

The perceived ideal qualities of secondary school mathematics leaders

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Abstract

Effective school leadership is critical for school success. Teachers as leaders have extraordinary influences not only in their classrooms but also in the general school framework. The aspect of teacher leadership provides self-knowledge and the courage to act on that knowledge. However, there is no consensus on what defines teacher leaders and the specific qualities that characterise them. In this study, the insights of twelve conveniently sampled graduate teacher candidates in one of the teacher training institutions in Brunei Darussalam were explored. They were asked to describe the ideal leadership qualities that a secondary school mathematics teacher leader should possess. There were many variations in their responses. However, the overarching finding was that mathematics teacher leaders should have ideal qualities that make them functional within and outside of the classroom. Key attributes such as effective classroom management, content and pedagogical knowledge, effective communication and problem-solving skills, and the ability to contribute to maintaining a healthy school-community partnership were mentioned. This study concluded that in defining teacher leadership, it is essential to define the concept based on teachers' ability to influence others to achieve set goals within and outside of the classroom.

Keywords: Leadership Traits, Mathematics Teacher Leaders, Teacher Leadership

Introduction

One of the essential ingredients for effective teaching and learning is the leadership style a teacher possesses. The ability of the teacher to know about effective leadership styles and be able to apply them have the possibility to bring about instructional success, student motivation, performance, and teacher learning (Tsang et al., 2014; Braseth, 2021). In the classroom, the

teacher is the primary leader who models and initiates leadership acts, and prominent among them is how to lead the teacher's own students and other peer teachers (Kani et al., 2014; Amalu & Njoku, 2018).

Generally, leadership has been defined as the process of influencing the activities of others to achieve a goal (Ngambi, 2011; Okon, 2016). This indicates that there cannot be a leader without followers, and in most cases, the leader possesses the power and authority to influence or direct followers before the set goals can be achieved (Burkett, 2011; Ekpiken, 2016). The particular methods leaders use to influence, exercise authority, and motivate followers to achieve the set goals are termed as leadership styles (Ware, 2010). The kind of leadership style that a teacher uses is important because it has the potential to improve or hold back the commitment and interest of students (Obiwuru et al., 2011).

Considering that effective leadership style is vital in achieving set goals, teachers are responsible for using effective leadership styles to be able to guide students to achieve learning goals, and like any other teacher, mathematics teachers are also responsible to develop effective leadership styles (Shahrill, 2014). The ability of the teacher to achieve the goals of influencing or leading others, especially students, to achieve instructional goals becomes meaningful when specific leadership styles are exhibited constantly or contingently in the classroom. As a result, it is important to continually explore the meaning of teacher leadership across contexts (Wenner & Campbell, 2017).

The literature appears rich in theorising the leadership qualities or styles individuals, including teachers, should possess. For example, in 1947, Weber developed three leadership styles: transactional, transformational, and *laissez fair*. This thinking of Weber was made popular by Burns (1978) and Bass (1997). In transformational leadership, the leader brings about desirable changes when needed, and this is done by inspiring and motivating followers. This kind of leadership is associated with high performance, commitment, and self-satisfaction among followers (Hiller et al., 2011). Leaders who exhibit transformational qualities are proactive, knowledgeable, creative, dynamic, and embrace changes. This indicates that teachers who exhibit transformational qualities in teaching and learning are more likely to fulfil students' interests, motivate, inspire, and increase student awareness of the achievement of instructional goals.

In transactional leadership, leaders use rewards to achieve set goals (Bolkan et al., 2011). There is an exchange or transaction taking place between leaders and followers. Teachers who exhibit this leadership characteristic may prioritise giving rewards to students for task achievement. This suggests that teachers who exhibit transactional qualities are task-oriented and may see teaching and learning as an exchange or a transaction. Students may not have the enthusiasm and engagement in teaching and learning since the achievement of instructional tasks is contingent on transactions or rewards. Leaders who do not exercise ultimate control over followers have *laissez-fairness* leadership qualities (Almansour, 2012). Teachers who exhibit these qualities may not show concern for student learning and may give students too much autonomy in the classroom. Exhibiting this leadership style in the classroom can be dangerous since students may not have the necessary knowledge for self-instruction.

Teachers can also demonstrate autocratic and democratic qualities in the classroom. In the latter, the teaching and learning experience is based on the dictates of the teacher (Cherry, 2014). The teacher exhibits total authority and dictatorship, and instructional activities are the prerogative of the teacher. In the former, the teacher believes in participatory leadership qualities, teamwork, and collaboration. Students are most often guided, undergo teaching and learning experiences based on their interests, and are free to voice their views. Although authoritarian leadership in the classroom can be advantageous by prioritising student achievement of instructional tasks (Cherry, 2014), democratic qualities have been the most effective style of leadership, and contemporary teaching and learning have shifted from an autocratic and teacher-centred environment to a more democratic and student-centred learning (Schott et al., 2020).

Despite the relevance of leadership qualities, there has not been a consensus on how teacher leadership is defined (Neumerski, 2013) and on what qualities of teachers characterise effective teacher leadership in the classroom. York-Barr and Duke (2004, pp. 287-288) defined teacher leadership as “the process by which teachers, individually and collectively influence their colleagues, principals and other members of school communities to improve teaching and learning and learning practices with the aim of increasing students’ learning and achievement.” Others have defined teacher leadership as their understanding of educational practice, the entire educational system within which they work, and how they accumulate resources to influence others to improve teaching and learning (Criswell et al., 2018). Teacher leadership should also lead to improvement in student learning (Smith et al., 2017).

The previous definitions of teacher leadership suggest that what qualifies a teacher leader is not only limited to how he/she organises or ensures a classroom environment that supports effective teaching and learning. However, it also includes the qualities he/she possesses to contribute to the effectiveness of teaching and learning outside the classroom (Danielson, 2006; Lin et al., 2018). The conceptualisation of the term ‘teacher leader’ or ‘teacher leadership’ is linked to formal leadership roles in which teachers undertake both management and pedagogical responsibilities such as head of department (Muijs & Haris, 2007). This shows that the understanding of ‘teacher leader’ should not be viewed as static but rather a fluid phenomenon. Teacher leadership can exist within the school where teachers are not necessarily in their formal leadership roles but could make positive changes (Muijs & Harris, 2007). Less traditional leadership roles can take the form of supporting the professional learning of peers, influencing decision making, and targeting student learning (Wenner & Campbell, 2017). A variety of strengths and characteristics of a teacher leader are essential in shaping the teaching and learning of students (Yow, 2013).

In this study, we narrow the discourse concerning the meaning of teacher leadership and the qualities that characterise teacher leaders to mathematics teachers. This is because, like any other teacher, mathematics teachers should be leaders in mathematics classrooms (Amalu & Njoku, 2018). Improving mathematics teachers’ leadership competencies by involving them in the development of school policy is associated with a conducive classroom and school environment that will enhance teaching and learning (Callingham et al., 2017).

Transformational and instructional leadership qualities exhibited by mathematics teachers improved students' mathematics outcomes, especially those from low socio-economic communities (Vale et al., 2010). Effective mathematics teaching has also been associated with the leadership of mathematics teachers. For example, Ismail et al. (2015) found that effective teaching and learning of mathematics was hindered because there were no mathematics teacher leaders at the departmental level in a school.

While transformational and democratic qualities are needed for effective instruction, teachers have been reported to adopt autocratic leadership qualities in mathematics classrooms, especially when their years of teaching experiences increase (Morsidi et al., 2015). In contrast, mathematics teachers tend to be more democratic, and this leadership trait was based on demographic variables such as years of teaching experience, educational level, and age (Tsang et al., 2014). Teacher belief in participatory leadership in mathematics classrooms was confirmed by Tsakeni and Jita (2017). They reported that mathematics and science teachers regarded classroom leadership as participatory, and the purpose of this kind of leadership was to improve teacher learning and instructional practices.

Mathematics teachers' leadership qualities should also extend beyond the classroom. They should be able to develop and execute equitable, and at the same time, high-quality mathematics teaching and learning for all students, and put in place appropriate classroom environments that support the teaching and learning of mathematics (National Council of Supervisors of Mathematics, NCSM, 2019). They should also monitor student learning through formal and informal techniques by providing enough evidence that can be used to track student progress (Asamoah et al., 2022). They must create a classroom culture that improves student learning and collaboration (NCSM, 2019). Arguably, these responsibilities demand teachers who demonstrate leadership qualities other than autocratic leadership styles.

Given that there is no answer to how teacher leadership is defined and the characteristics that depict teacher leadership (Schott et al., 2020), and that "teacher leadership continues to be ill-defined in research" (Hite & Milbourne, 2018, p. 2), this study draws on the diverse nature of the definition of ideal teacher leadership in an organisation and asks the question: What are the ideal traits of a secondary school mathematics leader? This study explores the definition of ideal qualities possessed by mathematics school leaders from the perspectives of mathematics Graduate Teacher Candidates (GTCs).

Methods

This study adopted a qualitative descriptive approach. This approach to qualitative research allows participants to provide a systematic description of phenomena based on their opinions (Creswell, 2009). Not only does this design allow for the investigation of a social phenomenon such as the qualities of an effective mathematics leader, but it also allows data to be obtained from the natural settings of participants based on open-ended questions (Creswell, 2009). Since this study aimed at soliciting the opinions from mathematics teacher candidates about what

qualifies an effective mathematics leader by responding to open-ended questions, the adopted design was deemed appropriate.

Using convenience sampling, a total of 12 GTCs served as participants for this study. They were made up of ten female and two male teacher candidates. These teacher candidates were enrolled in the Master of Teaching (MTeach) programme under the learning area of Secondary Mathematics. The MTeach programme is a master's or graduate degree that provides prospective educators with the necessary professional qualification for entry into the teaching profession (Shahrill et al., 2014, 2021; Jaidin et al., 2015).

Data was collected through an open-ended questionnaire. The questionnaire was distributed to the participants through an online platform. Data were collected using open-ended questions because we wanted to explore comprehensive and holistic opinions of participants on the ideal qualities of a mathematics leader since open-ended questions help elicit in-depth opinions. The use of open-ended questions brings about diversity in responses compared to when closed-ended questions are used (Allen, 2017). Participants' participation rights were protected during data collection, and their participation was voluntary. They had the right to leave the study anytime they wanted and were assured of the confidentiality of the information provided. Their names and further details that can reveal their identities were changed to protect their identity.

Data collected were analysed using thematic analyses (Braun & Clarke, 2012). The responses were read and coded. Key issues suitable to help answer the research question were put together to form themes. To validate the general findings that originated from our analysis, excerpts have been chosen from the pool of responses provided by the participants.

Results and Discussion

There were two themes that emerged from the responses of the participants. The GTCs described an ideal trait as similar to the qualities of a good mathematics teacher inside the classroom. In addition to this, the GTCs defined an ideal mathematics teacher leader as someone who also possessed leadership skills that extend beyond the classroom

Ideal traits of a good mathematics teacher leader within the classroom

The most common response by the GTCs to describing the ideal traits of a mathematics teacher leader is someone who possesses the ability to lead a classroom. The term 'students' were mentioned explicitly in the responses by eight out of twelve GTCs. This indicates that a good mathematics teacher leader is perceived to place emphasis on their students first. These emphases include the well-being of students, student learning, and students' behaviour.

Ultimately, with the focus on the students, the teacher leader is perceived to be knowledgeable in teaching, adaptable in making innovations and changes in the lessons, in control of the classroom environment and yet making sure lessons are enjoyable. This confirms that a mathematics teacher-leader should exhibit more transformational and democratic leadership qualities from the teacher candidates' perspectives. This view of leadership qualities

shared by the teacher candidates confirms previous studies. For example, Hiller et al. (2011) opined those leaders with transformational qualities initiate desirable changes. Other studies such as Tsang et al. (2014) and Tsakeni and Jita (2017) corroborated that exhibiting democratic and participatory leadership styles in class leads to student commitment and participation, which encourages student-centred teaching and learning.

The ability to instruct and direct students are crucial to achieve the desired learning goals. However, instructions become essential to facilitate student learning when students are given some level of authority over their learning. Most definitions of leadership involve the process of guiding, structuring and facilitating activities by one person over other people (Yukl, 1998; Ngambi, 2011; Wachira et al., 2013; Kani et al., 2014; Okon, 2016; Criswell et al., 2018). It also involves filtering and narrowing of ideas generated by students to focus on mathematical content (Sherin, 2002). GTC11 has encapsulated the role of a mathematics teacher leader as shared in the response.

GTC11: ...the teacher should possess the role of a leader in the classroom. This can be shown through class management, such as the ability to provide clear and concise instruction and commands to students, knowledgeable about mathematical concepts and high-knowledge content, able to properly managing their time, ability to manage student behaviour without any discrimination and fair treatment as well as allowing students to feel comfortable in their classroom environment without fear.

In addition to having control of the classroom, teachers are seen as role models in the classroom. Highly motivated and supportive teachers ensure that students feel secure and motivated in their learning. Amalu and Njoku (2018) found that teachers' leadership styles significantly impact student learning and motivation. In addition, Callingham et al. (2017) found that the leadership qualities of mathematics teachers are associated with their ability to develop and maintain a conducive classroom environment that supports teaching and learning. As shared below, prioritising students' affective domain was also seen as one of the qualities of a mathematics teacher leader.

GTC2: The teacher as a role model must be highly motivated and supportive so students will not feel insecure in their learning.

GTC6: The teacher should be able to make the lesson interesting and interactive to ensure that students enjoy and understand the lesson.

The ability to incorporate technology in education was another trait of a mathematics teacher-leader mentioned by one of the GTCs (GTC11). The aim of this is to motivate to learn. Teacher leaders who are on par with technological advancement give them an added advantage. Especially in this era of the new normal, technological tools are essential to enhance student learning (Jääskelä et al., 2017). Integrating technology in their classroom allows easy access to learning materials and collaboration with others.

GTC11: Another trait for ideal leadership of mathematics is to possess other teaching skills, such as technological skills. In this era, it is essential for teachers to be computer literate. This will allow them to explore resources outside of the classroom and even outside

of the country. Additionally, the use of technological tools will further enhance student motivation to study mathematics.

The GTCs responded that passion in teaching is another essential aspect of a mathematics teacher leader. This is achieved by implementing interesting and interactive lessons to ensure that students enjoy and understand the lessons. Effective teacher leaders use this passion as a drive to improve their pedagogical knowledge and student learning. This agrees with Stronge (2002; 2007), who shared those effective teachers are fair, caring, respectful, enthusiastic, motivated and above all, dedicated to their teaching profession.

GTC7: I believe that a leader should have passion for his/her profession. In this case, a good leader uses that passion as a drive to improve his/her skills as a teacher and others to improve student learning.

Teacher leaders are also perceived to have a good command of pedagogy and content knowledge. This enables them to adapt to changes by varying their teaching styles to meet student needs. As Hill et al. (2008) stated, teacher knowledge of mathematics content and knowledge of students (KCS) are essential components of good teaching. In theorising teacher leadership, it should include how they possess pedagogical responsibilities (Muijs & Haris, 2007). Such qualities help teachers design instructions that are effectively tailored to the students' abilities. Expertise in mathematical concepts, content, and pedagogical knowledge allows teacher leaders to create a positive, engaging, and intellectually stimulating learning environment that supports student learning.

GTC8: Secondary school mathematics teachers should have a good pedagogical content knowledge, strive to improve teaching practice, and student learning through research...

GTC5: Be a facilitator and not a giver of knowledge.

Ideal traits of a good mathematics teacher leader beyond the classroom

The traits of a good mathematics teacher leader should not only occur inside their classrooms. The GTCs mentioned that mathematics teacher leaders should exhibit leadership skills outside the classroom. They should be able to work collaboratively with other teaching and non-teaching staff to achieve a common course in the school. This view of leadership as emphasised by teacher candidates confirms the definition of teacher leadership propounded by York-Barr and Duke (2004). They theorised that teacher leadership should not be limited to the classroom but must include how well they can relate well with other individuals in the school community. These individuals include their school principals, their colleague teachers, and other members of the school community who work to improve teaching and learning (York-Barr & Duke, 2004). Furthermore, Danielson (2006) and Lin et al. (2018) agree that teacher leadership qualities should also contribute to the effectiveness of teaching and learning outside the classroom.

Criswell and colleagues also suggested that, as part of teacher leadership skills, teachers should understand instructional practices and the entire educational and school system in which the teacher works (Criswell et al., 2018). They were of the view that understanding the school system has the potential of accumulating the needed resources that can improve teaching and learning (Criswell et al., 2018).

Good management skills by which a teacher leader plans carefully to achieve specific objectives is one of the traits acknowledged by the GTCs as a good mathematics teacher leader. This is not surprising because in exhibiting leadership beyond the classroom, NCSM (2019) indicated that teachers should be able to develop and execute equitable teaching and learning. These competencies involve teachers' ability to study the teaching and learning environment and make it relevant for mathematics instructions. In essence, teachers should have the qualities of creating a mathematics culture in the school that have the potential of improving the teaching and learning of mathematics (NCSM, 2019).

In addition, teachers should be able to communicate clearly. Good communication skills are important for initiating dialogues and discussions, especially in conversations that can improve mathematics teaching and learning in schools. Examples include how the needed human and material resources are available in the school. Not only that, but teacher leaders should also be able to collaborate with colleagues and, at the same time, develop the needed trust within themselves (York-Barr & Duke, 2004). Making fair delegation of works, updated to the latest information, and cascading them accordingly to all staff members are the traits described by the GTCs to indicate a mathematics teacher leader with excellent communication skills.

GTC1: Capacity to prioritise listening effectively over talking, seeking to learn varying perspectives, and deciding for the welfare of teachers, students, and staff.

Another ideal trait for a mathematics teacher leader is to acquire good problem-solving skills. One of the GTCs defined an excellent problem solver as someone who has the ability to analyse the situation, minimise potential conflicts and suggest possible solutions that benefit all stakeholders. This includes effective listening to members' opinions during decision-making. It also includes gathering and sharing information that can be useful in decision-making, especially when it involves student learning, curriculum, and school policies.

Ideally, a teacher leader acts as a mentor, supporter, and motivator to other mathematics teachers. The GTCs described this as being compassionate and empathetic to others, assisting inexperienced or struggling teachers by sharing the best teaching practices, whilst at the same time providing support and motivation in the development of colleagues in a variety of settings (York-Barr & Duke, 2004). Doing so will indirectly benefit both teachers for their professional development and students' academic success. Harrisson and Killion (2007) suggested that teachers sharing instructional resources may assist colleagues by sharing websites, instructional materials, readings, or other resources to use with students. They should also share professional resources such as articles, books, lesson or unit plans, and assessment tools.

GCT12...it is important for teachers to assist young or struggling teachers. Indirectly, this will also benefit both teachers for their professional development and students' academic success.

Community collaboration and partnership were also mentioned as qualities of mathematics teacher leaders by the GCTs. Generally, the school and the community should ensure a healthy community-school partnership. This can be achieved by building learning communities in schools that inculcate and embrace the values and customs of the community (Darling-Hammond & MacLaughlin, 1995). Teachers should be able to use feedback from the teaching and learning not only to inform instruction and/or to measure student learning (Asamoah et al., 2022), but also, they should be accountable to the community on pressing issues that relate to student learning, curriculum, and school policies to other stakeholders.

GTC12: Teacher-leader should possess the ability to gather feedback shared by colleagues and students, listen to them, and then use the feedback to share the decision- making responsibilities especially when it comes to students' learning, curriculum and school policies. It is believed that this approach helps build community and nurture partnership among stakeholders.

Shimabukuro (1993) had stressed that the teacher should be a community builder. They should exhibit leadership qualities such as appreciating the diversity and dignity of every student irrespective of the student's socio-economic background. Teachers should also maintain a lasting relationship with parents and students and, at the same time, encourage students to be of service to others within and outside of the school (Shimabukuro, 1993). This helps create a culture of openness and accountability between the schools and the community (Shahrill, 2014; Ismail et al., 2015).

Conclusion

This study explored the ideal qualities possessed by mathematics teacher leaders from the perspectives of Graduate Teacher Candidates. The teacher candidates voiced several qualities that characterise a mathematics teacher leader. The qualities they reported were under two themes. First, a good mathematics teacher leader should possess specific leadership qualities in the context of classroom teaching and learning. Such a teacher should be able to lead students in the classroom and seek to achieve the interests and well-being of students. The teacher should also be knowledgeable in pedagogy and content and inculcate innovative teaching approaches by incorporating technology to enhance student learning. He/she should have control in the classroom and at the same time develop enjoyable lessons that meet the needs of the student. In addition, the teacher should be a role model and a motivator to the students. Above all, he/she should have a passion for teaching.

Second, a mathematics teacher-leader should possess leadership skills beyond the context of the classroom. The teacher should be able to work collaboratively with all school employees. He/she should have good management skills and communicate clearly, especially about the progress of mathematics teaching and learning. Since there is a need for mathematics teachers

to take part in decision-making and information sharing in the school, a good mathematics teacher leader should also have good problem-solving skills. He/she should have the temperament to listen to other people's opinions in school dialogues and contribute meaningfully to school discussions related to learning, curriculum, and school policies. A good mathematics teacher leader should be able to support other teachers and contribute to maintaining a good community-school partnership.

This study contributes to the discourse of defining teacher leadership. By exploring teacher candidates' views about what characterises a good mathematics teacher leader, this study contributes to the literature from the Bruneian perspective by depicting how teacher candidates perceive mathematics teacher leaders and teacher leadership in general. In defining teacher leadership, it is important to define the concept based on the teachers' ability to influence others to achieve set goals within and outside of the classroom. Similarly, the ideal qualities of the teacher leader should not be limited to the ones that make him/her successful in classroom teaching and learning. Still, it should also include the qualities that make him/her successful and functional in the school and the community.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript. In addition, the authors also declare, to the best of their knowledge, there were no ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies in the conduct of this study and subsequent publication of this manuscript in this journal.

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