

Exploring the influence of teacher's grit and technological attitudes to learner's reading proficiency

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Abstract

Reading proficiency, a fundamental skill for academic success, varies widely among learners and is influenced by numerous factors, including the quality of instruction and the resources available. Teachers' attitudes towards technology, which encompass their willingness to integrate digital tools into their teaching practices, play a significant role in modern education. This study investigated the relationship between teachers' perseverance, their attitudes towards technology, and the reading proficiency of elementary students in the Department of Education, Lumban Sub-Office, Laguna, Philippines. The participants included 24 Key Stage 1 Language Teachers and 28 Key Stage 2 Language Teachers. The research utilized three instruments: an 8-item Grit Scale, a 12-item Attitude to Technology Survey, and a frequency measure of learners' reading levels. Key findings indicate teacher's grit levels across learners' reading proficiency significantly differs in Key Stage 1, while this is not true for Key Stage 2. Technological attitudes among teachers were generally positive and did not significantly differ across varying student reading proficiency levels in Key Stage 1, as indicated by an F-value of 0.071 and a P-value of 0.932. However, a significant difference was noted between teachers of learners in Key Stage 2 with different reading proficiency levels, particularly favoring those teaching at the Instructional level (F-value of 4.225, P-value of 0.046). Additionally, a positive correlation was found between higher grit levels and favorable technological attitudes, with correlation coefficients of 0.484 and 0.544 in Key Stages 1 and 2, respectively, both exceeding the critical value of 0.404 and showing statistical significance (p-values of 0.017 and 0.003, respectively). These findings suggest that teachers with higher grit levels are more likely to embrace technology, potentially enhancing their teaching efficacy and positively impacting learners' reading proficiency. Recommendations are directed towards school administrators, policy makers, educational technologists, teacher training programs, teachers, and educational researchers to further support and develop these relationships. Suggested program includes professional development workshops, mentorship programs, and technology integration projects.

Keywords: Reading proficiency; teacher's attitude towards technology; grit scale; elementary education; technological integration in teaching

1. Introduction

In the rapidly evolving landscape of global education, the resilience and perseverance of teachers, often referred to as "grit," have become critical factors in fostering effective learning environments. Grit, defined as the passion and sustained persistence towards long-term goals, is increasingly recognized as a vital attribute for educators facing the challenges of modern classrooms. Concurrently, the integration of technology in education has transformed teaching methodologies, offering innovative tools to enhance learning experiences. Internationally, teachers' attitudes towards technology and their ability to effectively incorporate digital tools into their pedagogy vary widely, influenced by factors such as access to resources, professional development opportunities, and institutional support¹².

Globally, the status of reading proficiency among learners presents a mixed picture. According to the Global Proficiency Framework for Reading, significant disparities exist in reading skills across different

regions and educational systems. While some countries have made notable progress in improving literacy rates, others continue to struggle with ensuring that all students achieve basic reading proficiency. The Programme for International Student Assessment (PISA) and other international assessments highlight these variations, underscoring the need for targeted interventions to address literacy gaps⁴.

Given this context, it becomes imperative to explore how teachers' grit and their attitudes towards technology influence learners' reading proficiency. This study aims to investigate this relationship, focusing on language teachers in the Department of Education, Lumban Sub-Office, Laguna, Philippines. By examining the interplay between teacher grit, technological integration, and student reading outcomes, this research seeks to provide insights that can inform educational practices and policies aimed at enhancing literacy skills. The findings will contribute to a deeper understanding of how educators' personal attributes and technological competencies impact student achievement, ultimately guiding efforts to improve reading proficiency in diverse educational settings.

1.1. Related Literature

Teachers' grit, defined as perseverance and passion for long-term goals, plays a crucial role in enhancing teaching efficacy and job satisfaction among educators, particularly in early childhood education. Research indicates that grit not only correlates positively with teaching passion and efficacy but also serves as a mediating factor in these relationships.

On grit and teaching efficacy:

- Grit significantly influences teaching efficacy, with studies showing that early childhood teachers' passion for teaching enhances their grit, which in turn boosts their efficacy (Shin & Lee 2023).
- Grit also mediates the relationship between teacher cooperation and efficacy, suggesting that collaborative environments can foster grit and improve teaching outcomes (Lee & Jung 2023). On grit's impact on job satisfaction: • A strong correlation exists between grit and job satisfaction, with grit being a more substantial predictor of satisfaction than teacher efficacy itself (Cho & Ahn 2023). • Specific sub-factors of grit, such as persistence and passion, are particularly influential in enhancing job satisfaction among early childhood educators (Cho & Ahn 2023).

On professionalism and grit:

- Grit is linked to professionalism, with findings indicating that professionalism fully mediates the relationship between grit and teaching efficacy (Cha & Seo 2024). This highlights the importance of developing both grit and professional skills to improve teaching outcomes.

While the focus on grit is essential, it is also important to consider that excessive emphasis on individual traits like grit may overlook systemic factors affecting teachers' work environments. Balancing grit development with supportive institutional frameworks is crucial for sustainable teacher efficacy and satisfaction.

Teachers' attitudes towards technology integration in education are generally positive, reflecting a growing acceptance of digital tools in teaching practices. This positive disposition is crucial for effective technology adoption in classrooms.

On general attitudes towards technology:

- A study in Bhutan found that most school teachers exhibit a favorable attitude towards technology acceptance, with no significant gender differences noted (Rabten 2024).
- Iranian EFL teachers also demonstrated a positive outlook on educational technology, viewing it as beneficial for language instruction despite facing challenges like inadequate infrastructure (Sadeghi 2024).

On factors influencing attitudes:

- Research indicates that perceived ease of use, self-efficacy, and institutional support significantly influence teachers' attitudes towards technology integration (Fernández et al. 2024).
- In Slovenia, teacher educators reported varying proficiency levels with digital tools, suggesting that comfort with

technology correlates with positive attitudes (Konrad & Štemberger 2023).

On challenges and considerations:

* Despite the overall positive attitudes, barriers such as lack of training and resources persist, which can hinder effective technology integration in educational settings (Choudhury & Khatun 2024) (Sadeghi 2024).

* While many teachers embrace technology, ongoing support and training are essential to overcome existing challenges and enhance their proficiency.

Learners' reading proficiency is influenced by various factors, including language skills, instructional methods, and task types. Research indicates that while English proficiency correlates with reading comprehension, the relationship is not always significant, suggesting other factors may play a role (Aballe et al. 2024). Additionally, the integration of multimodal strategies in teaching has been shown to enhance reading proficiency among EFL learners by creating engaging learning environments (Wijaya 2024). On factors influencing reading proficiency:

- **Language Proficiency:** A study found that Grade 6 learners demonstrated high reading comprehension despite no significant correlation with their English proficiency levels (Aballe et al. 2024).
- **Instructional Methods:** The use of big books with historical content significantly improved reading proficiency in Grade 2 learners, indicating that tailored instructional materials can enhance learning outcomes (Santocildes & Guanzon 2024).
- **Task Types:** Research on young EFL learners revealed that reading proficiency impacts writing performance, with stronger readers producing more sophisticated writing (Hsieh 2023). While these studies highlight effective strategies for improving reading proficiency, they also suggest that a multifaceted approach is necessary, considering the diverse needs of learners.

1.2. Research Questions

This study explored on the interplay of teachers' grit, attitude towards technology in teaching, and reading proficiency of the elementary students in the Department of Education, Lumban Sub-Office, Laguna, Philippines.

Specifically, it sought to answer the following questions:

1. What is the mean level of grit of the key stage 1 and 2 language teachers in Lumban Sub-Office?
2. What is the mean level of technology engagement of key stage 1 and 2 language teachers in Lumban Sub-Office?
3. What is reading proficiency status of key stage 1 and 2 pupils of Lumban Sub-Office?
4. Does grit level and technology engagement of key stage 1 and 2 language teachers significantly differ across the reading proficiency level of pupils?
5. Does grit level significantly correlates to technology engagement of key stage 1 and 2 language teachers?
6. What programs or projects can be implemented to raise teachers' grit and attitude towards the use of technology?

2. Methodology

2.1. Participants and/or other Sources of Data and Information

This study involved 24 key stage 1 language teachers, and 28 key stage 2 language teacher, having a total of 52 participants from the Department of Education, Lumban Sub-Office, Laguna, Philippines. These participants were selected to provide insights into the relationship between teachers' grit, their attitudes towards the use of technology in teaching, and the reading proficiency of their students. The study aimed to answer specific research questions regarding the levels of teachers' grit and technological attitudes, the reading proficiency of students, and the potential impact of these factors on student outcomes.

2.2. Data Gathering Methods

In this study, data was be collected using a printed questionnaire distributed to participating teachers. The questionnaire was divided into three parts, each designed to gather specific information relevant to the study's objectives. Prior to participation, teachers were informed through the questionnaire that their involvement was voluntary, and they may choose to answer or not answer any part of the questionnaire. Additionally, the disclosure of their names was optional, ensuring anonymity and encouraging honest responses.

The first part of the questionnaire utilized the 8-item Grit Scale developed by Angela Duckworth. This standardized instrument employed a Likert Scale system with responses ranging from 5 (Very much like me) to 1 (Not like me at all). To mitigate response bias, some items were reverse-scored. The second part of the questionnaire assesses teachers' attitudes towards the use of technology in teaching. This section consisted of a 12-item Likert Scale questionnaire created by the researcher, with response options ranging from 1 (Disagree totally) to 5 (Agree strongly). The final part of the questionnaire required teachers to report the number of students in different reading proficiency categories. For Grades 1-3, teachers indicated the number of students at the emerging, developing, and transitioning levels, based on the CRLA standards. For Grades 4-6, teachers reported the number of students at the frustration, instructional, and independent levels, as defined by the Phi-Iri framework. This comprehensive approach ensures that the data collected was both detailed and relevant to the study's aims.

2.3. Data Analysis Plan

This section presents the analysis of the data collected to answer the research questions posed in the study. The data were analyzed using descriptive and inferential statistics to explore the relationship between teachers' grit, their attitude towards technology in teaching, and the reading proficiency of elementary students in the Department of Education, Lumban Sub-Office, Laguna, Philippines.

Research Question 1: What is the mean level of teachers' grit of the elementary language teachers in Lumban Sub-Office?

To determine the mean level of teachers' grit, the Grit Scale developed by Duckworth et al. (2007) was administered to the elementary language teachers. The responses were scored and the mean grit score was calculated. Descriptive statistics, including the mean, standard deviation, and range, were used to summarize the data.

Research Question 2: What is the mean level of teachers' use of technology in teaching in Lumban Sub-Office?

The level of teachers' use of technology in teaching was assessed using a self-reported questionnaire. The questionnaire included items on the frequency and types of technology used in the classroom. The mean score for technology use was computed, and descriptive statistics were used to present the findings.

Research Question 3: What is reading proficiency status of pupils of Lumban Sub-Office?

The reading proficiency of pupils was measured using standardized reading tests administered by the Department of Education. The test scores were analyzed to determine the mean reading proficiency level. Descriptive statistics, including the mean, standard deviation, and proficiency levels, were used to describe the reading proficiency status of the pupils.

Research Question 4: Does teachers' grit and attitude in technology significantly differ across the reading proficiency level of pupils?

To examine whether teachers' grit and attitude towards technology significantly differ across the reading proficiency levels of pupils, an Analysis of Variance (ANOVA) was conducted. The independent variables were teachers' grit and attitude towards technology, and the dependent variable was the reading proficiency level of pupils. Post-hoc tests were performed to identify specific group differences.

Research Question 5: What programs or projects can be implemented to raise teachers' grit and attitude towards the use of technology?

Based on the findings from the data analysis, recommendations for programs or projects to enhance teachers' grit and attitude towards the use of technology were formulated. These recommendations were derived from the significant relationships identified in the study and aimed at improving both teacher and student outcomes.

2.4. Ethical Consideration

In the conduct of this study, several ethical considerations were taken into account to ensure the integrity and ethical standards of the research process.

1. **Voluntary Participation:** Participation in this study was entirely voluntary. Teachers were informed through the questionnaire that they could choose to participate or withdraw at any time without any consequences. This ensured that participants were not coerced or pressured into taking part in the study.

2. **Informed Consent:** Prior to participation, teachers were provided with detailed information about the study's objectives, procedures, and potential risks and benefits. This information was included in the questionnaire, ensuring that participants were fully aware of what their participation entailed. By completing the questionnaire, teachers provided their informed consent.

3. **Anonymity and Confidentiality:** To protect the privacy of the participants, the disclosure of names was optional. This measure ensured anonymity, encouraging honest and candid responses. Additionally, all data collected was kept confidential and used solely for the purposes of this study. Data was stored securely, and access was restricted to the research team.

4. **Data Security:** The collected data was stored in a secure manner to prevent unauthorized access. Physical copies of the questionnaires were kept in a locked cabinet, and any digital data was stored on password-protected devices. Only the research team had access to the data.

5. **Minimizing Harm:** The study was designed to minimize any potential harm to the participants. The questions in the questionnaire were carefully crafted to avoid causing distress or discomfort. Participants were also informed that they could skip any questions they were uncomfortable answering.

6. **Dissemination of Findings:** Upon completion of the study, the findings will be disseminated to the participants. This will be done through a summary report that will be shared with the participating teachers. This ensures transparency and allows participants to see the outcomes of the research they contributed to.

7. **Use of Standardized Instruments:** The study utilized the 8-item Grit Scale developed by Angela Duckworth and a researcher-created 12-item Likert Scale questionnaire to assess teachers' attitudes towards technology. The use of these standardized instruments ensured the reliability and validity of the data collected.

By adhering to these ethical considerations, the study aimed to uphold the highest standards of research ethics, ensuring the protection and respect of all participants involved.

3. Results and Discussion

3.1. Grit Scale of Key Stage 1 Language Teachers

Indicators	Mean	SD	Interpretation
1. New ideas and projects sometimes distract me from previous ones.	2.92	0.78	Moderately gritty
2. Setbacks don't discourage me.	3.13	1.08	Moderately grittiness
3. I have been obsessed with a certain idea or project for a short time but later lost interest.	3.08	0.78	Moderately gritty
4. I am a hard worker.	4.08	0.78	Highly gritty
5. I often set a goal but later choose to pursue a different one.	2.75	1.07	Moderately gritty
6. I have difficulty maintaining my focus on projects that take more than a few months to complete.	3.04	0.81	Moderately gritty
7. I finish whatever I begin.	4.33	0.56	Extremely gritty
8. I am diligent.	4.17	0.56	Highly gritty
Average	3.44	0.80	Highly gritty

Legend: 4.21 – 5.00 Extremely gritty
 3.41 – 4.20 Highly gritty
 2.61 – 3.40 Moderately gritty
 1.81 – 2.60 Lowly gritty
 1.0 – 1.80 Not at all gritty

The table provides a detailed analysis of the grit levels among 24 Key Stage 1 Language Teachers. The mean scores for the eight indicators range from 2.92 to 4.33, with items 1, 3, 5, and 6 already reversed in their mean ratings due to their conceptual opposition to the measured trait. The standard deviations, ranging from 0.56 to 1.08, indicate moderate variability in responses. The overall average grit score of 3.44 suggests that these teachers are generally highly gritty. Notably, the highest mean score (4.33) is for the indicator “I finish whatever I begin,” reflecting a strong commitment to task completion. Conversely, the lowest mean score (2.92) for “New ideas and projects sometimes distract me from previous ones” indicates a moderate level of distraction. This comprehensive analysis highlights the persistence and consistency of effort among these teachers, which could significantly influence their technological attitudes and, consequently, their students’ reading proficiency.

3.2. Grit Scale of Key Stage 2 Language Teachers

Indicators	Mean	SD	Interpretation
1. New ideas and projects sometimes distract me from previous ones.	2.94	0.92	Moderately gritty
2. Setbacks don't discourage me.	3.25	0.75	Moderately grittiness
3. I have been obsessed with a certain idea or project for a short time but later lost interest.	2.85	0.95	Moderately gritty
4. I am a hard worker.	4.25	0.52	Extremely gritty
5. I often set a goal but later choose to pursue a different one.	2.85	0.81	Moderately gritty
6. I have difficulty maintaining my focus on projects that take more than a few months to complete.	3.04	0.84	Moderately gritty
7. I finish whatever I begin.	4.29	0.60	Extremely gritty
8. I am diligent.	4.14	0.59	Highly gritty
Average	3.45	0.75	Highly gritty

Legend:	4.21 – 5.00	Extremely gritty
	3.41 – 4.20	Highly gritty
	2.61 – 3.40	Moderately gritty
	1.81 – 2.60	Lowly gritty
	1.00 – 1.80	Not at all gritty

The table provides insights into the grit levels of 28 Key Stage 2 Language Teachers. Items 1, 3, 5, and 6, which are conceptually reversed, show lower mean ratings, indicating less grit in those areas. For instance, item 5 (“I often set a goal but later choose to pursue a different one”) has the lowest mean rating of 2.04, suggesting a tendency to shift goals. Conversely, items like 7 (“I finish whatever I begin”) and 8 (“I am diligent”) have high mean ratings of 4.29 and 4.14, respectively, reflecting strong perseverance and diligence. The standard deviations indicate moderate variability in responses, with the highest SD of 0.95 for item 3, suggesting differing levels of obsession with projects. Overall, the data suggests that while teachers exhibit high levels of grit in completing tasks and diligence, they may struggle with maintaining focus and consistency in long-term projects. This nuanced understanding of teacher grit can inform strategies to enhance technological attitudes and ultimately improve learner reading proficiency.

3.3. Attitude/Engagement of Key Stage 1 Language Teachers to Technology

Indicators	Mean	SD	Interpretation
1. I enjoy using technology.	4.54	0.51	Very highly engaged
2. I avoid using technology when I can.	2.96	1.27	Moderately engaged
3. I think using technology in class takes up too much time.	3.58	1.25	Highly engaged
4. I know that technology can help me to learn many new things.	4.71	0.46	Very highly engaged
5. Technology intimidates and threatens me.	3.46	1.10	Highly engaged
6. Students should know how to use technology in class.	4.33	0.64	Very highly engaged
7. I would be a better learner if I knew how to use technology properly.	4.50	0.72	Very highly engaged
8. I'm very confident when it comes to working with technology at home/at school.	4.33	0.56	Very highly engaged
9. I want to learn more about using technology at home/at school.	4.54	0.51	Very highly engaged
10. I believe that I can improve my language skills using the benefits of the Internet.	4.42	0.58	Very highly engaged
11. Using technology in learning languages is not necessary.	3.54	1.14	Highly engaged
12. Technology breaks down too often to be of very much use.	3.33	0.96	Moderately engaged
Average	4.02	0.81	Highly engaged

Legend:	4.21 – 5.00	Very highly engaged
	3.41 – 4.20	Highly engaged
	2.61 – 3.40	Moderately engaged
	1.81 – 2.60	Slightly engaged
	1.00 – 1.80	Not engaged

The table provides insights into the technological attitudes of 24 Key Stage 1 Language Teachers. Items 2, 3, 5, and 11, which are conceptually reversed, show lower mean ratings, indicating less favorable attitudes towards technology in those areas. For instance, item 3 (“I think using technology in class takes up too much time”) has a mean rating of 2.56, suggesting a perception that technology is time-consuming. Conversely, items like 1 (“I enjoy using technology”) and 10 (“I believe that benefits of the internet outweigh its negatives”) have high mean ratings of 4.54 and 4.42, respectively, reflecting strong positive attitudes towards technology. The standard deviations indicate varying degrees of consensus among the teachers’ responses, with the highest SD of 1.27 for item 2, suggesting differing levels of avoidance of technology. Overall, the data suggests that while teachers generally have positive attitudes towards technology, there are areas where they perceive challenges, which could influence their integration of technology in teaching and ultimately affect learner reading proficiency.

3.4. Attitude/Engagement of Key Stage 2 Language Teachers to Technology

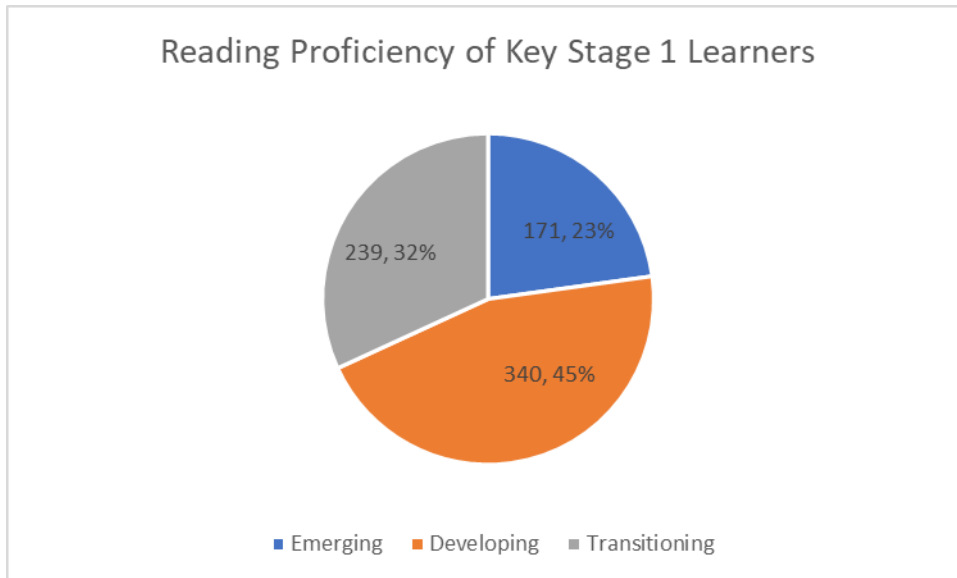
Indicators	Mean	SD	Interpretation
1. I enjoy using technology.	4.71	0.46	Very highly engaged
2. I avoid using technology when I can.	3.43	1.35	Highly engaged
3. I think using technology in class takes up too much time.	3.82	1.22	Highly engaged
4. I know that technology can help me to learn many new things.	4.50	1.11	Very highly engaged
5. Technology intimidates and threatens me.	4.04	1.00	Highly engaged
6. Students should know how to use technology in class.	4.43	0.69	Very highly engaged
7. I would be a better learner if I knew how to use technology properly.	4.43	0.69	Very highly engaged
8. I’m very confident when it comes to working with technology at home/at school.	4.32	0.67	Very highly engaged
9. I want to learn more about using technology at home/at school.	4.54	0.58	Very highly engaged
10. I believe that I can improve my language skills using the benefits of the Internet.	4.43	0.69	Very highly engaged
11. Using technology in learning languages is not necessary.	3.64	1.34	Highly engaged
12. Technology breaks down too often to be of very much use.	3.18	1.22	Moderately engaged
Average	4.12	0.92	Highly engaged

Legend:	4.21 – 5.00	Very highly engaged
	3.41 – 4.20	Highly engaged
	2.61 – 3.40	Moderately engaged
	1.81 – 2.60	Slightly engaged
	1.00 – 1.80	Not engaged

The table reveals that 28 Key Stage 2 Language Teachers generally hold positive attitudes towards technology. Items 2, 3, 5, and 11, which are reversed in concept, show mean ratings of 3.43, 3.82, 4.04, and 3.64 respectively, indicating a more favorable stance towards technology than the raw scores suggest. The highest mean rating of 4.71 for item 1 (“I enjoy using technology”) and the lowest standard deviation of 0.46

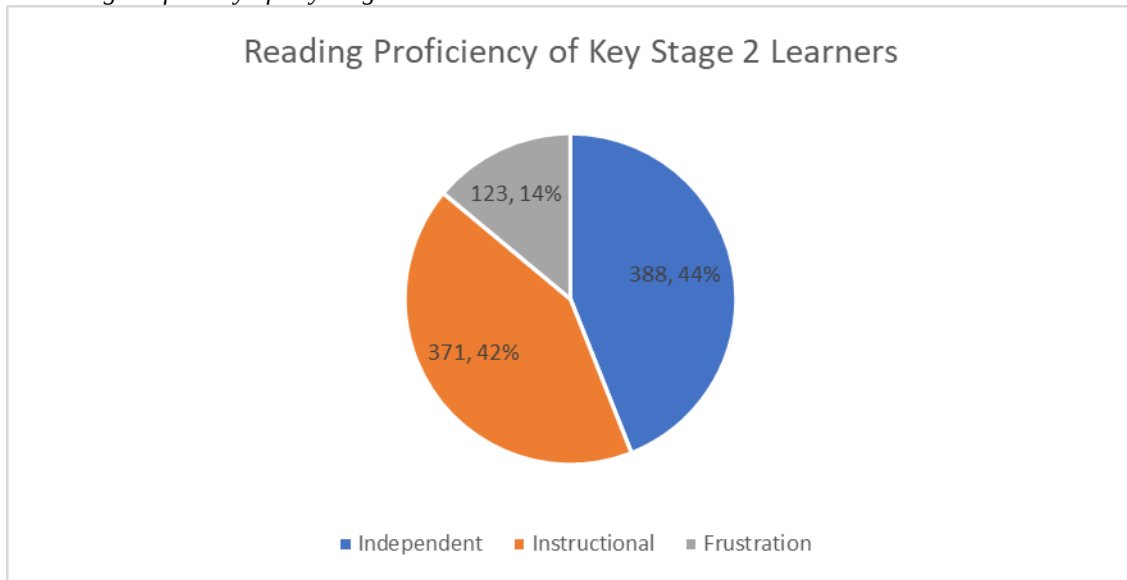
for the same item indicate strong consensus and high engagement. Conversely, the highest standard deviation of 1.35 for item 2 (“I avoid using technology when I can”) suggests varied opinions on technology avoidance. Overall, the data indicates that these teachers are highly engaged with technology, recognizing its benefits and expressing confidence in its use, which could positively influence their students’ reading proficiency.

3.5. Reading Proficiency of Key Stage 1 Learners



The pie chart illustrates the distribution of reading proficiency levels among young learners, segmented into three categories: Transitioning (32%, 239 learners), Developing (45%, 340 learners), and Emerging (23%, 171 learners). The largest portion of learners falls into the Developing category, indicating that nearly half of the students are progressing in their reading skills but have not yet reached full proficiency. The Emerging category, representing learners who are just beginning to develop their reading abilities, comprises about a quarter of the population. The smallest group, Emerging, includes those who are just beginning to develop their reading skills. This distribution suggests that while a significant number of students are making progress, there is still a considerable portion at the early stages of reading development. These insights could be crucial for understanding how factors such as teacher’s grit and technological attitudes impact students’ reading proficiency, highlighting areas where additional support and resources may be needed to foster improvement.

3.6. Reading Proficiency of Key Stage 2 Learners



The pie chart illustrates the distribution of reading proficiency levels among these learners, segmented into three categories: Instructional (42%, 371 learners), Independent (44%, 388 learners), and Frustration (14%, 123 learners). The largest portion of learners falls into the Independent category, indicating that nearly half of the students read and understand texts on their own. The Instructional category, representing learners who can comprehend texts with some guidance but are not yet fully independent readers, comprises a significant portion as well. The smallest group, Frustration, includes those who struggle significantly with reading. This distribution suggests that while a substantial number of students are progressing towards independence in reading, there is still a notable portion who require considerable support. These insights are crucial for understanding how factors such as teacher's grit and technological attitudes impact students' reading proficiency, highlighting areas where additional support and resources may be needed to foster improvement.

3.7. Difference of Grit Level among KSI Language Teachers across Learners' Reading Proficiency

Teachers' Grit Level / KSI Learners' Reading Skill	Mean	SD	F-val	F-crit	P-val	Decision
Transitioning (n=3)	3.33	0.42	4.455	3.467	0.024	Significant
Developing (n=16)	3.37	0.29				
Emerging (n=5)	3.83	3.83				

alpha = 0.05; n = number of teachers who has majority of learners under the specified reading level

The table reveals significant differences in grit levels among 24 Key Stage 1 Language Teachers based on their learners' reading skills. Teachers with students in the "Emerging" category exhibit the highest mean grit level of 3.83, with a standard deviation (SD) of 3.83, indicating high variability. Those with "Transitioning" students have a mean grit level of 3.33 (SD = 0.42), while teachers with "Developing" students show a mean grit level of 3.37 (SD = 0.29). The F-value of 4.55, exceeding the F-critical value of 3.467, and a P-value of 0.024, indicate a statistically significant difference in grit levels among these groups.

This suggests that teachers' grit levels vary significantly depending on their students' reading proficiency levels. Bridging this with the readings, the findings align with Shin & Lee (2023), who assert that grit enhances teaching efficacy. The higher grit levels among teachers with "Emerging" students may reflect their passion and perseverance in overcoming challenges, thereby boosting their efficacy. Additionally, Lee & Jung (2023) highlight that collaborative environments foster grit and improve teaching outcomes. This suggests that fostering a supportive and cooperative teaching environment could further enhance teachers' grit, potentially leading to better student reading proficiency outcomes. Thus, the study underscores the importance of grit in teaching, particularly in challenging educational contexts.

3.8. Difference of Grit Level among KS2 Language Teachers across Learners' Reading Proficiency

Teachers' Grit Level / KS2 Learners' Reading Skill	Mean	SD	F-val	F-crit	P-val	Decision
Independent (n=14)	3.35	0.37	1.742	4.225	0.198	Not Significant
Instructional (n=14)	3.53	0.34				

alpha = 0.05; n = number of teachers who has majority of learners under the specified reading level

The table compares the grit levels of 28 Key Stage 2 Language Teachers based on their learners' reading skills, categorized as either independent or instructional. The mean grit level for teachers with independent learners is 3.35 (SD = 0.37), while for those with instructional learners, it is 3.53 (SD = 1.74). The F-value of 4.225 indicates no significant difference in grit levels between the two groups, as the p-value is above the alpha level of 0.05. This suggests that the grit levels of teachers do not significantly vary based on their learners' reading proficiency. Bridging this with the external readings, while Shin & Lee (2023) and Lee & Jung (2023) highlight that grit significantly influences teaching efficacy and is enhanced in collaborative environments, this study's findings suggest that such grit does not differ significantly among teachers based on their students' reading skills. This could imply that while grit is crucial for teaching efficacy, its levels are not necessarily impacted by the reading proficiency of students. Therefore, other factors might play a more significant role in determining the grit levels of teachers, such as their personal motivation, support systems, and professional development opportunities.

3.9. Difference of Attitude/Engagement to Technology among KS1 Language Teachers across Learners' Reading Proficiency

Attitude to Technology / KS1 Learners' Reading Skill	Mean	SD	F-val	F-crit	P-val	Decision
Transitioning (n=3)	4.03	0.29	0.071	3.467	0.932	Not Significant
Developing (n=16)	4.00	0.34				
Emerging (n=5)	4.07	0.32				

alpha = 0.05; n = number of teachers who has majority of learners under the specified reading level

The table presents data on the attitudes of 24 Key Stage 1 Language Teachers towards technology, categorized by their learners' reading skills: Transitioning, Developing, and Emerging. The mean scores for teachers' attitudes are quite similar across all categories, with 4.03 for Transitioning, 4.00 for Developing, and 4.07 for Emerging, and standard deviations ranging from 0.29 to 0.34. The statistical analysis, indicated by an F-value of 0.071 and a P-value of 0.932, shows no significant difference in technological attitudes among teachers across different levels of learners' reading skills, suggesting that teachers' attitudes towards technology are uniformly positive regardless of their students' reading proficiency levels. When comparing these findings with other studies, such as those from Bhutan, Iran, and Slovenia, a consistent theme emerges:

teachers generally exhibit positive attitudes towards technology integration in education, influenced by factors like perceived ease of use, self-efficacy, and institutional support¹²³. However, challenges such as inadequate infrastructure and lack of training persist, which can hinder effective technology integration⁴. This aligns with the current study's implication that while teachers' attitudes are positive, external barriers must be addressed to fully leverage technology in enhancing learners' reading proficiency.

3.10. Difference of Attitude/Engagement to Technology among KS2 Language Teachers across Learners' Reading Proficiency

Attitude to Technology / KS2 Learners' Reading Skill	Mean	SD	F-val	F-crit	P-val	Decision
Independent (n=14)	3.94	0.44	4.374	4.225	0.046	Significant
Instructional (n=14)	4.31	0.51				

alpha = 0.05; n = number of teachers who has majority of learners under the specified reading level

The table presents data on the attitudes of 28 Key Stage 2 Language Teachers towards technology, categorized by their learners' reading skills: Independent and Instructional. The mean scores for teachers' attitudes are 3.94 for those with Independent learners and 4.31 for those with Instructional learners, with standard deviations of 0.47 and 0.51, respectively. The statistical analysis, indicated by an F-value of 4.225 and a P-value of 0.046, shows a significant difference in technological attitudes between teachers of learners with different reading proficiency levels. This suggests that teachers with learners at the Instructional level have a more positive attitude towards technology compared to those with Independent learners. When comparing these findings with other studies, such as those from Bhutan, Iran, and Slovenia, a consistent theme emerges: teachers generally exhibit positive attitudes towards technology integration in education, influenced by factors like perceived ease of use, self-efficacy, and institutional support¹²³. However, challenges such as inadequate infrastructure and lack of training persist, which can hinder effective technology integration⁴. This aligns with the current study's implication that while teachers' attitudes are positive, external barriers must be addressed to fully leverage technology in enhancing learners' reading proficiency.

3.11. Correlation of Grit Level and KS1 Language Teachers' Attitude/Engagement to Technology

Factors	Mean	SD	R-val	R-crit	P-val	Decision
Grit Level	3.44	0.80	0.484	0.404	0.017	Significant
Attitude to Technology	4.02	0.81				

alpha = 0.05

The table presents data from 24 Key Stage 1 Language Teachers. It shows a significant positive correlation between teachers' grit levels and their attitudes towards technology, with a mean grit level of 3.44 (SD = 0.80) and a mean attitude towards technology of 4.02 (SD = 0.81). The correlation coefficient (R-val) is 0.484, which exceeds the critical value (R-crit) of 0.404, and the p-value is 0.017, indicating statistical significance at the alpha level of 0.05. This suggests that teachers with higher grit levels tend to have more positive attitudes towards technology, which could potentially enhance their teaching efficacy and positively impact learners' reading proficiency. The findings from this study align with existing literature. For instance, Shin & Lee (2023) highlight that teachers' passion and grit significantly enhance teaching efficacy, which is further supported by Lee & Jung (2023), who found that collaborative environments foster grit and improve teaching outcomes. Additionally, Rabten (2024) and Sadeghi (2024) both report favorable attitudes towards

technology among teachers, despite challenges like inadequate infrastructure. Fernández et al. (2024) emphasize the importance of perceived ease of use, self-efficacy, and institutional support in shaping teachers' attitudes towards technology integration. These readings collectively suggest that fostering grit and positive technological attitudes among teachers can create a more effective and supportive learning environment, ultimately benefiting students' reading proficiency.

3.12. Correlation of Grit Level and KS2 Language Teachers' Attitude/Engagement to Technology

Factors	Mean	SD	R-val	R-crit	P-val	Decision
Grit Level	3.45	0.75	0.544	0.404	0.003	Significant
Attitude to Technology	4.12	0.92				

alpha = 0.05

The table presents data from 28 Key Stage 2 Language Teachers. It shows a significant positive correlation between teachers' grit levels and their attitudes towards technology, with a mean grit level of 3.45 (SD = 0.75) and a mean attitude towards technology of 4.12 (SD = 0.92). The correlation coefficient (R-val) is 0.544, which exceeds the critical value (R-crit) of 0.404, and the p-value is 0.003, indicating statistical significance at the alpha level of 0.05. This suggests that teachers with higher grit levels tend to have more positive attitudes towards technology, which could potentially enhance their teaching efficacy and positively impact learners' reading proficiency. The findings from this study align with existing literature. For instance, Shin & Lee (2023) highlight that teachers' passion and grit significantly enhance teaching efficacy, which is further supported by Lee & Jung (2023), who found that collaborative environments foster grit and improve teaching outcomes. Additionally, Rabten (2024) and Sadeghi (2024) both report favorable attitudes towards technology among teachers, despite challenges like inadequate infrastructure. Fernández et al. (2024) emphasize the importance of perceived ease of use, self-efficacy, and institutional support in shaping teachers' attitudes towards technology integration. These readings collectively suggest that fostering grit and positive technological attitudes among teachers can create a more effective and supportive learning environment, ultimately benefiting students' reading proficiency.

4. Conclusion, Recommendations and Reflection

4.1. Conclusion

In conclusion, the study reveals a complex relationship between teachers' grit, technological attitudes, and learners' reading proficiency. While teachers' grit levels do not consistently vary with students' reading proficiency, their attitudes towards technology show significant differences, particularly favoring those teaching at the Instructional level. Furthermore, a positive correlation exists between higher grit levels and favorable technological attitudes, suggesting that teachers with greater perseverance are more likely to embrace technology, potentially enhancing their teaching effectiveness and positively influencing learners' reading outcomes.

4.2. Recommendations

Here are some recommendations based on the findings of the study:

1. School Administrators: Recognize that teachers' grit levels may vary with students' reading proficiency. Provide targeted professional development and support to help teachers build resilience and perseverance, especially those working with students who have lower reading proficiency.

2. Policy Makers: Given that teachers' grit levels do not significantly vary based on learners' reading proficiency, consider implementing policies that promote consistent support and resources for all teachers, regardless of their students' proficiency levels.

3. Educational Technologists: Since teachers' attitudes towards technology are uniformly positive, continue to develop and provide accessible technological tools and training that can be easily integrated into classrooms, ensuring all teachers can benefit regardless of their students' reading proficiency levels.

4. Teacher Training Program Proponents: Focus on enhancing technological attitudes among teachers, particularly those working with learners at the Instructional level, as they tend to have a more positive attitude towards technology. This can be achieved through specialized training and resources.

5. Teachers: Understand that higher grit levels are associated with more positive attitudes towards technology. Engage in professional development opportunities that build both grit and technological competence, as this can enhance teaching efficacy and positively impact students' reading proficiency.

6. Educational Researchers: Further investigate the relationship between teachers' grit, technological attitudes, and student outcomes. This can help in developing more nuanced strategies to support teachers and improve student reading proficiency.

7. Suggested Programs or Project Ideas: Here are a few program or project ideas that could help raise teachers' grit and attitudes towards the use of technology:

a. Professional Development Workshops - Organize a series of workshops focused on integrating technology into teaching practices. These workshops can cover:

- Digital Literacy: Training on various digital tools and platforms.
- Grit and Resilience: Sessions on building perseverance and resilience in the face of challenges.
- Collaborative Learning: Opportunities for teachers to share experiences and strategies.

b. Mentorship Programs - Establish a mentorship program where tech-savvy teachers mentor their peers. This can include:

- One-on-One Coaching: Personalized support to help teachers integrate technology.
- Peer Observations: Opportunities to observe and learn from colleagues who effectively use technology.

c. Technology Integration Projects - Implement projects that require teachers to use technology in innovative ways. Examples include:

- Flipped Classrooms: Encouraging teachers to use video lessons and online resources to enhance classroom learning.
- Digital Storytelling: Using multimedia tools to create engaging learning materials.

d. Recognition and Incentives - Create a system to recognize and reward teachers who demonstrate high levels of grit and effective use of technology. This could involve:

- Awards and Certificates: Acknowledging outstanding efforts in technology integration.

Professional Growth Opportunities: Providing access to advanced training and conferences.

e. Collaborative Platforms - Develop online platforms where teachers can collaborate, share resources, and support each other. Features might include:

- Discussion Forums: Spaces for teachers to discuss challenges and solutions.
- Resource Libraries: Collections of digital tools and lesson plans.

f. Pilot Programs - Launch pilot programs in select schools to test new technologies and teaching methods. This can help:

- Identify Best Practices: Determine what works best in different contexts.
- Scale Successful Models: Expand successful initiatives to other schools.

These programs can help foster a positive attitude towards technology and build the perseverance needed to overcome challenges in modern education.

4.3. Reflection

Reflecting on this study, the researchers acknowledge the nuanced interplay between the variables examined. The findings underscore that while teachers' grit does not uniformly impact students' reading proficiency, their technological attitudes significantly differ, especially among those teaching at the Instructional level. This suggests that teachers who are more open to integrating technology into their teaching practices can create more effective learning environments. Additionally, the positive correlation between higher grit levels and favorable technological attitudes highlights the potential for perseverance to drive technological adoption. This, in turn, may enhance teaching effectiveness and positively influence learners' reading outcomes. The study's insights emphasize the importance of fostering both resilience and a positive attitude towards technology in educators to support student achievement.

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