, M., Cattaneo, A., Citraro, R., Ferraris, C., Ronchi, F., Luongo, G., Santocchi, E., Guiducci, L., Baldelli, P., Iannetti, P., Pedersen, S., Petretto, A., Provasi, S., … Striano, P. (2019). Microbiota-Gut Brain Axis Involvement in Neuropsychiatric Disorders. In *Expert Review of Neurotherapeutics* (Vol. 19, Issue 10, pp. 1037–1050). Taylor and Francis Ltd. https://doi.org/10.1080/14737175.2019.1638763

Ibrahim, B., Hassan, H. F., Abd Hamid, R. I., Sulaiman, M. A., & Mohamad, N. H. (2018). Tahap Grit dalam Kalangan Guru di Negeri Johor. *Politeknik & Kolej Komuniti Journal of Social Sciences and Humanities*, *3*, 51–63.

Kaya, S., & Karakoc, D. (2022). Math Mindsets and Academic Grit: How Are They Related to Primary Math Achievement? *European Journal of Science and Mathematics Education*, *10*(3), 298–309. https://doi.org/10.30935/scimath/11881

Khan, N. (2018). *The Impact of Mindset and Grit on Academic Success in Math and Science*. Hofstra University.

Kidd, R. S., & Latif, D. A. (2003). Traditional and Novel Predictors of Classroom and Clerkship Success of Pharmacy Students. *American Journal of Pharmaceutical Education*, *67*(4), 860–865.

Larkin, K., & Jorgensen, R. (2016). 'I Hate Maths: Why Do We Need to Do Maths?' Using iPad Video Diaries to Investigate Attitudes and Emotions Towards Mathematics in Year 3 and Year 6 Students. *International Journal of Science and Mathematics Education*, *14*(5), 925–944. https://doi.org/10.1007/s10763-015-9621-x

Miele, D. B., Browman, A. S., Shen, C., Vasilyeva, M., & Tyumeneva, Y. A. (2022). Domain-General and Math-Specific Self-Perceptions of Perseverance as Predictors of Behavioral Math Persistence. *The Journal of Experimental Education*, *90*(3), 593–614. https://doi.org/10.1080/00220973.2020.1799312

Mirza, H. S. (2014). Decolonizing Higher Education: Black Feminism and the Intersectionality of Race and Gender. *Journal of Feminist Scholarship*, *7*(3), 1–12.

Farok, M.N. H., & Mahmud, N. (2020). Mindset and Grit as the Predictor of Academic Success. *Jurnal Kemanusiaan*, *18*(1), 63–70. www.jurnal-kemanusiaan.utm.my

Matore, M. E. @ E., Zainal, M. A., Kamaruddin, M., Abdul Rahman, N., Idris, H., & Matore, E. R. (2020). Grit vs. Academic Performance: The Power of Polytechnic Students to be Academically GRIT-tinians! *Proceedings of Mechanical Engineering Research Day*, 253–254.

Mulcahy-Dunn, A., King, S. J., Nordstrum, L. E., Newton, E. O., & Batchelder, K. (2018). The Relationship Between Grit, Self-Control, and Early Grade Reading: A Trial Measuring Soft Skills in Rural Tanzania. *Educational Psychology*, *38*(8), 997–1009. https://doi.org/10.1080/01443410.2018.1475628

Mustaza, M. S. A., & Kutty, F. M. (2022). The Relationship between Grit Personality and Resilience. *Creative Education*, *13*(10), 3255–3269. https://doi.org/10.4236/ce.2022.1310208

Naimnule, M., Kartono, & Asikin, M. (2020). Mathematics Problem Solving Ability in Terms of Adversity Quotient in Problem Based Learning Model With Peer Feedback. *Unnes Journal of Mathematics Education Research*, *10*(2), 222–228. http://journal.unnes.ac.id/sju/index.php/ujmer

Orogo, J. N. (2022). Grit Mindset and Attitudes: Their Influence on The Mathematics Academic Achievement. *International Journal of Education and Research*, *10*(11), 37–52. www.ijern.com

Palisoc, A. J. L., Matsumoto, R. R., Ho, J., Perry, P. J., Tang, T. T., & Ip, E. J. (2017). Relationship Between Grit with Academic Performance and Attainment of Postgraduate Training in Pharmacy Students. *American Journal of Pharmaceutical Education*, *81*(4), 1–10.

Pappano, L. (2013). "Grit" and the New Character Education. *Harvard Education Press*. *Pelaporan Pentaksiran Sekolah Rendah 2019*. (2019).

Poropat, A. E. (2009). A Meta-Analysis of the Five-Factor Model of Personality and Academic Performance. *Psychological Bulletin*, *135*(2), 322. https://doi.org/https://doi.org/10.1007/s12671-018- 0961

Postigo, A., Barria, J., Cuesta, M., & García-Cueto, E. (2023). Psychometric Properties of the Chilean Version of the Oviedo Grit Scale. *Collabra: Psychology*, *9*(1), 1–14. https://doi.org/10.1525/collabra.57516

Rojas, J. P., Usher, E. L., & Toland, M. D. (2012). *Creativity and Grit as Predictors of Mathematics Achievement in Early Adolescence*. http://www.authentichappiness.sas.upenn.edu/

Schmidt, F. T. C., Fleckenstein, J., Retelsdorf, J., Eskreis-Winkler, L., & Möller, J. (2019). Measuring Grit. *European Journal of Psychological Assessment*, *35*(3), 436–447. https://doi.org/10.1027/1015-5759/a000407

Seliaman, N., & Dollah, M. U. (2018). Pengajaran Matematik Sekolah Rendah Menggunakan Pendekatan Kontekstual : Satu Kajian Kes. *Jurnal Pendidikan Sains & Matematik Malaysia*, *8*(2), 27–34.

Shariff, M. I. A. bin, Sulaiman, W. S., & Khairudin, R. (2022). Exploring the Relationship between Grit and Flourishing: Are There Gender Differences? *International Journal of Academic Research in Business and Social Sciences*, *12*(3), 519–530. https://doi.org/10.6007/IJARBSS/v12-i3/12193

Sia, C., & Lim, C. S. (2020). Knowledge States in the Learning of "Time": Comparison of Primary Six Pupils' from Different Types of Schools in Penang. *The Mathematics Enthusiast*, *17*(1), 7–31. https://doi.org/10.54870/1551-3440.1478

Sigmundsson, H., Haga, M., & Hermundsdottir, F. (2020). Passion, grit and mindset in young adults: Exploring the relationship and gender differences. *New Ideas in Psychology*, *59*, 1–7. https://doi.org/10.1016/j.newideapsych.2020.100795

Sternberg, R. J., Bonney, C. R., Gabora, L., & Merrifield, M. (2012). WICS: A Model for College and University Admissions. *Educational Psychologist*, *47*(1), 30–41. https://doi.org/10.1080/00461520.2011.638882

Stoltz, E. (2014). *Employability Attributes and Career Adaptability as Predictors of Staff Satisfaction with Retention Factors*. University of South Africa.

Volk, A. A., Schiralli, K., Xia, X., Zhao, J., & Dane, A. v. (2018). Adolescent Bullying and Personality: A Cross-Cultural Approach. *Personality and Individual Differences*, *125*, 126–132. https://doi.org/10.1016/j.paid.2018.01.012

Wan Jaafar, W. N., & Maat, S. M. (2020). The Relationship Between Self Efficacy and Motivation with Stem Education: A Systematic Literature Review. *International Journal of Modern Education*, *2*(4), 19–29. https://doi.org/10.35631/IJMOE.24002

Yu, Y., Hua, L., Feng, X., Wang, Y., Yu, Z., Zi, T., Zhao, Y., & Li, J. (2021). True Grit in Learning Math: The Math Anxiety-Achievement Link Is Mediated by Math-Specific Grit. *Frontiers in Psychology*, *12*, 1–6. https://doi.org/10.3389/fpsyg.2021.645793