



















































































































































































## *Effects of Concrete Mathematics Manipulatives on Student Engagement*

improved as they engaged in mathematical inquiry and cooperation during group activities. They were excited about their tactile learning experiences, once they became accustomed to using the manipulatives for learning.

These changes in observable behaviours are evidence of positive changes across the three dimensions of engagement: affective, behavioural and cognitive (Fredrick et al., 2004). These findings further align with those of Shaw (2002), Ojose and Sexton (2009), Boggan et al. (2010), Siew et al. (2013), Brijlall and Niranjana (2015), Cockett and Kilgour (2015), and Larkin (2016), who suggested that changing the mathematics learning environment by simply introducing concrete manipulatives can demonstrably reduce student boredom, increase the fun and enjoyment they experience during learning and sustain their engagement in learning activities. This is a welcome outcome of these action research studies conducted by teacher-researchers in three secondary schools in Trinidad and Tobago. These teachers had insider knowledge of their contexts and were in the best position to identify interventions that could address issues that influenced teaching and learning there.

The significant increase in students' assessment scores at the end of the intervention suggests that the use of manipulatives helped students connect their concrete explorations with manipulatives, with abstract mathematical concepts and relationships to solve mathematical problems that mimicked daily life. This finding supports Kelly's (2006) suggestion that the strength of concrete manipulatives lies in its ability to help students bridge the gap between the mathematics they learn at school with its applications in solving problems in daily life. In this way, students can develop the ability to represent mathematical ideas in a variety of ways using multiple representations, which are important skills for problem solving, highlighted by Lester and Kehle (2003), Uttal et al. (2009), Karakuş and Peker (2015) and Hakki (2016). This approach creates opportunities for students to develop their conceptual understanding about mathematical topics and relationships before they learn rules and theorems, as suggested by Moyer (2001), Van de Walle et al. (2009), and Laski et al. (2015).

*Jozette Roberts, Sacha Phipps, Diandra Subeeksingh,  
Sharon Jacqueline Jaggernauth, Nalini Ramsawak-  
Jodha and Zhanna Dedovets*

Across the three schools, students demonstrated the ability to interpret different types of problems - story, short response and multiple choice - and retrieve appropriate concepts and skills from memory to respond correctly, as suggested by Lester and Kehle (2003). These findings concur with Ojose and Sexton (2009) regarding improved achievement after exposure to instruction with manipulatives. This is a critical finding given already established global concerns about declining mathematics achievement and evidence of the same in Caribbean territories noted by CXC (CXC, 2018). It is also noted that though Larkin (2016) suggested that manipulatives are less effective with students older than 12 years, students in these studies across the three schools who ranged in age from 11 years to 17 years, responded favourably to their use. This suggests that there is diversity among learners regarding their stage of development, and some learners well into their teen years may still require the support of visual and tactile sensory experiences when learning complex mathematical concepts and relationships.

### **Researchers' Reflections**

As the research team reflected on the outcomes of these three studies, they noted that although these studies were localised to three secondary schools, these schools are similar to other schools across Trinidad and Tobago. It is likely, therefore, that similar findings could be realised in other schools across Trinidad and Tobago under similar research conditions, barring specific unique characteristics of schools that make them substantially different from the three involved in these studies. Therefore, the research team suggests that other teacher-researchers in schools across Trinidad and Tobago conduct their own research into the integration of concrete manipulatives into mathematics instructions to compare their findings with those of these studies, regarding their influence on student engagement in learning and mathematics problem solving as presented in this paper. The procedures and methods articulated in this paper provide sufficient detail for other educators and researchers to replicate, adapt or enhance them to align with

*Effects of Concrete Mathematics Manipulatives on Student  
Engagement*

students' needs at other schools and the nuances among different schools in Trinidad and Tobago. Further, such investigations are warranted across grade levels as well, particularly because the findings presented in this paper suggest that even older learners, who are assumed to have moved beyond the concrete stage of development, could respond favourably to concrete manipulatives in learning mathematics.

The findings presented in this paper provide evidence of improvement in students' ability to solve mathematics problems. This was evident in students' ability to express their thinking through diagrams in the absence of the concrete manipulatives in the assessment, a skill that the teachers helped students develop by gradually removing the scaffold of the concrete manipulative over time. Students developed the ability to interpret simple real-life problems and model them diagrammatically, bypassing the need to use concrete representations through manipulatives. This brings to the fore, the potential of having students work with concrete manipulatives to model and investigate mathematical relationships in preparation for transitioning to diagrammatic representations of these relationships. It also highlights the importance of concrete manipulatives in assisting students to utilise multiple representations in mathematics problem solving.

Reflections on the interventions at these schools highlight how resourceful teachers can be when planning instruction to meet the needs of their students. Given the financial constraints that were evident at the schools in these studies, and the limited availability of commercially-produced manipulatives, the teachers purchased material and used readily available items to make manipulatives for their students to use. Unfortunately, this is the reality for many teachers who are constrained by school resources, and resort to personally purchasing or otherwise accessing teaching aids. Admittedly, it was difficult to provide each student with her/his own set of manipulatives, so students worked together with the manipulatives in small groups. This introduced the social aspect of learning which allowed students to discuss their mathematical ideas, express mathematics problems using various representations, think divergently, work collaboratively, and gain confidence in their

*Jozette Roberts, Sacha Phipps, Diandra Subeeksingh,  
Sharon Jacqueline Jaggernaut, Nalini Ramsawak-  
Jodha and Zhanna Dedovets*

mathematics problem solving skills. This is a testament to the creativity of these teacher-researchers, and the concern they have for their students, whom they recognised could benefit from tactile learning experiences. As it was for the teachers involved in these studies, for many teachers, the internet can be a good source for ideas about teaching resources, which they can create themselves or with the involvement of their students.

The research team noted the absence of mathematics rooms or spaces dedicated to the teaching and learning of mathematics in all of the three schools in this study. Consequently, the teacher-researchers spent considerable time at the start of the lessons arranging the physical space of their classrooms to facilitate group work with manipulatives. They then returned the rooms to their original condition after each lesson. They understood the importance of preparing the classrooms to create learning environments that facilitated the use of concrete manipulatives, and their effort highlights the value they placed on creating learning spaces dedicated to inductive inquiry in mathematics. Lack of a specialised mathematics room is a reality in many schools across Trinidad and Tobago, and even in some schools where these dedicated spaces are available, they may be under-resourced and under-utilised. In light of these realities teachers must be creative in the use of available spaces for the teaching of mathematics, to stimulate students' interest in learning mathematics, and engage them in meaningful learning experiences that develop their mathematics problem solving.

As a final reflection, the research team acknowledges that further research into the teaching and learning of mathematics should be a research imperative due to the already established concern about the decline in students' mathematics achievement internationally (see, Stokke, 2015; Wolfram, (2014), and regionally (see, Budoo, 2017; CXC, 2018; Kalloo & Mohan, 2015). The team notes that although these studies revealed favourable students' responses to concrete manipulatives in terms of engagement in learning and problem solving, further research is needed to

## *Effects of Concrete Mathematics Manipulatives on Student Engagement*

substantiate the claims made in this paper at other schools in Trinidad and Tobago. Further, the team did not explore the connection between increasing students' engagement in learning and improving mathematical problem solving, and strongly advocates for such research on a much larger scale across Trinidad and Tobago, to determine whether such a connection can be made.

### **Conclusion**

The outcomes of these studies suggest that students responded favourably to the use of manipulatives during the intervention, regardless of their age, grade level, and school type. Students were more engaged in learning mathematics during the intervention and improved their mathematics problem solving techniques. The use of concrete objects provided visual and kinaesthetic sensory experiences for students. It enhanced their engagement in learning and their understanding of mathematical concepts through inquiry and discovery of properties and relationships among them. This helped them to solve problems in the post-intervention assessments. This intervention provides teachers with a learner-centred instructional approach that actively engages students' imagination and creativity. Therefore, like Boggan et al. (2010) and Kontaş (2016), this research team supports the integration of concrete manipulatives into mathematics instruction in secondary schools in Trinidad and Tobago.

### **References**

- Ary, D., Jacobs, L. C., Sorensen, C., & Razavieh, A. (2010). *Introduction to research in education* (8th ed.). Belmont, CA: Wadsworth Publishers.
- Ball, D. L. (1992). Magical hopes: manipulatives and the reform of math education. *American Educator*, 16(2), 14–18.
- Blom-Hoffman, J., Leff, S., Franko, D., Weinstein, E., Beakley, K., & Power, T. (2009). Consent procedures and participation rates in school-based intervention and prevention research:

*Jozette Roberts, Sacha Phipps, Diandra Subeeksingh,  
Sharon Jacqueline Jaggernaut, Nalini Ramsawak-  
Jodha and Zhanna Dedovets*

- Using a multi-component, partnership-based approach to recruit participants. *School Mental Health*, 1, 3-15.
- Boggan, M., Harper, S., & Whitmire, A. (2010). Using manipulatives to teach elementary mathematics. *Journal of Instructional Pedagogies*, 3. Retrieved from <http://www.aabri.com/manuscripts/10451.pdf>
- Braun V., Clarke V., Hayfield N., & Terry G. (2018) Thematic analysis. In P. Liamputtong (Ed.). *Handbook of Research Methods in Health Social Sciences* (pp.843-860). Singapore: Springer. [https://doi.org/10.1007/978-981-10-2779-6\\_103-1](https://doi.org/10.1007/978-981-10-2779-6_103-1)
- Brijlall, D., & Niranjana, C. (2015). Using manipulatives to support an embodied approach to learning trigonometry in a South African school: A case study. *Africa Education Review*, 12 (3), 361-380.
- Bruner, J. S. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.
- Budoo, C. (2017, February 20). Mathematics education: A case for problem-solving. *Jamaica Observer*. Retrieved from [http://m.jamaicaobserver.com/columns/Mathematics-education--A-case-for-problem-solving\\_90150](http://m.jamaicaobserver.com/columns/Mathematics-education--A-case-for-problem-solving_90150)
- Carbonneau, K. J., Marley, S. C., & Selig, J. P. (2013). A meta-analysis of the efficacy of teaching mathematics with concrete manipulatives. *Journal of Educational Psychology*, 105(2), 380-400.
- Cockett, A., & Kilgour, P. W. (2015). Mathematical manipulatives: Creating an environment for understanding, efficiency, engagement, and enjoyment. *Teach Collection of Christian Education*, 1(1), 5.
- Caribbean Examination Council. (2018). Annual Report. Retrieved from <https://www.cxc.org/annual-reports/2018/5.html>
- De Lisle, J. (2011). The benefits and challenges of mixing methods and methodologies: Lessons learned from implementing qualitatively led mixed methods research designs in Trinidad and Tobago. *Caribbean Curriculum*, 18, 87-120.

*Effects of Concrete Mathematics Manipulatives on Student  
Engagement*

- De Lisle, J., Keller, C., Jules, V., & Smith, P. (2009). When choosing might mean losing: A mixed method study of secondary school choice in the Republic of Trinidad and Tobago. *Caribbean Curriculum, 16*(1), 131–176.
- Dewey, J. (1938). *Experience and education*. New York, NY: Taylor & Francis.
- Fielding-Wells, J., & Makar, K. (2008). Student (dis) engagement in mathematics. In P. L. Jeffery (Ed.). *AARE 2008 International Education Conference Brisbane, Changing Climates: Education for Sustainable Futures* (pp. 1-10). Brisbane, Australia: AARE
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109.
- Goetz, J. P., & LeCompte, M. D. (1984). *Ethnography and qualitative design in educational research*. Orlando, FL: Academic Press.
- Glanz, J. (2014). *Action Research: An educational leader's guide to school improvement*. Lanham, MA: Rowman & Littlefield Publishers.
- Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*, 255-274.
- Hakki, K. (2016). The effect of manipulatives on mathematics achievement and attitudes of secondary school students. *Journal of Education and Learning, 5*(3), 10-20.
- Hammersley, M., & Traianou, A. (2012). *Ethics and educational research*. London, UK: British Educational Research Association.
- Holmes, A. B. (2013). Effects of manipulative use on pk-12 mathematics achievement: A meta-analysis. Retrieved from <https://files.eric.ed.gov/fulltext/ED563072.pdf>.
- Johnson, P. E., Campet, M., Gaber, K., & Zuidema, E. (2012). Virtual manipulatives to assess understanding. *Teaching Children's Mathematics, 19*(3), 202-206.
- Kalloor, V. & Mohan, P. (2015). Investigating the value of









*Jozette Roberts, Sacha Phipps, Diandra Subeeksingh,  
Sharon Jacqueline Jaggernauth, Nalini Ramsawak-  
Jodha and Zhanna Dedovets*

*developmentally* (7th ed.). Boston, MA: Allyn & Bacon/Merill.

Van de Walle, J. A., Karp, K.S., & Bay Williams, J. M. (2013). *Elementary and middle school mathematics: Teaching developmentally* (8th ed.). Boston, MA: Pearson.

Vygotsky, L.S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Wolfram, C. (2014, February 23). The UK needs a revolution in the way maths is taught. Here's why... *The Guardian*. Retrieved from

<http://www.theguardian.com/education/2014/feb/23/maths-teaching-revolution-needed-conrad-wolfram>

Yin, R. K. (2014). *Case study research design and methods* (5th ed.). Thousand Oaks, CA: SAGE Publications.

**DOES CLINICAL SUPERVISION WORK? The Stories of Two Teachers Empowered to Adopt Student-Centred Teaching Strategies in the Classroom Through a Clinical Supervision Intervention.**

*Alicia Massiah and Freddy James*

This paper reports on an action research study that implemented a clinical supervision intervention with two secondary school teachers in the education district of Victoria in Trinidad and Tobago, to improve their instructional skills in using the Think-pair-share and Jigsaw student-centred teaching strategies in their classrooms. The paper tells the stories of the teachers' transition from resisting - not seeing the need to change from their teacher-centred strategies - to embracing and valuing student-centred strategies they were exposed to during the intervention. The participants had at least ten years' teaching experience but no formal initial teacher preparation for teaching. The data collection instruments used were an interview, a Likert scale teaching survey, a questionnaire, reflective journals and observation. Data were analysed by organising and categorising into themes for each research question and constructing teacher narratives from the data. Results of the study illuminated the tensions and contestations the teachers underwent as they perched on the threshold of becoming a different kind of teacher, and how they made the transition. The results also indicated that clinical supervision can improve teachers' pedagogical and instructional skills, and the use of student-centered teaching strategies can create meaningful learning experiences that can lead to increased student engagement and achievement. The researchers conclude that clinical supervision is an effective professional development mechanism that resonates at the chalkface of education, that is, in the classroom.

## **Introduction**

Millennial learners, 21st century learning, and personalised learning are ubiquitous terms in education today. As the world changes, educators find themselves in a position where they are preparing students for a future and a world which are unknown to them (Schleicher, 2015). The facts of today are not necessarily the facts of tomorrow; the cultural and social issues of today may be replaced by new ones. As such, it is imperative that our students receive an education that empowers them to become critical thinkers, collaborators and innovators. Student-centred rather than teacher-centred teaching methods are more likely to achieve this. Yet, in the researchers' experience, for some educators, there appears to be a real fear to let go of the traditional chalk and talk method of teaching and to embrace more student-centred approaches.

In emphasising the need for innovation in education, the Organization for Economic Cooperation and Development (OECD) (2016), for instance, states that teachers are sometimes perceived as being change resistant, which can negatively impact the quality of education offered. The OECD (2016), however, corrected this misconception, highlighting that teachers are willing to change but may not do so for a variety of reasons. Some of the reasons they put forward were that teachers feel that too many changes are top-down, formulated without their consultation, but with them being wholly responsible for the successful implementation. Another reason is a lack of collaboration among teachers themselves which could encourage professional development, and, further, teachers feel that they are not sufficiently skilled to use more innovative methods of teaching.

Rotherham and Willingham (2009) postulated teachers know about student-centered teaching methods and believe that they are effective but do not use them as they may create classroom management problems. Furthermore, they require the teacher to be knowledgeable about a broad range of topics and to be prepared to make in-the-moment decisions as the lesson progresses. Herrmann (2017) added to the debate, stating that teachers view the status quo as more comfortable and less risky, fearing losing competence when they must move from a predictable and comfortable place to embrace newer methods of teaching.

Research has linked student learning and achievement to the quality of teaching received in classrooms (Marzano, 2007; Blomeke, Olsen & Suhl, 2016 & McKinsey, 2017). If schools want to develop critical thinkers and prepare students for the future, the quality of teaching students are receiving must be their focus. Within the discourse on education in Trinidad and Tobago (T&T), the reliance on the teacher-

### *Does Clinical Supervision Work?*

centred approach has been criticised, as well as the lack of creativity in classrooms, and a preoccupation with the passing of examinations (Warner & Kaur, 2017, De Lisle, Secharan & Ayodike, 2010 & Edwards, 2007). These challenges must be addressed if we are to adequately prepare our students for the challenges outside of the school environment. The best way to do so is to train our teachers to use newer and more exciting teaching strategies in the classroom. Administrators must then focus on becoming instructional leaders prepared to advance the professional growth of their teachers. It is here that clinical supervision plays a critical role as a mechanism to improve teachers' pedagogical and instructional skills and serves as a corollary to the quality of teaching and learning in classrooms.

This paper reports on an action research study that examined the role of clinical supervision in helping two teachers to improve their pedagogical skills. It also sought to determine if the clinical supervision intervention helped teachers to enhance their skills in the use of student-centred teaching strategies such as Think-Pair-Share and Jigsaw and, by extension, if the learning experience and student achievement in the classroom improved. The views of the participants are reported through the narratives constructed through their interviews, self-reflective journals and the researchers' journals. Reflective journals in the form of narratives provide powerful prismatic windows into how the teachers construct their knowledge and beliefs of the self-as-teacher (Mahlios, Massengill-Shaw & Barry, 2010).

### **Background and Situational Context**

In T&T, the government continues to increase its investment in the education sector with a view to improving and reforming it. In its National Report on the Development of Education (2008), the Ministry of Education indicated teachers are required to adopt student-centred approaches to teaching and learning; moving away from lecturing to become more of a "guide on the side", using demonstration and infusing Information and Communication Technology in the learning process. Still, despite being professionally trained and acknowledging that they have learnt new and more effective teaching strategies (James, Phillip, Herbert, Augustin, Yamin-Ali, Ali & Rampersad, 2013), many teachers continue to use teacher-centred approaches.

It seems as if it is a culture that is entrenched in their practice. In fact, Jennings (2001) and Melville-Myers (2001) described teaching methods in Trinidad and Tobago as teacher-centred, emphasizing content and dissemination of knowledge with a reliance on traditional pedagogical

*Alicia Massiah and Freddy James*

practices such as the memorisation of notes with limited opportunities for the development of critical thinking skills. This seems to hold true for some today. At present, there appears to be little change in teaching methods despite technological advances, more tech-savvy students and efforts by the Ministry of Education to revamp the education system. Warner & Kaur (2017) indicate that despite a highly developed secondary school curriculum and continuous encouragement for teachers to receive training, “the traditional modality of teacher-centred instruction continues as the major instructional approach” (p. 194).

At Golden Valley High (pseudonym), the school under study, it is very much the same. The school is in a suburban area in San-Fernando, within the Victoria Education District. Golden Valley High is a government secondary school and is generally perceived as one of the better performing government schools. However, teachers have begun to raise concerns that students are not performing as well as they ought to and at times seem to lack the motivation to do well academically. Students have also voiced their concerns, lamenting that classes are boring and there is no attempt by teachers to use different strategies apart from lecturing or calling notes. One of the most prevalent issues for students is the limited use of ICT by teachers, and the apparent indifference of teachers to improve their methods of delivery.

The researchers observed that at Golden Valley High teachers tend to use more of a teacher-centred rather than a more student-centred approach in the classroom. When questioned about their reasons for using this approach, some teachers indicated that there is no time for group work and students will not learn if other strategies are used. Teachers also mentioned that they are consumed by fears of not covering the syllabus. The prevailing thought is that there is no time to engage in new strategies; one should simply get the material covered so that students can pass the examination. This approach does not provide the type of student experience in the classroom that fosters student engagement and empowerment, particularly in terms of providing the 21<sup>st</sup> century digital skills that students need to function effectively in the future. If this gap is left unchecked, it can negatively impact student achievement. The researchers felt that it was imperative to do something to improve teachers’ pedagogical and instructional skills to successfully enhance academic achievement and promote the development of important learning skills for students. A clinical supervision intervention involving the development of selected student-centered teaching strategies was chosen to fill the gap. As such, the purpose of the study was to investigate the extent to which the implementation of a clinical supervision intervention, focused on developing teachers’ skills and practice, using student-centred teaching

### *Does Clinical Supervision Work?*

strategies could improve the learning experience in the classroom for teachers and students and, as a corollary, improve student engagement and motivation.

Clinical supervision was chosen as the intervention as Brennen (2000) states, through clinical supervision, “teachers are able to develop new skills and strategies which will be replicated as needed. As teacher instruction improves, students will become more motivated, classroom management will be improved and a better atmosphere for promoting learning will exist” (para. 14).

In conducting the study, the researchers thought it necessary to verify what teaching strategies were being used by teachers. The first research question, therefore, was: What student-centred teaching strategies are being used by teachers at Golden Valley High during classroom instruction? Interviews were conducted with two teachers from the Business and Languages departments, which revealed teachers were not employing any student-centred teaching strategies, and it was necessary to engage teachers in the clinical supervision process to develop their skills in using selected student-centred strategies, namely, Jigsaw and Think-Pair-Share.

This led to the development of the second research question: How have teachers’ skills in implementing student-centred strategies such as Jigsaw and Think-Pair-Share in the classroom improved as a result of a clinical supervision intervention targeted at developing teachers’ skills in these pedagogical and instructional areas? After training teachers to implement new student-centred teaching strategies in the classroom, it was necessary to investigate if the learning environment in their classes changed. The third research question developed was: To what extent has teachers’ use of Jigsaw and Think-Pair-Share improved the learning experience and student achievement in the classroom?

## **Literature Review**

This study drew on several theoretical and conceptual perspectives to provide an organising framework. These perspectives included, teaching and learning, liminality, clinical supervision, teacher-centred versus student-centred teaching approaches and their effectiveness. Further expositions on these perspectives follow.

### **The concept of liminality and its role in professional development**

Clinical supervision by nature is a form of professional development that is collaborative and occurs over a period of time. It is not

*Alicia Massiah and Freddy James*

a one off. It occurs within the context of a supervisor and supervisee relationship that is created to assist the supervisee in improving and developing his/her practice. The process is, therefore, one in which some transformation is expected to occur in terms of the supervisee's actions and behaviours. The researchers' intent was to capture, in real time and upon reflection, the influence the intervention was having on the teachers, in terms of refinement of their beliefs of teaching, their belief in themselves as teachers, and the transitions, if any, that they were experiencing. The concept of liminality provided a prismatic lens for the researchers/supervisors to conceptualise and interpret the teachers' experiences of uncertainty, instability, tensions, enlightenment and shifts in belief, as the intervention provided a "period of margin" or "liminality" (Turner, 1964, p. 46) that takes place as an individual is on the verge (Batchelor, 2012 & Cook-Sather, 2006) of transitioning from one state to another in a process of "becoming" or "transformation" (Turner, 1964, pp. 46-47). More so, it helped the researchers/supervisors to understand the intersections between the teachers' original status, pre-intervention, their status being sought during and post-intervention.

The teaching and learning process involves an interaction among the teacher, the students, and the content (Marzano, 2007). Students, therefore, must be active participants in the learning process as learners today are no longer content to learn in traditional ways. This means that educators must continuously improve pedagogical practices to ensure that learning takes place. Research shows that the more teachers have pedagogical competence, the greater is the achievement of the students (Marzano, 2007). Teachers are, therefore, challenged with the responsibility of creating an engaging and innovative learning environment. It is critical that they ensure learning takes place in the classroom, and that they employ a variety of strategies to promote student achievement. The challenge for teachers exists in determining the best strategies to employ to meet the needs of students. It is here the concept of following a teacher- or student-centred philosophy emerges. The teacher-centred approach places the teacher at the centre of the classroom. In a student-centred learning environment, the student moves from being passive to an active participant in the learning process and takes greater responsibility for his/her learning.

### **Teacher-Centred vs Student-Centred Approaches to Learning**

The teacher-centred classroom is both conservative and traditional. It places the teacher at the centre of the classroom. A typical teacher-centred classroom is one where there is minimal student

### *Does Clinical Supervision Work?*

interaction, and teacher student interaction, which are essential aspects of effective teaching and learning (Toh, 1994; Yale Centre for Teaching and Learning, 2016). Teachers make all the decisions regarding content taught, methods used and forms of assessment. As teacher talk exceeds student talk, students become passive learners viewed as empty vessels to be filled with the teacher's knowledge. This can negatively impact student growth and interest as emphasis is placed on students knowing and remembering facts presented by the teacher (Duckworth, 2009; Brittney, 2003).

The student-centred approach casts the teacher as a facilitator rather than presenter. It is a direct contrast to the teacher-centred approach and encourages discovery learning and students learning from each other (Weimer, 2002). Student-centred learning environments are rooted in the works of constructivist theorists such as Dewey and Piaget who posit that learners are active participants in creating their own knowledge. Here, the teacher is seen as a facilitator and coach implementing cooperative work in the classroom. Student-centred learning, therefore, dispels the notion that the student is a passive recipient, because both teachers and students share the focus in the classroom. Students are actively learning, taking responsibility for their own learning and are directly involved in the learning process. As such, there is equal interaction between the teacher and students, which can be beneficial in promoting student growth and interest, which are critical in teaching the 21<sup>st</sup> century learner.

### **Is Student-Centred Teaching More Effective Than Teacher-Centred Teaching?**

The teacher-centred approach is often viewed in a negative light and is criticised for its lack of ingenuity and disregard for the contribution the learner can make. It is seen as authoritarian, lacking vision and encouraging rote memorisation. Despite these criticisms, there are supporters of teacher-centred instruction. In investigating the best approach to use in teaching children to read, the National Institute of Child Health and Human Development in the United States (2000) found solid empirical evidence that teacher-centred approaches are clearly related to improving student reading performance. Similarly, in determining how teachers taught students Mathematics, Morgan (2009) found that teacher-directed activities were the most effective in improving students' academic performance. Student-centred instruction only improved outcomes among students who did not previously exhibit difficulty learning Mathematics. Bruno (2014) concurs as he regards student-centred teaching as being beneficial for relatively strong students, but often not meeting the needs of students with weaker skills, and that teacher-centred strategies have many

*Alicia Massiah and Freddy James*

advantages. In support of Bruno (2014), Concordia University (2012) cited the classroom remaining orderly, students learning independence and correct information given to students as advantages of the approach.

Supporters of the student-centred approach, however, believe that as the student becomes an active participant in his/her learning, the learning experience can become more meaningful. Among the benefits of this approach are encouraging critical thinking skills, boosting student confidence and more interesting and exciting classes (Sayre, 2013; Wohlfarth, 2008 & Lea 2003). Examples of student-centred strategies are active learning, cooperative learning and inductive teaching and learning. This study focused on the use of two cooperative learning strategies: Jigsaw and Think-Pair-Share. Cooperative learning, according to Johnson & Johnson (n.d.), involves students working together in small groups to maximise their own and other students' learning.

Think-Pair-Share is a cooperative discussion strategy developed by Frank Lyman (1981). With this strategy, students are taught to listen to the question, think about the question, to discuss the question in pairs and, finally, to raise hands and share with the total group. Among the benefits of the strategy are increasing students' willingness to share openly in front of the group, bringing out students who never speak in the arena setting, increasing on-task behavior, and decreasing disruptiveness. It also created a safe setting in which almost all students will talk with a partner, increased "wait-time", which could be associated with better recall, and improved the quality of responses made (Lyman, 1981).

Sampsel (2013) and Bamiro (2015) support Lyman's (1981) postulation when they indicated that the use of the strategy positively impacts student participation, class enjoyment, student achievement and the development of higher quality cognitive and problem-solving skills. Student-centred strategies also positively impact the learning experience. Additionally, Walters, Smith, Leinwand, Surr, Stein & Bailey (2014) found that student-centred teaching strategies in Mathematics classes resulted in higher levels of student engagement, an increase in student learning, deeper connections to the subject, higher levels of understanding and higher scores on assessments.

The Jigsaw classroom invented by Aronson (1970) requires teachers to arrange students in groups. Each group member is assigned a different piece of information. Group members with the same information join to discuss, after which they return to their original groups with each person sharing his/her information. The sharing of information completes the "puzzle" as students form a whole idea of the topic. Azmin (2016) and Hanze and Berger (2007) cite increased student enjoyment of the lesson, improved relationship with peers, higher levels of confidence, autonomy

### *Does Clinical Supervision Work?*

and achievement as some of the benefits of employing Jigsaw in the classroom. While there are numerous benefits of using these cooperative strategies, Baloche and Brody (2017) indicate that the class becoming too noisy, the strategies being time consuming and certain students dominating the class, as potential challenges of using them.

#### **Clinical Supervision as an Intervention**

Clinical supervision is one of the techniques used to improve teachers' competencies in classroom instructional practices and, by extension, teacher quality. It was the intervention strategy used in this study to empower teachers to implement the Think-Pair-Share and Jigsaw strategies in their classrooms. The goal of the intervention being reported on was to help the teachers increase student engagement and improve classroom management by using student-centred teaching methods. The researchers felt justified in using clinical supervision as an intervention, because it is a developmental process for which the foremost goal is to help teachers develop skills in using instructional strategies (Acheson & Gall, 1992). In determining the effects of clinical supervision on teacher performance, Veloo, Komuji and Khalid (2013) found the process had positive effects on teaching, including increased teaching quality of teachers and enhanced student understanding. Aldaihani (2017) concurred, stating that clinical supervision allows the teacher to get information on advanced teaching styles, learn to control the classroom environment, deal with students, and prepare and present lessons in an attractive and effective way.

#### **Methodology**

The chosen design for the study was action research. According to Mills (2000), action research is the systematic inquiry, conducted by teacher researchers in the teaching or learning environment to gather information about the ways their schools operate and how their students learn. Action research was appropriate for use in this study because the intervention was focused on professional development and improvement of the pedagogical skills of two teachers through clinical supervision (Luttenberg, 2017). It allowed the researchers to work collaboratively with the teachers to identify problems and issues at the classroom level and find ways to make improvements in their pedagogical and instructional skills. Action research facilitated reflection on and in practice, and, through journaling, allowed practitioners to tell their stories. Deeper expositions on the use of

*Alicia Massiah and Freddy James*

the reflective journal and the role and use of narratives and stories in the study are discussed below.

### **Data collection methods**

#### *Narratives and reflective journal writing*

Through the telling of stories, humans keep the memory of their experiences and the history of their communities. At the same time, the narrative mode imposes order on the heterogeneity of experience and, therefore, does not merely reflect it but constructs it (Fina & Georgakopoulou, 2012, p. 17).

The purpose of the intervention was to develop teachers' pedagogical and instructional skills in the use of student-centred strategies. Knowledge is constructed based on one's epistemology and ontology. As such, the teachers would construct meaning as they experience the intervention and retain and sustain as they see fit. Using the reflective journal was, therefore, a particularly important data collection method, but reporting the findings by using stories not only gave the teachers a voice, but also allowed them to hear their voices. The use of narratives in this way promotes the emergence of what Batchelor (2012) calls the ontological voice or the "voice for being and becoming" (p. 598). The reflective journals provided prismatic windows into the beliefs and self-perceptions of the teachers contextually and developmentally. The reflective journals allowed the teachers to understand craft and to communicate the reasons for their professional decisions and actions to us, the researchers/supervisors.

#### *Other Data Collection Methods and Data Analysis*

The research questions determined the data collection methods used in the study. To answer research question one, which asked what student-centred teaching strategies were being used by teachers at Golden Valley High during classroom instruction, a Likert scale survey, and a semi-structured interview, were used to determine the teaching strategies employed by teachers in the classroom. The Likert scale survey was a free classroom teaching style survey developed by the Science Education Resource Centre at Carleton College in the United States of America. There were six items on the survey that examined where a teacher fell in the context of a series of teaching characteristics. The teachers read the characteristics and decided where they fell on the 1-5 scale. After completing the six items, the total score was used to classify teaching styles according to four classifications available. This survey allowed teachers to determine their teaching styles through a quick and simple format.

### *Does Clinical Supervision Work?*

A semi-structured interview was also used for determining the teaching strategies used in the classroom. A prepared list of open-ended, semi-structured questions was used in addition to probing questions for clarification. This allowed the researchers to understand the strategies used by the teachers and the reasons why, as well as what challenges were encountered during instruction. Marshall (2006) states despite being time consuming, interviews are useful to help the researcher gain insight and context into a topic and allow respondents to describe what is important to them.

Data collection for research question two, which asked *how have teachers' skills in implementing student-centred strategies such as Jigsaw and Think-Pair-Share in the classroom improved as a result of a clinical supervision intervention targeted at developing teachers' skills in these pedagogical and instructional areas*, was done through observation and teacher journals. Journals were critical sources of data, because they chronicled the teachers' progress throughout the clinical supervision process. The method of observation is a part of the clinical supervision process. In this study, the researchers observed the teachers in the classroom delivering lessons to their students. Recording of observations was done through the researchers' field notes in a narrative, descriptive style. The field notes allowed for charting of the teachers' progress throughout the clinical supervision process.

Data collection for research question three, which asked *to what extent has teachers' use of Jigsaw and Think-Pair-Share improved the learning experience and student achievement in the classroom*, was done through semi-structured teacher interviews, student questionnaires, and observation. Interviews were semi-structured, which allowed for the researchers to ask probing questions and seek more clarification to properly determine how the use of student-centred strategies improved the learning experience for the teacher and students. The interview and questionnaire were used in addition to observation as both the teachers and students would be given the chance to express the impact they felt student-centred teaching strategies had on them. Student questionnaires were essential, because they were directly affected by what the teachers did in the classroom, and they were the ideal candidates to share information on the effectiveness of teaching strategies. During clinical supervision sessions, the teachers' use of student-centred methods was observed while the researchers made field notes for each session.

Data that addressed each research question from interviews, questionnaires and observation were extracted and summarised into themes using the process of coding (Creswell, 2009). Apart from those

*Alicia Massiah and Freddy James*

data that reflected the findings from the students' questionnaire, data were presented through the narratives constructed for each teacher.

### **Participants**

The main participants in the study were Ms. Grant and Mrs. Martin. Ms. Grant is between 30-40 years of age and has been teaching for twelve years. She teaches Principles of Business and Tourism at the fourth and sixth form levels respectively. She holds a Bachelor of Arts Degree in International Business Administration and has been teaching at Golden Valley High for the duration of her teaching career. Mrs. Martin is between 30-40 years of age and has been teaching for ten years. She teaches Spanish at the first to third form levels and holds a Bachelor of Arts Degree in Spanish. She has been teaching at Golden Valley High for approximately two years.

These teachers were selected for several reasons. Firstly, both do not have any formal initial teacher preparation for teaching. Secondly, they frequently spoke with one researcher about their students and strategies that can be implemented in the classroom to improve their performance. Ms. Grant also admitted that she struggles with student engagement in her classes while Mrs. Martin identified that she had challenges with classroom management. These reasons suggested that a clinical supervision intervention was necessary to assist both teachers in improving their pedagogical and instructional skills. The clinical supervision process provided knowledge and practice in using new teaching strategies in the classroom.

Other participants in the study were the students of Ms. Grant's Form Four Principles of Business class which comprised 32 students ranging in ages from 14-16, and Mrs. Martin's Form One Spanish class of 30 students ranging in ages from 12-13. Additionally, the two researchers were participants as they observed, discussed, and evaluated the lessons with the teachers.

### **Implementation Plan**

Prior to the beginning of the intervention, Ms. Grant, Mrs. Martin and one of the researchers met to discuss how the clinical supervision process would work. It was agreed that the intervention would be collaborative in nature, with six sessions for each teacher, targeting various instructional and pedagogical skills to be developed. Resource material such as a lesson plan template, videos and readings were made available to the teachers via a website created to facilitate the clinical supervision. The use of the website allowed for the development of the

### *Does Clinical Supervision Work?*

21st Century skills necessary for all learners at all levels of education; that is, curation, communication, collaboration and critical thinking. All materials created and uploaded by participants and researchers were curated and continue to exist online. Participants and researchers used digital tools, such as Padlet, Google Docs and WhatsApp to communicate and collaborate. The discussions and online activities, such as lesson planning and reflection on and in practice, provided opportunities for critical thinking.

The clinical supervision intervention implementing the Think-Pair-Share and Jigsaw strategies followed the three-step process of pre-conference, observation and post-conference. The following occurred during each phase:

- **Pre-Conference:** The teacher discussed the lesson to be taught and gave details such as the topic, objectives and teacher strategies to deliver the content with the supervisor/s. In addition, focus was placed on what the students would do during the lesson. The supervisee and supervisor/s discussed the specific areas to be observed, and how data would be recorded.
- **Observation:** As the teacher delivered the lesson, the supervisor/s recorded what took place during the lesson.
- **Post-Conference:** The supervisor/s encouraged the teacher to reflect on the lesson through Socratic questioning. The supervisor/s gave feedback on observations made, highlighting the strengths of the supervisees and mentioning areas for improvement. Problem areas of the lesson and strategies to address them were discussed.

The clinical supervision intervention was used to develop the teachers' pedagogical and instructional skills by using more student-centred teaching strategies. The goal was to empower Ms. Grant to engage her students through questioning and implementing student-centred strategies in her classroom. The goal for Mrs. Martin, was to improve her classroom management skills through implementing student-centred teaching strategies in her classroom.

Clinical supervision was chosen as the intervention as it sought to ensure the professional development of both teachers. Acheson and Gall (2003) state that clinical supervision provides teachers with objective feedback on the current state of their instruction, diagnoses and solves instructional problems, and the general goal is to improve teachers' classroom instruction.

### **Discussion and Telling of the Emerging Stories**

*Alicia Massiah and Freddy James*

The stories that chronicle the journeys, intersections and liminality experienced by teachers and students are presented below. The stories are constructed from the various data collected from teachers and students. The researchers make meaning of these data in reference to the literature reviewed, and the understandings that emerge about the individuals involved in the research. The teachers' stories tell a tale of individuals reflecting on their practice as teachers, and confronting their beliefs, philosophies and identities as teachers. They tell how teachers embody liminality as a metacognitive frame to explain and understand the transitioning and reflexivity that they experience during the intervention.

### **Teachers' Stories: An Examination of Self Before the Intervention**

*Ms. Grant*

"I think I'm a very prepared and thorough teacher. I think maybe at times I am student-centered, but, generally, I think I am teacher-centred. I have always told my students that I am in charge of the classroom, not them. I generally use lecturing as my way of delivering content. When I lecture, I allow the students to take notes and, sometimes, I call out notes for them. I stick with lecturing and notes because we do not have the time for anything else. The students are quiet during the lesson and there are less interruptions because they are busy writing when I call out a note. Also, when I give them the note, I am sure they have the correct information. There are some disadvantages. Sometimes, I can see students are bored or they're falling asleep while I call the note. When I lecture, some boys are always distracted. I've never tried anything new, because I think the students are too undisciplined. With my current strategies, there is no room for talk and unruly behavior, because I keep them busy. I also use these methods, because my teachers taught me like this, and it was effective. I've been teaching for many years now, and I always cover the syllabus and get good results, so I don't see the need for me to change anything. I mean, sometimes I think about trying something different, but I don't think the students are mature enough, and then I keep thinking about how time consuming it would be to try another way. I seem to be doing ok so far."

*Mrs. Martin*

"My teaching style? You know I don't think I've ever been asked that question. I don't think I've even thought about it. Let me see, I think I try to make class exciting, and I'm patient with the students. I teach a foreign language, so I need to be patient because it's something new to them. I'm very easy going, but they know I'm in charge. I'm mostly teacher-centred, because I like being in control of the classroom. Now that I think about it, I just go into the class with the text, and I go over the information with the students. That's a problem, isn't it? The advantage when I give them the information is, I know it's correct. I would probably say maybe it's boring to hear me speak all the time. I can see students lose focus many times. I tried playing a game once, and it was a disaster! They

### *Does Clinical Supervision Work?*

were too noisy, and I was becoming annoyed. We also took up almost the entire period just trying to get everyone to do what they were supposed to. I can't afford to do anything else, because we have so much work to cover. It's easier to just use the text and go through; it's been working for me so far, so why should I change?"

From their accounts, both teachers described themselves as teacher-centred, emphasizing that they are in control of their classrooms, with Ms. Grant sharing, "*I am in charge of the classroom, not them*" and Mrs. Martin indicating, "*I like being in control of the classroom.*" With their emphasis on control of their classrooms, both seemed to suggest that they strongly believed in the teacher's role as the authority in her discipline, disseminating knowledge, with students as passive recipients of this knowledge. The survey results corroborated the teachers' descriptions of themselves, in terms of their classroom teaching style being teacher-centred. In the survey, both described their classrooms as one where they speak for more than 95% of the class, with limited interaction between themselves and students, who rarely do activities and work together.

The teachers seemed to have a negative perception of student-led activities as a teaching strategy, with both believing that only they could give students "correct" information. Ms. Grant shared, "*When I give them the note, I am sure they have the correct information*", and Mrs. Martin indicated the same, "*The advantage when I give them the information is, I know it's correct.*" Both teachers acknowledge that as they reflect on their teaching methods, they realise that their methods may be problematic, because they come across as "boring", caused students to "lose focus", be "distracted" and "fall asleep in class". Yet, while the teachers recognise that their methods may not be engaging and motivating, they resist changing them for various reasons. Both mention that using a different method may not allow them to, "cover" the amount of work they must, as advocated by Mrs. Martin, or to "cover" the syllabus as declared by Ms. Grant. The account of Ms. Grant's showed that she was content to maintain the status quo and culture; because she was taught in that way, she, therefore, taught in that way and, in her opinion, with good results, meaning that students passed their examinations.

In addition, both seem to believe that a student-centred approach fosters "unruly" and "noisy" behavior where the teachers lose control of the classroom. Ms. Grant shared that she had not tried any new strategies, because she thinks the students are too "indisciplined", and she seemed to perceive a quiet and orderly classroom as the only way learning can take place, because she indicated, "*there is no room for talk and unruly behavior.*" Mrs. Martin, too, appeared to share a similar belief. She described her attempt to use a game as a teaching method "disastrous" and

*Alicia Massiah and Freddy James*

time consuming, and she described herself as becoming “annoyed”. Their sentiments suggest that there is a real fear of giving up control and rethinking how students ought to learn.

It is interesting that both teachers at this point were in no way concerned about making learning interesting and empowering for the students. It seems that both teachers’ philosophy of teaching stemmed from their own experiences of teaching. Implicit in their accounts is a sense that ‘if what we’ve been doing gets passes, why change’. There is a sense in which one cannot fault the teachers, for they have not seen things done another way, and they did not know how it would work differently, and with success. Nevertheless, intuitively both teachers seemed to believe that their methods may not be best for the students.

Their accounts suggest a lack of student-centered strategies employed in the classroom. Both teachers identified lecturing as their primary method of delivery. This confirms Melville-Myers (2001), Edwards (2007), De Lisle (2010) and Warner and Kaur’s (2017) research. While the teachers embraced the use of lecturing, and share concerns about trying new strategies, both seemed to defend their use of the strategy by readily admitting that there are disadvantages of employing this as their main strategy, supporting Duckworth’s (2009) and Brittney’s (2003) postulation that the teacher-centred approach can negatively impact student growth and interest. Despite acknowledging the disadvantages of lecture as their main strategy, and questioning its use, both seemed reluctant to attempt new strategies, and were comfortable to continue to employ this method of delivery. Both teachers expressed a real fear of not completing the syllabus, which corresponded with Edward’s (2007) postulation that teachers are limited to traditional methods due to these fears. In addition to this, the fact that their students had been performing while they used the lecture method seemed to be enough reason for both teachers to continue using the method.

### **Teachers’ and Supervisors’ Observations: The Clinical Supervision Journey and Lessons Learned (or not) Along the Way**

The rich data collected from the teachers’ and supervisors’ journals, field notes and observations revealed strong themes of increased teacher efficacy, changes in pedagogical approach and a resulting improvement in classroom environment. Excerpts from the teachers’ and supervisors’ recordings are discussed below.

*Ms. Grant*

Ms. Grant’s clinical supervision journey is an example of an increase in teacher efficacy and growth in confidence, because with each

### *Does Clinical Supervision Work?*

session, she recorded a sense of accomplishment in being able to use the strategies in her lessons. For her first session, Ms. Grant was hesitant to include student-centred teaching strategies in her lesson. She shared that, she was *“afraid of not being able to cover the content of the lesson and was unsure of doing it right.”* Despite this, Ms. Grant appeared to be at ease using the Think-Pair-Share strategy as she recorded, *“I will definitely continue to use this strategy; it’s simple to use.”* Her comfort in using the strategy was noted by her supervisor who also recorded that Ms. Grant showed, *“No problems implementing Think-Pair-Share in the lesson. Teacher [Ms. Grant] seemed at ease and confident with the strategy.”*

Not only did she experience comfort in using the strategy, but Ms. Grant recorded that using Think-Pair-Share, *“really yielded results and students gave good answers.”* She also noted that *“Student participation was greater”* and *“I noticed improvement with myself as a teacher with regard to questioning.”*

In her second session, Ms. Grant was more reflective and willing to admit that lecturing may not always be the best strategy to employ as she shared, *“I realised that maybe lecturing a lot in the lesson was taking up time that could have been spent encouraging students more or having them working together.”* By her third session, Ms. Grant stated that, *“Once again I saw improvement in my delivery of the lesson”* and *“students were more participative when answering questions.”* Attempting the strategy and finding that it was simple to use seemed to dispel Ms. Grant’s early fears of trying a new teaching strategy in her classroom. It was evident that her pleasure in finding the strategy *“simple to use”* began to cause a shift in her belief that the students were *“too undisciplined”* to try a new strategy, because she recorded, *“I am feeling more confident in using this strategy to allow students time to discuss among themselves.”* Therefore, practising using the strategy and seeing her students becoming more engaged and giving ‘good’ answers, engendered a change in Ms. Grant’s teaching philosophy, the catalyst for which was using a more student-centred approach. This was reflected in her assertion that *“This is a teacher and student friendly strategy and I am comfortable with it.”*

The shift in Ms. Grant’s beliefs about a teacher-centred classroom was also noted by her supervisor who by the third session recorded in her journal, *“I was able to see evidence of Ms. Grant’s pedagogical skills improving. I noticed growth in her from our last sessions”* and *“From the first to this session, the teacher [Ms. Grant] has minimised her use of lecturing and has been using more student-centred strategies.”*

In her pre-intervention interview, Ms. Grant shared, *“I’ve been teaching many years now, and I always cover the syllabus and get good results, so I don’t see the need for me to change anything.”* While Ms.

*Alicia Massiah and Freddy James*

Grant experienced some difficulty in using the Jigsaw, excerpts of her journal show beginnings of a transformation from a teacher rooted in her beliefs that there was no need to try new strategies in the classroom, to one who was willing to embrace change and continue attempting to use new teaching methods. She shared, *“The Jigsaw takes some getting used to; it’s not as easy to implement as Think-Pair-Share. I think I tried too much in this session, but I’ll improve the next time I use Jigsaw.”* The positive reaction she gained from her students also encouraged Ms. Grant to continue using the strategy as she noted, *“Since I received such a positive response from the class, I will use the Jigsaw activity again.”*

As the clinical supervision process continued, Ms. Grant’s skill in using the strategy improved, thus, encouraging her to feel comfortable and more confident in her ability to use the strategy. She records, *“I am enjoying the use of the Jigsaw activity and I think the students are as well. I am comfortable and plan on using it for myself in another lesson. I think I am now confident in my ability to use these strategies in another class.”*

Ms. Grant’s supervisor noted that as the clinical supervision process progressed, Ms. Grant continued to grow and experience changes in her pedagogical approach, recording, *“It amazes me how much growth has taken place in Ms. Grant. She continues to make efforts in the area of student engagement.”* This coincides with Ms. Grant’s reflections that suggested she was moving from her predictable and comfortable place in teaching, to one of innovation as she shared, *“I will definitely continue to implement both strategies in future lessons, and I am now excited to try other student-centred strategies.”*

It is evident that Ms. Grant’s willingness to change her approach in the classroom was as a direct result of seeing her students become more engaged in her classes. She noted, *“Student response and participation in my classes have really improved. Since the students are responding so positively, I will use these activities again.”* In her fifth session, it was even clearer that there is a link between student engagement and teacher efficacy as Ms. Grant recorded, *“I am enjoying the use of the Jigsaw and I think the students are as well. Students are very enthusiastic; it is good to see them enjoying class rather than looking bored. I will continue using these new strategies.”* This was also noted by her supervisor who recorded in the last session, *“Teacher [Ms. Grant] is very familiar with the strategy and seems to enjoy seeing the students engaged in the activity; teacher’s skill has improved.”*

Ms. Grant’s story shows a teacher’s progression from one firmly rooted in using the lecture method to one open to exploring new possibilities, using more engaging and empowering student-centred methods. In her last session, Ms. Grant shared, *“I feel a sense of*

### *Does Clinical Supervision Work?*

*accomplishment from the entire process. I feel satisfied with the teaching techniques I have learnt. They raised my standard as a professional teacher and improved my relationship with my students.*” This was also highlighted by her supervisor, who recorded in her last journal entry, “*Teacher [Ms. Grant] has embraced the role of SCA in the classroom*” and “*Teacher’s [Ms. Grant’s] skills have grown exponentially in all areas.*”

*Mrs. Martin*

Like Ms. Grant, Mrs. Martin’s clinical supervision journey was a transformative one as she documented her progression from doubting her ability to use the strategies well, to becoming more confident in herself as a teacher. After her first session, Ms. Martin seemed disappointed as she shared, “*Class was noisy at times. I was struggling as I didn’t use the strategy well.*” Her supervisor noted there was some difficulty but was sure with practice Mrs. Martin would improve, noting, “*Teacher made an error in using the strategy, and there was some chaos; with practice, will improve.*”

This was noted by Mrs. Martin’s third session, with her being more positive, recording, “*I have improved tremendously from the first to this session. I can use this strategy in another class and feel confident about the benefits.*” Her supervisor also noted that there was an improvement in Mrs. Martin’s confidence and skill in utilising student-centred strategies, stating, “*Teacher [Mrs. Grant] had a better command of the class and was more at ease with the strategy.*”

As Mrs. Martin’s confidence in her ability to use the strategies improved, her thoughts about using student-centred strategies in the classroom began to change. In her pre-intervention interview, she shared, “*It’s easier to just use the text and go through. It’s been working for me so far, so why should I change?*” This sentiment changed as the clinical supervision process unfolded. Mrs. Martin noted, “*I see the value of this. Class is getting better. I am getting better. I’m more comfortable and will use the strategy by myself in another class.*” Mrs. Martin’s comment that she sees the value in using more student-centred strategies indicates that, in terms of liminality, she has moved beyond the intersection, the margin from essentially embracing the teacher-centred approach, to embracing the student-centred approach.

With every clinical supervision session, Mrs. Martin’s pedagogical skills and confidence in her ability to include other student-centred strategies in her lessons grew. Seeing evidence of her growth, Mrs. Martin recorded, “*I’ve grown so much. I don’t doubt that class can function with student-centred strategies. Love using the strategy.*” Her supervisor observed this, noting, “*Teacher [Mrs. Martin] is progressing; uses the strategy seamlessly. Confidence level and skill have increased,*

*Alicia Massiah and Freddy James*

*and teacher's [Mrs. Martin's] skills in using the strategy have improved tremendously. Teacher [Mrs. Martin] is also including other SCA strategies in her lesson."*

This boost in confidence in her ability to use the strategies extended to Mrs. Martin's classroom management skills as she noted, "Class is getting better. I enjoy using the strategy; it's helping me to better manage the class." With an improvement in her classroom management skills, Mrs. Martin also noted a change in her students' level of engagement. In her pre-intervention interview, Mrs. Martin described students as sometimes "bored" or "losing focus at times". There was a transformation among her students as she noted, "Students were very involved in the lesson and seem to be enjoying class more."

At the beginning of Mrs. Martin's story, we saw her resistant to change, comfortable in the belief that what she was doing did not need to change as she said, "It's been working for me so far, so why should I change?" Despite this resistance, she seemed to acknowledge that her teaching strategies could have been improved as she questioned her reliance on the textbook and simply reviewing information from it. The clinical supervision process evidently helped Mrs. Grant to reexamine her pedagogical approach. She shared, "I can use these strategies in another class and feel confident about the benefits. Teaching is more enjoyable using these."

Mrs. Martin's story shows her evolution from a teacher rooted in her belief that the teacher-centered approach was the only strategy to use in the classroom to one willing to embrace change, because in her last session, she shared, "I have improved tremendously from the first to this session." Her supervisor noted this, recording, "Teacher [Mrs. Martin] has embraced the role of SCA in the classroom. Incorporated the strategy in all lessons and used successfully. Teacher's [Mrs. Martin's] skills have grown exponentially in classroom management."

### **Students' Observations: The Clinical Supervision Journey**

Ms. Grant and Mrs. Martin were not the only ones to experience noteworthy changes during the clinical supervision process. 100% of the students in both classes indicated that their classes had changed due to the clinical supervision exercise in which their teachers engaged. Of the thirty-two students in Ms. Grant's class, twenty-five indicated that they enjoyed participating in the new activities, while eight did not. Mrs. Martin's class of thirty students saw twenty-six of them giving the activities positive reviews, with four indicating that they did not enjoy the new activities. The significant comments of the students highlighted emerging themes

### *Does Clinical Supervision Work?*

such as better class management, increased student engagement, enhanced student understanding, enjoyment of the lesson and improved relationships with peers.

Students indicated that the changes were positive. Ms. Grant's senior students shared sentiments such as, "*Classes are now exciting, and students are more alert;*" "*Class was more interactive;*" "*The teacher is more active with the class and does activities;*" "*Class is less boring, because we don't have to write all the time;*" "*Students were engaged and excited to see what Miss would do;*" "*I actually began to like POB, because I was understanding the lesson;*" and "*It has changed for the better; the class is more interactive and fun.*"

Mrs. Martin's junior students expressed similar views, saying, "*Class is more interesting and student behaviour is better;*" "*Students were more obedient, and we had lots of activities which were fun to do;*" "*The discipline and attitude of the class got better, and we were more involved in the sessions we had;*" "*We got to speak more in Spanish, and that helped me understand more;*" "*There were many activities which were fun to do and made learning easier*" and "*The class is definitely not boring; it's interesting!*"

Ms. Grant's students also shared that the activities helped them to learn more in class, stating, "*Explaining to my peers helped me to learn and remember more;*" "*I remembered more and answered questions correctly;*" "*They challenged us to think and focus as we weren't only writing;*" "*I paid attention more because I was responsible for what I learnt and I was teaching someone else;*" "*Because we had to teach each other and discuss, it helped us to figure out answers to questions and to answer correctly*" and "*I was more focused in class and paid attention more and was able to understand better.*"

Mrs. Martin's students shared similar feelings. They indicated, "*Working with someone else helps you to understand better, and we were able to form better sentences and remember vocabulary;*" "*I understood better so I could have answered questions correctly;*" "*It was easier to learn because it was more fun, and you had someone to help you remember;*" "*It was good to practice with my friend; I understood better;*" "*We got to speak more Spanish and learnt more doing the activities;*" and, "*I remembered more because I got to do more in class.*"

With regard to improved relationships with peers, Ms. Grant's students shared, "*I enjoyed the activities, because we were helping each other learn and bonding with one another at the same time;*" "*I interacted with people I don't usually talk to so that was nice. I think for other people too, we kind of made some new friends;*" "*We bonded with each other and socialized more;*" and, "*I talked to lots of people I don't usually talk to.*"

*Alicia Massiah and Freddy James*

Mrs. Martin's students conveyed similar opinions, saying, "*It is fun working with others and sharing our ideas;*" "*Cooperation with others was a new thing for me with certain people in the class,*" and, "*It was nice to share with someone before trying to answer in class; it made it easier to talk to others.*" Still, some students did indicate that the new strategies posed some problems for them. Referring to the activities used with the new strategies, they stated, "*It became boring after a while, because some people were wasting time,*" and, "*These things took up too much time; some people weren't doing the correct thing.*" Some also shared, "*There were lazy students expecting others to do all the work.*" These students' comments warrant dialogue with the students, and deeper reflection between the teachers and supervisors, to better design activities to make students more engaged and accountable. Nevertheless, this issue of students finding activities being time consuming is one of the challenges raised by Baloché and Brody (2017).

The results of the study were also in accordance with literature which states that student-centred teaching strategies positively impact student participation, class enjoyment, student achievement and student understanding, (Sampsel, 2013; Bamiro, 2015; Walters, Smith, Leinwand, Surr, Stein & Bailey, 2014).

### **Teachers' Stories: The End of the Journey: A Transformative Process**

The teachers' final remarks on the clinical supervision journey are presented and discussed below.

*Ms. Grant*

*"It has made a difference since prior to using these strategies, I believed that the students were not capable of working on their own. I also believed that using other strategies meant I would have to give up control of the class. There has been a great difference in student participation in my classes. I have gone from an unenthusiastic class to one where students are engaged and seem to enjoy what they are learning. For me too, there has been change. I have changed my idea of how a classroom must be. I see that I was too rigid and not willing to adopt new strategies. Now, I am eager to improve as a teacher. Clinical supervision was responsible for this change because it is through that I learnt about these strategies. I can tell you from our first session to our last, I saw improvement and I enjoyed myself more. There was such a change in the class. I saw more student participation than I ever did; the students gave quality answers and I could see they felt proud of themselves. This made me feel better as a teacher. You know, I used to dread going to that class before, but now I feel that I'm equipped to have classes where they're engaged and learning."*

## *Does Clinical Supervision Work?*

*Mrs. Martin*

*“There has been a change in the class. Before we started, I had difficulty with classroom management. I mean, there is always room for improvement, but I have grown so much. Because of the process, students in the class are on task and focused. Now, they’re not listless and bored. I see them working throughout the class. I also have noticed they seem to understand better and class participation has really grown. They are more confident in sharing their answers now. Clinical supervision helped me to write proper lesson plans, to plan my lessons and generally to gain more confidence in myself. I have not had good experiences with clinical supervision before this, so I can say there has been real growth. The class is like a new class. This has done so much for me and my class. We went from a chaotic environment to one where learning was taking place. I am now equipped with the tools to become a better teacher, and I’m open now to improving my practice.”*

Both Ms. Grant and Mrs. Martin were in high praise of the activities, indicating that they observed an increase in student achievement in their classes. Both teachers made profound statements that clearly exhibited that there was a shift in their beliefs regarding the use of student-centred methods that can be adopted in the classroom. It is evident that both teachers reflected on their practice and experienced a sense of enlightenment throughout the clinical supervision process, as they moved from a sense of uncertainty, to confidence in their ability to implement new teaching methods in their classrooms.

The transformative nature of the clinical supervision process is distinct. For both teachers, the process encouraged them to become reflective practitioners, bringing about a change in their teaching philosophies. For Ms. Grant, it is clear there was willingness to admit that her previous practices were not benefitting her students as she recognised the importance of being open to new methods in her classroom. Mrs. Martin’s initial resistance quickly subsided as she saw evidence of the changes that were taking place in her classroom as well as herself.

The growth in teacher efficacy and changes experienced in both classrooms lend support to the notion that, if done properly, clinical supervision helps teachers improve instructional skills, increases teaching quality and has a significant impact on teacher growth (Acheson & Gall, 1992; Veloo, Komuji & Khalid, 2013).

The concept of liminality provided a prismatic lens for the researchers/supervisors to conceptualise and interpret the teachers’ experiences of uncertainty, instability, tensions, enlightenment and shifts in beliefs as the intervention provided a “period of margin” or “liminality” (Turner, 1964, p. 46) that takes place as an individual is on the verge

*Alicia Massiah and Freddy James*

(Batchelor, 2012; Cook-Sather, 2006) of transitioning from one state to another in a process of “becoming” or “transformation” (Turner, 1964, pp. 46-47). More so, it helped the researchers/supervisors to understand the intersections between the teachers’ original status, pre-intervention, and their status being sought during and post intervention.

### **Conclusion**

The results of this study were profound, cementing the fact that clinical supervision is a valuable tool to employ in the quest to improve teachers’ pedagogical and instructional skills. The transformation of both teachers throughout the process solidifies the researchers’ belief that devoting time to the clinical supervision process is meaningful and valuable, as a professional development mechanism that can improve teachers’ practice. While this study was a small one conducted in one school, the results, which showed, by their own revelations, teachers’ change in philosophy and growth in practice, as well as student improvement, are undeniable and appreciated.

The hope that student-centred teaching strategies would improve the learning experience was materialised as students shared increased feelings of engagement and empowerment which resulted in improved understanding of the work for them. The positive reactions of students to the new teaching strategies motivated the teachers to change their perceptions of the student-centred approach to teaching, and have encouraged them to continue using these strategies in future classes. It would be worthwhile to do a further study to see if these teachers have continued to use teacher-centred strategies. A longitudinal study of student achievement as a result of their continued exposure to these strategies would also be useful.

The results of this study can serve as a foundation for further analysis of clinical supervision as an intervention in improving teachers’ pedagogical skills, by working with other teachers at Golden Valley High. The researchers recommend increased collaboration among administration, Heads of Departments and teachers, to review how clinical supervision is conducted at the school. The results of this study can be used to encourage teachers to see clinical supervision as a developmental rather than punitive tool. During this collaboration, teachers should be given the opportunity to discuss their expectations and requirements of the process, so that they can benefit from it. Adequate time should be provided for Heads of Departments to conduct sessions as regularly as possible, and for teachers to engage in proper planning for their lessons to support their growth.

### *Does Clinical Supervision Work?*

This study shows that continuing professional development, particularly within the school, is necessary to keep teachers abreast of new and effective methods of teaching, and the benefits of implementing them in the classroom. Teachers can be introduced to a variety of student-centred strategies and empowered to implement them in their classes after having been trained how to use them. A key learning from this study is that it is important to engage and empower students to enhance their learning, because they are directly impacted by what the teacher does in the classroom. The results of this study also highlight the value of conducting action research in schools and classrooms.

Notwithstanding the benefits of the intervention, the researchers are mindful that it presents a snapshot of what can occur if the ideal circumstances are created to facilitate clinical supervision-led professional development. This intervention worked because of the process that was implemented, which takes time and competence to execute, particularly from the perspective of the supervisor, who must be inspiring. However, ideal circumstances do not usually obtain in schools, and, as such, more research is needed in the area of clinical supervision and its impact on teacher development and student achievement in the context of schools in Trinidad and Tobago, since clinical supervision has been made mandatory by the Ministry of Education.

A national study that investigates the practice and experience of clinical supervision, and its impact on teacher performance, should be conducted in schools throughout Trinidad and Tobago in the quest to improve teacher and student performance. With an increase in research, empirical data can be shared among administrators and teachers as they seek to improve teaching performance, and aid our teachers in becoming true professionals. The study shows the merits of clinical supervision, as well as student-centred teaching strategies, and indicates that these are needed as we engage in the quest to improve the quality of education offered to our students.

## References

- Acheson, K. A., & Gall, M. D. (1992). *Techniques in the clinical supervision of teachers: Preservice and inservice applications*. New York: Longman.
- Acheson, K. A., Gall, M. D., & Acheson, K. A. (2003). *Clinical supervision and teacher development: Preservice and inservice applications*. New York: Wiley.
- Aldaihani, G. (2017). Effect of prevalent supervisory styles on teaching performance in Kuwaiti high schools. *Asian Social Science*, 13 (4). doi: URL: <https://doi.org/10.5539/ass.v13n4p25>
- Azmin, H. (2016). Effect of the jigsaw-based cooperative learning method on student performance in the general certificate of education advanced-level psychology: An exploratory Brunei case study. *International Education Studies*, 9(1). Retrieved, from <https://files.eric.ed.gov/fulltext/EJ1086691.pdf>
- Baloche, L. & Brody, C. (2017). Cooperative learning: Exploring challenges, crafting innovations. *Journal of Education for Teaching*, 43(3), 274-283, DOI:10.1080/02607476.2017.1319513
- Bamiro, A. (2015). Effects of guided discovery and think-pair-share strategies on secondary school students' achievement in chemistry. *SAGE Open*, 5 (1). <https://doi.org/10.1177/2158244014564754>
- Batchelor, D. (2012). Borderline space for voice. *International Journal of Inclusive Education*, 16(5-6), 597-608.
- Blömeke, S., Olsen, R.V., & Suhl, V. (2016). Relation of student achievement to the quality of their teachers and instructional quality. In T. Nilsen & J. E. Gustafsson (Eds.), *Teacher quality, instructional quality and student outcomes relationships across countries, cohorts and time* (pp.21-50). Switzerland: Springer International Publishing AG.
- Brennen, A. (2000). *Clinical supervision*. Retrieved from <http://www.soencouragement.org/clinical-supervisoion-case-study.htm>
- Brittney, K. (2013). *Teacher centered instructional strategies: A continuum of instructional approaches*. Retrieved from

*Does Clinical Supervision Work?*

<https://prezi.com/mf1nlqtrpuex/chapter-8-teacher-centered-instructional-strategies/>

- Bruno, P. (2014, June). *More evidence of the trouble with 'student-centered' teaching*. Retrieved from <http://paul-bruno.com/2014/06/more-evidence-of-the-trouble-with-student-centered-teaching/>
- Cook-Sather, A. (2006). *Newly betwixt and between: Revising liminality in the context of a teacher preparation program*. Retrieved from <http://repository.brynmawr.edu/cgi/viewcontent.cgi?article=1009&context=edu>
- Concordia University Portland. (2012, December 31st). *Which is best: Teacher-centered or student-centered education?* Retrieved from <https://education.cu-portland.edu/blog/classroom-resources/which-is-best-teacher-centered-or-student-centered-education/>
- Creswell, J. (2007). *Qualitative inquiry* (2nd ed.). Thousand Oaks, CA: SAGE.
- Creswell, J. (2009). *Research design qualitative, quantitative, and mixed methods approaches*. Los Angeles: Sage.
- De Lisle, J., Seecharan, H. & Ayodike, A. (2009). Is the Trinidad and Tobago education system structured to facilitate optimum human capital development? New findings on the relationship between education structures and outcomes from national and international assessments. Retrieved from <http://sta.uwi.edu/conferences/09/salises/documents/J%20De%20Lisle.pdf>
- Duckworth, E. (2009). Helping students get to where ideas can find them. *The New Educator*, 5(3). Retrieved from [http://higher.ed.mheducation.com/sites/0072877723/student\\_view0/chapter9/index.html](http://higher.ed.mheducation.com/sites/0072877723/student_view0/chapter9/index.html)
- Edwards, Z. (2007 August 21). Too many exams, too little creativity. Retrieved from <http://www.trinidadandtobagonews.com/blog/?p=327>
- Fina, A., & Georgakopoulou, A. (2012). *Analyzing narrative: Discourse and sociolinguistic perspectives*. Cambridge, UK: Cambridge University Press.

*Alicia Massiah and Freddy James*

- 48th Session of the International Conference on Education (ICE) National Report on the development of education in Trinidad and Tobago. (2008). Retrieved from [http://www.ibe.unesco.org/National\\_Reports/ICE\\_2008/trinidadtobago\\_NR08.pdf](http://www.ibe.unesco.org/National_Reports/ICE_2008/trinidadtobago_NR08.pdf)
- Hänze, M., & Berger, R. (2007). Cooperative learning, motivational effects, and student characteristics: An experimental study comparing cooperative learning and direct instruction in 12th grade physics classes. *Learning and Instruction, 17*(1), 29-41. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0959475206001174>
- Herrmann, Z. (2017, January 3). *The challenge of change*. Retrieved from <https://www.gse.harvard.edu/uk/blog/challenge-change>
- James, F., Phillip, S., Herbert, S., Augustin, D., Yamin-Ali, J., Ali, S., & Rampersad, J. (2013). Is anybody listening? Teachers' views of their in-service professional development programme. *Caribbean Curriculum, 20*, 71-94.
- Jennings, Z. (2001). Teacher education in selected countries in the Commonwealth Caribbean: The ideal of policy versus the reality of practice. *Comparative Education, 37* (1), 107-134.
- Johnson, D. & Johnson, R. (n.d.). *An overview of cooperative learning*. Retrieved from <http://www.cooperation.org/what-is-cooperative-learning/>
- Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centered learning: 'Beyond educational bulimia'. *Studies in Higher Education, 28* (3), 321-334
- Luttenberg, J., Meijer, P., & Oolbekkink-Marchand, H. (2017) Understanding the complexity of teacher reflection in action research. *Educational Action Research, 25*(1), 88-102. DOI: 10.1080/09650792.2015.1136230.
- Lyman, F. T. (1981). The responsive classroom discussion: The inclusion of all students. In A. Anderson (Ed.), *Mainstreaming Digest* (pp. 109-113). College Park: University of Maryland Press. Retrieved from

*Does Clinical Supervision Work?*

[https://archive.org/stream/mdu-univarch-027524/univarch-027524\\_djvu.txt](https://archive.org/stream/mdu-univarch-027524/univarch-027524_djvu.txt)

- Mahlios, M., Massengill Shaw, D. & Barry, A. (2005). Making sense of teaching through metaphors: A review across three studies. *Teachers and Teaching: Theory and Practice*, 16(1), 49-71.
- Marshall, C., & Rossman, G. B. (2006). *Designing qualitative research*. Thousand Oaks, Calif: Sage Publications.
- Marzano, R. (2007). *The art and science of teaching*. Alexandria, Virginia: Association for Supervision and Curriculum Development.
- McKinsey & Company. (2017). *What drives student performance in Latin America?* Retrieved from <https://www.mckinsey.com/industries/social-sector/our-insights/what-drives-student-performance-in-latin-america>
- Melville- Myers, I. (2001). *Sub-regional seminar on curriculum development for "Learning To Live Together" Havana, Cuba, 15 – 18 May, 2001 Country Report - Trinidad and Tobago*. Retrieved from [http://www.ibe.unesco.org/fileadmin/user\\_upload/archive/curriculum/Caribbean/CaribbeanPdf/trinidad.pdf](http://www.ibe.unesco.org/fileadmin/user_upload/archive/curriculum/Caribbean/CaribbeanPdf/trinidad.pdf)
- Mills, G. (2000). *Action research: A guide for the teacher researcher*. Boston: Pearson
- Morgan, P., Farkas, G. & Wu, Q. (2009). Five-year growth trajectories of Kindergarten children with learning difficulties in Mathematics. *Journal of Learning Disabilities*, 42 (4). Retrieved from <https://doi.org/10.1177/0022219408331037>
- National Institute of Child Health and Human Development. (2000). Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. Retrieved from <https://www.nichd.nih.gov/publications/pubs/nrp/Documents/report.pdf>
- OECD (2016). *Innovating education and educating for innovation: The power of digital technologies and skills*. OECD Publishing, Paris.

Alicia Massiah and Freddy James

<http://dx.doi.org/10.1787/9789264265097-en>

- Rotherham, A. J., & Willingham, D. (2009). 21<sup>st</sup> century skills: The challenges ahead. *Educational Leadership*, 67 (1), 16-21.
- Sampsel, A. (2013) *Finding the effects of think-pair-share on student confidence and participation*. Honors Projects. Paper 28.  
<https://scholarworks.bgsu.edu/cgi/viewcontent.cgi?article=1029&context=honorsprojects>
- Sayre, E. (2013) *Integrating student-centered learning to promote critical thinking in high school social studies classrooms*. Retrieved from [http://etd.fcla.edu/CF/CFH0004486/Sayre\\_Elaine\\_N\\_2013\\_08\\_BS.pdf](http://etd.fcla.edu/CF/CFH0004486/Sayre_Elaine_N_2013_08_BS.pdf)
- Schleicher, A. (2015). Foreword. In *Schooling redesigned: Towards innovative learning systems*. pp. 3-5. OECD Publications. Centre of Educational Research and Innovation.
- Toh, K.A. (1994). Teacher-centered teaching is alive and well. *Teaching and learning*, 15 (1),12-17.
- Turner, V. (1964). Betwixt and Between: The liminal period in *Rites de Passage*. pp 4 – 20. The Proceedings of the American Ethnological Society. Symposium on New Approaches to the Study of Religion.
- Veloo, A., Macdalena, M., Komuji, A., & Khalid, R. (2013). *The effects of clinical supervision on the teaching performance of secondary school teachers*. Social and Behavioral Sciences, (93), 35 – 39.
- Walters, K., Smith, T., Leinwand, S., Surr, W., Stein, A., & Bailey, P. (2014). *An up-close look at student-centered math teaching: A study of highly regarded high school teachers and their students*. Retrieved from Nellie Mae Education Foundation Website: <https://www.nmefoundation.org/resources/student-centered-learning/an-up-close-look-at-student-centered-math-teaching>
- Warner, S. & Kaur, A. (2017). The perceptions of teachers and students on a 21st century mathematics instructional model. *International Electronic Journal of Mathematics Education*, 12 (2), 193-215

*Does Clinical Supervision Work?*

- Weimer, M. (2002). *Learner-centered teaching: Five key changes to practice*. San Francisco: Jossey-Bass Publishers.
- Wohlfarth, D. (2008). Student perceptions of learner-centered teaching. *Insight: A Journal of Scholarly Teaching*, 3, 67-74.
- Yale Center for Teaching and Learning. (2016). *Classroom Seating Arrangements*. Retrieved from <https://ctl.yale.edu/>

**TEACHER LEARNING IN ACTION RESEARCH: Insights  
From Information Technology/Computer Science Teachers in  
the Post-Graduate Diploma in Education Programme at the  
School of Education, The University of the West Indies, St  
Augustine**

*Vimala Judy Kamalodeen  
and Michele Taylor*

The Action Research course, as part of the Post-Graduate Diploma in Education programme for in-service teachers, is conceptualised as research where in-service teachers investigate a problematic issue in their classroom/school. Action research expects a shift from practitioner to researcher, a journey that is often difficult for teachers, and presents opportunities for formal and informal learning through participation in the course. Using purposive sampling, 19 Information Technology/Computer Science teachers were selected to explore their learning in a blended Action Research course. Data were collected from online cross-sectional surveys, with closed- and open-ended questions, and qualitatively analysed for common themes. Findings revealed teacher learning occurred through participation in learning activities leading to desirable learning outcomes, such as change in knowledge, beliefs and practices. Teachers seemed committed to the action research process, appeared motivated during their learning and indicated a desire to continue to do action research. Four assertions about teacher learning are made, noting the importance of the learning environment in fostering teacher learning. Insights into teacher learning are useful for course lecturers, and recommendations are made to conduct further research into the teacher shift from practitioner to researcher.

### **Background**

The in-service Post-graduate Diploma in Education (PGDipEd) at the School of Education(SoE) of the University of the West Indies (UWI), St. Augustine, offers a course in action research (AR), (formerly called the Curriculum study), one of four compulsory courses in the programme. The present study explored teacher learning among Information Technology/Computer Science (IT/CS) teachers in AR and followed a

*Vimala Judy Kamalodeen and Michele Taylor*

large-scale evaluation of teachers' views of the larger PGDipEd programme (James et al., 2013). That 2013 study found that teachers held mostly positive perceptions of the programme and benefitted from pedagogical improvement. While teachers were expected to use research literature during the programme (p. 91), no specific findings in relation to teacher experiences with AR are stated.

AR emanates from a number of philosophical traditions and, in education, can take the form of teacher or classroom AR. According to Herr and Anderson (2014), AR is both a route to individual teacher professional development and a collaborative avenue to institutional change. Teaching AR methodology is considered to be relevant to the context of improving educational practice in Trinidad and Tobago for several reasons. Firstly, AR places the practitioner (the teacher) as the main actor in his/her research (McNiff, 2001). Secondly, it can be tailored to a specific historical-social context and allows researchers the freedom to choose which methods they wish to use (Kemmis & McTaggart, 2005). Further, AR is about empowerment and change, thus liberating practitioners from existing cultural practices (Kamalodeen, 2014). In an increasingly complex and challenging education environment, there is a need for teachers, administrators and school systems to improve practice and enhance the educational experience (Yamin-Ali, 2014). Thus, AR is critical in promoting social justice and in facilitating teacher reflexivity in practice, which can lead to desirable teacher change in the classroom.

Teachers face a multiplicity of challenges in their practice, from curriculum reform to school-wide policy change implementation. Teachers' daily work often does not allow for opportunities to engage in critical reflection on their educative practice. Teachers need to be decision-makers, which would be easier if data and evidence were available. Frequently, anecdotal data and observations are the sole data sources for decision-making. Yamin-Ali (2014) laments that:

Whereas tacit knowledge, intuition, and hunches based upon experience may have their place, professionalism demands that schools be engaged in research if they are to use data to make decisions (p. 3).

James and Augustin (2017) looked at several programmes in which AR occurs, including higher education, preservice teacher education and teachers in graduate programmes. They, however, did not look specifically at the PGDipEd programme of which AR is a module. These distinctions are important as PGDipEd AR studies are practitioner-centred. The PGDipEd AR course is not necessarily aimed at publications. It requires

## *Teacher Learning in Action Research*

in-service student-teachers to plan, design and implement an AR project to solve a problem in their practice. Student-teachers face some tensions in shifting from practitioner to researcher (Yamin-Ali, 2014). Further, teachers may be reluctant to engage in reflective practice, a necessary component of AR, for many reasons, one being the fear of discovery and another a reluctance to sustain action within their practice that reflection may require (James & Augustin, 2017). But as adult learners, PGDipEd students are expected to be self-directed and to navigate new learning experiences efficaciously (Knowles, Holton, & Swanson, 2005).

### **Rationale for the Study**

As relatively new entrants to the existing PGDipEd programme, IT/CS teachers are under-researched, and their engagement with AR can lead to better comprehension of their learning in the course. IT/CS has been taught at all levels of the secondary school system in Trinidad and Tobago since 1989. However, IT/CS education was initiated in 2012 at the UWI School of Education by the lead author of this paper. Action researchers tend to retain the basic academic model of small-scale experimental research (minus the 'control group'), and the 'problem-solving' attitude of hoping to change things for the better by finding more efficient classroom techniques (Allwright, 2015). In order to identify a research focus for the AR classroom study, some IT/CS student-teachers used the strategy of selecting a 'failed' educational target, such as low-test scores or poor student engagement in a particular content area. This has been called a 'failure-driven' learning approach by Schank & Abelson, 1977 (as cited in Bereiter & Scarmalia, 2014), and perhaps test scores are all the data that the teacher or schools have. This AR course was designed for teachers to consider their own practice, as well as that of others, to become more systematic in their research on practice.

The AR course demands strong academic writing and research skills, but IT/CS student-teachers are often bereft of these skills upon entering the PGDipEd programme, as their undergraduate degrees in Information Technology/ Computer Science often focused on technological and content knowledge. Additionally, student-teachers are full-time workers without reduced academic demands at their schools, while trying to conduct research there. Sometimes student-teachers face conflict with school administrators, colleagues and students in achieving multiple targets in the same timeframe (James et al., 2013). Lecturers, too, felt a level of frustration in student-teachers' slow grasp of methods and apparent inability to diagnose problem areas in their practice. In the year 2014/2015, the PGDipEd utilised a blended learning format to reduce time

*Vimala Judy Kamalodeen and Michele Taylor*

away from work and modernise the course. Lectures and tutorials, both face-to-face and online, dominated the course facilitation but students were expected to do a significant portion of the work as independent study.

The main purpose of this paper is to explore how learning took place among IT/CS teachers in the AR course. It focuses on teacher experiences and learning activities, learning outcomes, and challenges that they may have faced during the course. This understanding may be useful to course lecturers and designers, as classroom AR is highly contextual.

The main research question that guides this study is, what is teacher learning in an AR course in the PGDipEd at the SoE, UWI? The sub-research questions are:

1. What learning activities do IT/CS teachers engage in during the action research course in the PGDipEd at the SoE, UWI?
2. What are IT/CS teachers learning outcomes while conducting action research in schools?
3. What are the barriers/challenges to IT/CS teachers learning while conducting action research in schools?

### **Conceptual Framework and Review of the Literature**

This study is grounded in the framework of adult learning (Knowles, Holton, & Swanson, 2005), and understanding how teachers become learners in adult education settings. The latter is the subject of ongoing research (Cochran-Smith & Lytle, 1999; Knowles, Holton, & Swanson, 2005; Feinman-Nemser, 2008; Patton, Parker, & Tannehill, 2015). Initial work on understanding adult learning is credited to Knowles (1990) who developed the concept of andragogy, which is built on principles of pedagogy applicable to any adult learning situation. He created a set of assumptions about how adults learn, which he used to develop educational programmes for adults. The six assumptions of andragogy are that adults are autonomous, self-directed learners; they need to know why they are learning; they bring a wealth of experience to the educational setting; they enter educational settings ready to learn; they are problem-centered in their learning; and they are best motivated by internal factors.

While there is ongoing criticism of Knowles' theory of andragogy, his work has elements of constructivism, such as self-direction and problem-centred learning; as well as that of motivation. Several other theories are important to adult learning, such as Mezirow's (1991) transformative learning and Kolb's (1984) experiential learning. While these theories have different emphases, they are founded on a common

### *Teacher Learning in Action Research*

principle that adults are independent learners who are capable of taking control of their lives and learning. Self-direction became a core component of adult learning and Deci (1980) argues that teachers participate in a learning environment to satisfy needs of competence, self-determination and connectedness. Motivational factors to participate in adult learning may be external (such as job mobility and performance appraisal) or internal factors (such as job satisfaction and self-esteem), but the latter has a stronger pull (Knowles, Holton, & Swanson, 2005, p.57).

Related to self-directed learning is the newer idea of self-regulated learning which originated from educational psychology and cognitive psychology. In examining key constructs within the context of achievement motivation, Clayton, Blumberg, and Auld (2010) found goal-orientation and self-regulated learning to be significant. Those who are considered highly self-regulated are knowledgeable about their abilities and how to attain their goals, and are also more likely to demonstrate high levels of self-efficacy. Those considered weak self-regulators are often less likely than high self-regulators to sustain efforts to attain their learning objectives, and often select tasks that require little effort to succeed and pose little to no challenge. Educational debates continue about the level of significance of personal characteristics like self-direction and motivational interest in teachers' participation in professional learning activities.

### **Action research**

Several definitions exist for AR. These definitions vary depending on the context and discipline. AR is identified as one aspect of educational research, the purpose of which is mainly to investigate specific problems in certain contexts and school settings (Johnson & Christensen, 2008). AR is conducted by practitioners, such as teachers, counselors, and principals, to solve a problem in a local setting, and not necessarily by academic researchers. According to Johnson and Christensen (2008), AR usually involves a participatory process and its purpose may not be for presenting generalisable findings in academic journals (p.12). Kemmis, McTaggart, and Nixon (2013) further describe AR as a systematic inquiry process undertaken by stakeholders to resolve specific and targeted problems. AR can be defined as a form of self-reflective enquiry undertaken by participants in social (educational) situations, in order to improve the rationality and justice of their own social or educational practices, their understanding of these practices, and the situations in which the practices are carried out (Kemmis, McTaggart, & Nixon, 2013).

AR democratises the process of knowledge production by building on the actions, beliefs and understandings of those working

*Vimala Judy Kamalodeen and Michele Taylor*

within a particular social context. It places emphasis on ‘insider’ experiences, rather than the more generalised observations of teaching and learning that may be advanced by external researchers (Burns, 2015). This type of research differs from outsider research, as the teacher is practitioner and researcher, and not necessarily the subject of the research. Teachers thus become researchers of their own practice in their specific school context.

James and Augustin (2017) postulate that classroom AR provides a mechanism for teachers to adopt a systematic, reflective approach that can address areas of need within their respective curricular domains and can lead to overall school improvement. They described AR as an approach that is based in practical action, known as the action component, while focusing at the same time on generating, informing and building theory, known as the research component. These two components work together, each at the same time informing and supporting the other. It is a constructivist approach to research that encompasses processes of dialogue, collaboration and action among the participants in the surrounding system (James & Augustin, 2017).

There are a number of professional benefits to teachers engaging in AR. James and Augustin (2017) indicate from their review of salient literature that teachers became increasingly reflective and developed research skills (p.11). Kember (2002), in a survey of 90 AR projects in higher education, specifically indicated “development of skills, changes in attitudes and the development of revised practices that endured” (p. 92). Additionally, Seider and Lemma (2004) disclosed that teachers developed an ‘inquiry’ mindset and enhanced professional efficacy. Ali et al., (2012) showed PGDipEd teachers enjoyed pedagogical benefits related to lesson planning, collaboration with colleagues, and understanding the theoretical foundations of education. Further, Hien (2009) cited AR benefits such as teacher commitment to the AR process, a mechanism for school change and enhancing democratic processes at the school.

Notwithstanding the focus on AR at the SoE, expectations of teacher AR by stakeholders such as the Ministry of Education may not match that of the teacher’s. For example, Ali et al. (2012) noted that while some stakeholders were comfortable with the focus on teachers’ work within the classroom context, others also expected outcomes related to an understanding of the broad purposes of education and of teachers’ role in the society; an outcome that they felt was not being achieved in the PGDipEd. According to the 2012 study, stakeholders also felt that teacher change was not sustained after the PGDipEd ended, a claim supported by prior literature (Rampersad & Herbert, 1999).

## **Teacher Learning**

Wenger (1998, p. 214) describes learning as an “interaction between experience and competence, which must remain in a state of tension for learning to occur”. The idea that teaching is a learning profession (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009) engages a substantial body of literature. Newer, more complex and broad-based ways of looking at teachers’ learning have emerged over observations of “discrete” activities like workshops and seminars in teacher professional development (Desimone, 2009). Teacher learning also emanates from informal interactions with colleagues and daily classroom practice (Feiman-Nemser, 2008; Vermunt & Endedijk, 2011).

Research into teacher learning is not as well developed as that of student learning (Vermunt & Endedijk, 2011), as theories abound for student learning. These include but are not limited to cognitivism, behaviourism, constructivism, and brain-based learning. However, when in-service teachers adopt the role of learners, they bring experiences from the school into the university. This could lead to what Barr and Tagg (1995) call paradigm shift in learning as schools/colleges of education are now producers of learning rather than providers of knowledge. Borko (2004) suggests that teacher learning needs to be studied while taking into account “both the individual teacher-learners and the social systems in which they are participants” (p.4), an idea often called situated learning. Vermunt and Endedijk (2011) conducted empirical research into models of patterns in teacher learning and found that teacher-learning patterns were directly related to both personal (personality characteristics, personal experience in teaching and learning, and gender), and contextual factors. These researchers suggest that the most direct factor in teacher learning is the learning environment which, for in-service student teachers, includes the social environment, the type of intervention used in learning (such as formal instruction, informal learning, collaboration, online learning) as well as the wider school climate (in terms of openness to innovation) (p. 298).

Opfer and Pedder (2011), in their review of literature on teacher learning, also identified the role of the learning activity (or process) as important as that of school factors and individual teacher characteristics. They used a complexity theory lens to study the interrelations among factors in teacher learning, and critiqued the linearity and discreteness of other approaches to studying teacher learning. In a longitudinal study of secondary school teacher learning at their workplace (schools), Bakkenes, Vermunt, and Wubbels (2010) adopt a definition of teacher learning as:

*Vimala Judy Kamalodeen and Michele Taylor*

an active process in which teachers engage in activities that leads to a change in knowledge and beliefs (cognition) and/or teaching practices (behaviour) (p. 538).

In analysing digital logs of teacher learning experiences, these researchers distinguished between learning activities (experimenting, considering own practice, getting ideas from others, experiencing friction, struggling not to revert to old ways, and avoiding learning) and learning outcomes (changes in cognition and behaviour).

Even the way teacher learning is measured is problematic. Hoekstra and Korthagen (2011) suggest that the way student learning is measured, as scores in tests and exams, is inappropriate in measuring teacher learning, and literature on social and informal learning can provide a useful lens for framing teacher learning, especially if participation in activities can lead to desirable learning outcomes. The idea that teachers are knowers and thinkers, and that the school is a learning community, has gained considerable support (Cochran-Smith & Lytle, 1999). These authors argue that there is little difference between teacher learning as social inquiry, practical inquiry or ways of knowing in communities.

Learning can be categorised in a number of ways. A debate exists between what is termed formal and informal learning, sometimes described politically as non-formal (Malcolm, Hokinson, & Colley, 2003). Informal learning is considered as learning through everyday practice or in non-formal education spaces while formal learning refers to what is acquired through lectures, tutorials and seminar/workshops within the University. Advocates for informal learning suggest a change in structure for learning and that schools lack the infrastructure to support workplace learning (Kwakman, 2003). Additionally, informal learning might take place individually or collaboratively, intentionally or unintentionally (Jokisalo & Riu, 2009 as cited in Rowell & Hong, 2013).

Social learning theory proposes that individuals can learn in formal and informal settings, such as the workplace, classroom or other spaces including online (Kamalodeen, 2014). This learning is horizontal, sometimes not intentional but emerges through an incidental outcome of interactions with others. Bandura (1977) also stressed that individuals construct learning through observing others, as it is where individuals learn attitudes, beliefs and behaviours.

In-service teachers navigate formal instruction in the educational institution, and informal learning in the workplace, continuously, while constructing knowledge of themselves, students and learning itself during the PGDipEd. These collective experiences may influence teacher learning in desired directions. In this scenario, educators, student-teachers

### *Teacher Learning in Action Research*

and even students co-create knowledge of the classroom that is practical and useful (Cochran-Smith & Lytle, 1999).

Teacher learning in AR may be considered as complex as it requires the synthesis of new materials, comprehension, reasoning and inquiry into practice. It calls for new ways of ‘seeing’ what has been routine, and this requires effort. According to Graesser and D’Mello (2012), this effort in learning may place student-teachers in a state of cognitive disequilibrium where social-cognitive-affective-behavioural-psychological mismatched states are experienced. Equilibrium is restored when learners disengage from the process. This may occur at the end of a successful study or if a student exits from the study at an earlier time. Student-teachers (undergraduates) “may feel overwhelmed at best”. Helm and Bailey (2013) recommend that student-teachers require mentoring and supervision throughout the process.

The literature reviewed provides lens for teacher learning in AR at the SoE and in the school setting. This study seeks to explore three aspects of teacher learning for in-service teachers conducting AR at their schools. These are the learning activities in which teachers were engaged in the AR course, changes in learning outcomes in cognition and practices, and challenges faced during their learning.

#### **Research Setting-The AR course in PGDipEd Programme 2014/2015**

The AR course was delivered in a blended mode through lectures, tutorials and independent study. Students were required to do readings around a research focus, developed after examining their practice. At the end of semester one, students individually produced an AR proposal, with supporting unit and lesson plans that were aligned to the relevant and current IT/CS curricula. An intervention strategy was carefully designed and implemented in the classroom during the second semester, in each school, by the teacher, all with the lecturer’s close supervision. Data were collected and analysed to answer the research questions. Students were mentored in the AR process on a one-to-one basis by the lecturer, who acted as a research supervisor. Communications between lecturer and student, and among students, were primarily online with limited face-to-face interaction. *Moxtra*, a free online collaborative tool, allowed independent and group chatrooms, group meets and filesharing. The lecturers also used *Zoom*, a free online meeting tool, to facilitate online classes as well as individual and group mentoring sessions. Additionally, *Google Drive* allowed for the annotation and sharing of documents, thus giving lecturers and students the ability to collaborate. Write-up and

*Vimala Judy Kamalodeen and Michele Taylor*

editing of the AR reports by students took another two months with close supervision. These AR reports of approximately 5,000 words were submitted in order to satisfy the course requirements. Two examples of these studies were '*Digital game-based learning to promote engagement among sixth form IT/CS students at a rural government secondary school in Trinidad*' and '*The teaching of reading in IT at an at-risk school in East Port-of-Spain*'. The authors of this paper were the AR course lecturers.

## **Methodology**

### **Combining Qualitative and Quantitative Methods in one Instrument**

Participants were given online questionnaires: one developed to evaluate the teachers' views of the larger PGDipEd by James et al. (2013), and one specifically designed for the views of PGDipEd IT/CS student-teachers by the AR lecturers. The first questionnaire consisted of 15 questions, both open and closed-ended, and was developed and tested by a PGDipEd in-house team. The second questionnaire consisted of 5 open-ended questions to elaborate on exploring the learning activities of the students, and the challenges faced during AR course. This instrument was developed by the course lecturers, and was piloted and tested in previous IT/CS courses at the SoE.

There is a debate about whether this type of combination of qualitative and quantitative data collected from the questionnaire can be described as concurrent mixed methods (Bryman, 2006), or is simply adding on open-ended responses to a close-ended survey. In his survey of 252 social science articles, Bryman (2006) found that the majority of researchers (62.9% of all articles) employed a cross-sectional design for the collection of both quantitative and qualitative data; by far the most common design combination. We therefore justify the use of this design for completeness of the data, which refers to the notion that the researcher can bring together a more comprehensive account of the area of enquiry in which he or she is interested if both quantitative and qualitative research are employed (Bryman, 2006).

## **Participants**

Participants in the study were IT/CS student-teachers in a PGDipEd at the SoE, UWI. There were 3 males and 16 females from 19 secondary schools. Fifteen (15) of those schools were Government Secondary schools (or high schools), thirteen (13) from Trinidad and two (2) from sister island

## *Teacher Learning in Action Research*

Tobago, as Trinidad and Tobago is a twin-island republic in the Caribbean. Of the remaining four schools, one was government-assisted and the other three were private. Five (5) of the Government secondary schools were considered at risk schools (Trinidad and Tobago, Parliament, n.d., p. 12). Years of experience before doing the programmes varied from 5 to 18 years. All 19 teachers in the group were selected for participation in the study.

### **Data Collection and analysis**

Data were collected through two surveys. The first was an online survey to all PGDipEd students using *Fluidsurveys.com* at the end of the 2014/15 AR course. The second was disseminated to 19 IT/CS participants using *Google Forms*. All participants consented to take part in the study and were granted anonymity through the online questionnaire as names were not submitted. Anonymity was essential to maintain confidentiality and to build trust in order for the participant to feel comfortable sharing valuable information required for the study. A limitation of this study was the variability in the length of the responses to the open-ended questions where participants may have offered 'weak satisficing' (Krosnick, 2018). In this scenario, respondents may have put the first answer they thought of, rather than exerting effort in providing optimal answers.

A clear advantage of electronic data collection, through online survey, was the ease of obtaining participant data and maintaining data integrity, as data were captured in their original form together with relevant activity histories. The availability of born digital data eliminated the need for data transcription and possible introduction of errors, as well as allowed data analysis to be easier and more efficient. Data from the online survey were captured on an Excel sheet by question and relevant respondent. Data per question were extracted into a table and coded for themes identified from the literature. This was done by one researcher and then by the other independently. A constant comparative analysis was used across all categories, themes were generated, and significant statements elicited (Butler-Kisber, 2010). Quotations were extracted according to each code and presented in support of the finding. Since statements were written in the first language of participants (Trinidad Creole), insertions and explanations were inserted for clarification where needed. It is to be noted that 'curriculum study' was the term used in 2015 to represent the AR report.

*Vimala Judy Kamalodeen and Michele Taylor*

## **Findings**

This section is organised according to the three research questions and presents findings related to each.

### **RQ1: What Learning Activities do IT/CS Teachers Engage in During the Action Research Course in the PGDipEd at the SoE, UWI?**

Findings revealed themes for learning activities that engaged teachers which were: considering one's own practice; innovating under supervision; interacting face to face and online; getting feedback from the lecturer; interacting with others; and planning for continued AR.

#### *Considering one's own practice*

IT/CS student-teachers thought about the teaching strategies they employ and remarked "*my teaching strategies were not as effective before*". Another student-teacher reported,

*"I would [now] attempt a more student-centered approach as I am learning to put my students at the center of my lessons. Thus, instead of imparting my knowledge and teaching my students, I am trying to help them learn"*.

#### *Innovating under supervision*

Teachers attempted to adapt to and adopt new pedagogical strategies in the classroom. Some of these were problem-based learning, technology integration, gamification, game-based learning and differentiated instruction. A benefit of attempting new strategies was the supervised visits by the lecturer, and engaging in reflection. There were some tensions and challenges to being supervised while experimenting. For instance, one teacher who used an innovative approach of gamification to teach the topic 'Data Types' commented,

*"I became a bit nervous knowing I had to teach in the presence of my curriculum supervisor... However, I was very pleased with the delivery of the lesson, my supervisor approach made me very comfortable"*.

Another student, who, during a supervised visit, chose to experiment with the use of a rubric as a means of evaluating his students, expressed

*"I had certain doubts with regard to using of the rubric to score students activities, but these doubts or misconceptions were properly rectified by her [lecturer] ideas and comments...Overall, her [lecturer] comments were well received and will be*

## *Teacher Learning in Action Research*

*implemented so as to have an effective and properly managed curriculum study”.*

### *Interacting face to face and online*

IT/CS student-teachers favoured a mix of online and face-to-face classes. *Moxtra.com* and *zoom.com* helped to facilitate chats and meetings with students. One student noted this about the online format,

*“It made me more interested in the program that I did not have to drive long distances to sit in a class. I was able to sit in the comfort of my home with my family than be stressed out in traffic getting to and from UWI. It also helped me to think critically during these sessions as it was stress free to sign on”.*

Students rated *Moxtra* highly for chatting and favoured asynchronous modes of communication. Participants claimed that they used *moxtra* mostly for “*clearing up ambiguity*”, but also for “*giving information*”, “*giving answers to specific questions*” and “*for socialisation*”. *Zoom* helped to facilitate classroom-like sessions. One student commented that the online space was “*Great! Still learnt a lot... like a classroom... there was interaction*”. Phone calls were used to “*clear up any misconceptions*”. It was particularly beneficial to those living in Tobago as this student indicated, “*It was very engaging. As a Tobago [Tobago is the sister island to Trinidad and quite a distance] student I will welcome more online courses*”. Lecturers were “*knowledgeable*” and were “*successful in facilitating an environment conducive to learning*”.

### *Getting feedback from the lecturer*

The quality of feedback from the lecturer was significant to teacher learning in AR. The majority of student-teachers described the quality of the supervision they received during their AR as “*excellent*” while the rest responded “*good*”. One student elaborated,

*“My Lecturer was very accommodating. She responded to my problems/issues at any time of the day or night. I appreciated her kindness, patience and interest she took, and I am very grateful for this. I learnt a lot from her both professionally and otherwise. Overall, it was an excellent experience. I am now a better teacher/educator/person”.*

Other students lauded *individualised coaching and guidance* as important to their learning. Another student claimed, “*lecturers were always ready to respond to questions and give feedback for all projects in a timely manner*”.

### *Interacting with others*

*Vimala Judy Kamalodeen and Michele Taylor*

Sixty-five percent (65%) of the students chose the option “pleasant” to indicate their experience in conducting AR at their school, while 29% indicated that it was “comfortable”. 6% selected “other” and further indicated that it was “refreshing”. Perhaps the most significant indicator of transformational learning is the desire to share experiences with others. One favourable response describes the need for “... a digital space to share findings with fellow/prior dip-Eders/lecturers.... continued communication from lecturers.... email of informative link, etc. [sic]”. They attributed success of the AR to “My [IT/CS] Curriculum lecturer and the cooperation of my students” while others indicated interactions with “HOD, UWI lecturers, fellow Dip. Ed. colleagues” [sic] were significant to their learning. Further, others enjoyed “meaningful discussions” with peers and this comment offers support, “Other colleagues helped and gave advice”. Mostly, findings reveal satisfaction with “interacting with teachers from different types of schools” and ‘networking of teachers’.

*Planning for continued research on practice*

Participants indicated that they would continue AR into their practice post Dip/Ed for “personal benefit and benefits to staff and school and students”. For example, one student indicated that after the PGDipEd, “I would be more relaxed and less stressed [so I can continue AR].” Another student indicated a continued “desire to improve my practice.” One participant indicated “she developed new strategies in understand[ing] how to teach my [IT/CS] class better”. Participants stated that while they rated the AR course highly for “personal and professional growth”, they felt certain challenges would affect their ability to continue doing AR.

**RQ2: What are IT/CS Teachers Learning Outcomes While Conducting Action Research in Schools?**

Findings for IT/CS teacher learning outcomes are categorised into two areas: changes in cognition (knowledge, beliefs and attitudes) and changes in pedagogical practice (behaviours).

*Changes in cognition (knowledge and beliefs)*

IT/CS teachers indicated a growth in knowledge in several areas, mostly related to pedagogy. The majority indicated that they gained insight into effective teaching strategies. For example, one of the teachers stated that “strategies do exist to engage my digital native students”, which signaled that the teacher realised there were strategies for the students born in the digital era (sometimes called millennials). Another teacher acknowledged that she gained “an awareness of new teaching strategies that can be used in the classroom”. IT/CS teachers also claimed they

### *Teacher Learning in Action Research*

gained insight into their practice in areas of student understanding, assessment feedback, and student-centered learning. Mostly they claimed that they gained insight into their “*individual strengths and weaknesses*”. One student indicated learning research skills and specified that it was “*the help from the lecture[r]s [sic] in how to conduct the research*”.

Beliefs about teaching seemed to have been impacted as some student-teachers indicated the importance of unit and lesson planning, along with student-centred learning. Additionally they pointed out that teaching literacy is the job of all teachers. There were a few comments that seemed to indicate a change in teacher beliefs may have taken place. One student-teacher, for example, indicated that having done the AR course she now believes that, “*students can contribute to their learning*” and another teacher stated that she now realised that, “*students need a lot of motivation and support*”. These beliefs did not come without some amount of uncertainty, as one student stated that,

*“I must admit I was a bit skeptical of this strategy in the curriculum study teaching practice however I decided to go brave and allow myself to be a guide in the lesson and allow my students to show their true potential”.*

The student-teacher seemed to have made a judgement about her practice and took action.

The idea that learning is situated in the field emanates from teacher observation of students in the classroom setting, and in answering higher order thinking skills (HOTS) questions. One student-teacher noted,

*“My students motivated me when I observe their struggles in answering HOTS and the challenges in answering HOTS question on the final examination paper”.*

Findings also indicate that student-teachers gained increased confidence in themselves and, at least, an awareness that they could impact their students positively. A typical response was “*I better understand what motivates the students to take part in class*”. Another student-teacher indicated he gained “*confidence in trying new strategies, discerning students’ strengths.... abilities...and looked for areas for improvements*”.

IT/CS student-teachers seemed to experience delight about the AR process and said,

*“The idea that my action research would potentially help my students with their comprehension skills and surprise, I now have students who like programming” [a core component in IT/CS].*

*Vimala Judy Kamalodeen and Michele Taylor*

An important change in belief came from understanding AR itself. This is exemplified by a student saying, “*with proper planning and thorough research we can improve learning in the classroom*”.

*Changes in pedagogical practices (behaviour).* IT/CS student-teachers indicated they used a number of teaching/learning strategies that they found to be effective in their classrooms including, teaching literacy in the classroom, problem-based learning, and effective use of technology. These strategies formed part of the pedagogical interventions in their AR studies, all specific to their classroom. One participant elaborated,

*“I have learnt how to incorporate Bloom's Taxonomy in my lessons so that I can train my students for the real world and their final exams. I also apply The Socratic Method to help when I need to break-down questions so that students can gain a better understanding. I have also learnt to push my stronger students by using depth of knowledge questions to challenge them”.*

Participants seemed to have gained satisfaction from engaging in the AR, as well as heightened self-esteem. One student-teacher remarked that her source of motivation was, “*to see my students succeed and in making my school a better learning environment*”. Yet another said that her reason for doing AR was a “*desire to improve my practice*”. While their classroom students motivated some teachers, others noted that their colleagues were motivating for them and thanked “*staff at school, Dip Ed. group and supervisors, my students' attitude towards the program*” for success. Finally, the statements from two teachers, “*I have become a much better teacher. Thanks to Dip Ed.*” and,

*“This curriculum study has opened my eyes as a glance in the past of my teaching characteristics of mainly through the use of textbooks and writing on the board. I have now realized that future problems associated with any topic besides problem solving can be researched and a proven strategy can be implemented to get better results from the students”.*

contribute to showing how positively teachers felt about the difference that the course made to their practice.

### **RQ3: What are the Barriers/challenges to IT/CS Teachers Learning While Conducting Action Research in Schools?**

Notwithstanding the participation in learning activities and obtaining desirable learning outcomes through the AR course, IT/CS teachers did indicate that there were three major challenges that hindered their learning. These challenges included time management, inadequate

## *Teacher Learning in Action Research*

resources, and insufficient administrative support, and are elaborated below.

*Time management:* This seemed to be the greatest factor hindering teachers' engagement in AR. Student-teachers are challenged to work with a lengthy IT/CS curriculum, sometimes unwilling students, and high academic expectations while performing extra duties in IT/CS. They indicated that they needed more time to properly conduct the AR. A suggestion was made that:

*"More time is needed to conduct the research to obtain more comprehensive data for analysis".*

Another student in the study, who also felt that time was indeed a major factor stated,

*"The time allotted for each study, since it's interesting to do the research but sometimes can feel overwhelming".*

One other student indicated that *"It should be full-time for a year."* The lack of time caused student-teachers to feel rushed and unable to enjoy the research process. As one student stated, *"deadlines are sometimes too soon and given my daily schedule I am unable to do enough background reading to give comprehensive answers to questions."*

*Lack of resources, such as technology and Internet:* This was also cited as a major concern among the student-teachers; it was the second highest concern after time management. Two teachers cited, *"Lack of resources (computers/laptops)"* as a major concern, while three teachers, listed *"no internet"*, *"internet problems"* and *"lack of resources (... internet service)"*.

*Lack of cooperation from administrators:* Students often claimed that the structure of the school, a lack of resources and technology support, and school disruptions made it difficult to *"follow the research implementation schedule"*.

Student-teachers indicated that the UWI SoE could do more to improve student experiences of conducting AR in schools, by increased support and resources, reduced number of assignments, scheduled times for AR, more time to conduct AR, and the offering of incentives.

## **Discussion**

Three major findings of the study were that IT/CS teachers engaged in learning activities during the AR course of the PGDipEd programme, positive changes occurred in cognition and pedagogical practices, and the major barrier/challenge to AR was time management.

*Vimala Judy Kamalodeen and Michele Taylor*

With regard to the IT/CS teachers' engagement in learning activities, the following were revealed: reflection on practice and innovating, interacting face-to-face and online, getting feedback from the lecturer, interacting with others, and planning for continued AR. IT/CS teachers experienced desirable changes in learning outcomes, incognition (knowledge, beliefs and attitudes), and in practice (behaviours). They also indicated challenges to learning. Of these, time management seemed to pose the greatest challenge. Others were linked to school contexts, such as lack of cooperation from school administration, staff and students. It was also noted that a number of minor challenges were linked to technology. Parental support did not seem to be a challenge. Programme limitations, such as lack of knowledge of AR and dedicated time to conduct AR, were least mentioned. Personal factors, such as lack of confidence to do the AR, was considered a minor hindrance.

From these findings, four assertions about teacher learning in AR are made below.

### **1. Learning Activities are Central to Teacher Learning**

IT/CS teachers in this AR course seemed to have engaged in several learning activities, such as considering their practice, innovating under supervision, interacting face to face and online, getting feedback from the lecturer, interacting with others, and planning for continued AR. Lecturers devised ways of intentional knowledge sharing of AR theories and processes for students who had no prior knowledge. Additionally, lecturers facilitated a learning environment, which Vermunt and Endedijk (2011) believe is the most direct factor in teacher learning. Supervised visits by the lecturer, while the teacher experimented in the classroom, allowed for immediacy in feedback, which student-teachers seemed to favour. Helm and Bailey (2013) do highlight the key role of mentoring and supervision in learning new concepts.

Additionally, facilitating reflection, supporting innovative practice and fostering engaging face-to-face and online classroom, seemed important to teacher learning. These findings align with ideas of teacher learning espoused by Bakkenes, Vermunt, and Wubbels (2010) as engagement in active learning processes leads to change in cognition and behaviour. Where the theory of the course is carefully meshed with field experience and carefully mentored (Darling-Hammond et al., 2009), teacher educators are better able to accomplish their goals in preparing teachers to successfully enact complex teaching practices (Zeichner & Conklin, 2008).

## **2. Teacher Learning is Co-constructed in Both Formal and Informal Learning Spaces**

As IT/CS teachers engaged in AR, they experienced positive shifts in their cognition and practices, which support the definition of learning purported by Bakkenes, Vermunt, and Wubbels (2010). They developed research skills and became increasingly reflective, as previously indicated by James and Augustin (2017). Systematic data collection and observation were used in reflection, decision-making and the development of more effective classroom strategies (Ali et al., 2012). In particular, teachers held reflective dialogues with the lecturer and meaningful discussions with peers (Ali et al., 2012). This reflection allowed for what Seider and Lemma (2004) called an 'inquiry mindset'. Observation, discussion, collaboration, reflection and interrogating practice activities helped teachers to co-construct their learning at the institution (UWI) and the workplace (school), and even in online learning spaces. The availability and accessibility of lecturers during independent study, and in clearing up ambiguity, was also critical to student informal learning. This informal learning was often facilitated through skillful leveraging of online collaborative tools, *zoom* and *moxtra*. Thus, the learning environment seemed to have enabled teachers to experience success in AR. Further, it is suggested that the School of Education acted as a producer of learning, which according to Barr and Tagg (1995), was a needed shift in the way Colleges/Schools of Education should operate.

## **3. Teacher Learning is Grounded in Adult Learning Theory Linked to Motivation and Self-regulation**

Motivating factors for learning in the AR course of PGDipEd program such as support from supervisors, colleagues and peers, plus a desire to become a better teacher (Deci, 1980), are indicative of intrinsically motivated factors for success. In spite of the purported lack of time to read, enjoy the research process and to acquire research skills, IT/CS student-teachers were all successful in submitting AR reports. This implies that motivators, both extrinsic and intrinsic, such as confidence and enjoyment, helped student-teachers to persist in their learning. Participants claimed that their students were their inspiration to conduct the AR.

At the beginning of challenging courses, Graesser and D'Mello (2012) suggest student teachers usually experience some form of cognitive disequilibrium where they feel confusion and frustration in knowledge building. This may have occurred because of the length of time it took to learn and design the research project, and engage in the research process, (three months). However, findings from this research indicate

*Vimala Judy Kamalodeen and Michele Taylor*

perseverance in completion of tasks, and do not seem to suggest that negative emotions from cognitive disequilibrium (Graesser & D'Mello, 2012), sufficiently disrupted teachers' ability to conduct or complete their AR. Perhaps the ongoing support by IT/CS course lecturers through online tools during periods of independent work assisted in success.

Self-regulation is a key aspect of adult learning according to Clayton, Blumberg, and Auld (2010). This group of teachers seemed knowledgeable about their abilities, figured out how to attain their goals, and remained committed to the AR process. This may indicate the presence of self-regulation. Educational debates continue about the level of significance of personal characteristics like self-direction and motivational interest in teachers' participation in professional learning activities. It is important that teacher educators are able to understand their student-teachers' own beliefs about their ability as learners and motivating factors for learning. However, while IT/CS teachers claimed they experienced a change in cognition (knowledge and beliefs) and practice/behaviour during the AR course, it is beyond the scope of this paper to predict whether teachers would do AR in their schools after the course is completed.

#### **4. Teacher Learning is Related to the Learning Environment**

The IT/CS teachers in this study came from diverse school settings - government and government-assisted, rural and urban. In the PGDipEd programme, students were able to build knowledge of research methods and processes in a relatively short time frame, and implement an action in their classroom/school. While time was identified as an issue in teacher-learning (Kamalodeen, 2014), success in IT/CS teacher learning may be attributed to the learning environment (the School of Education), the types of intervention used in learning (such as formal instruction, informal learning, collaboration, online learning), and the openness of the teacher's school to innovation (Vermunt & Endedijk, 2011, p. 298). Bereiter and Scarmalia (2014) defined schools as 'problem spaces' where AR is much needed. We propose that classrooms can evolve to be places of learning (Cochran-Smith & Lytle, 1999), if the learning environment supports teachers while conducting AR in these spaces. This would require schools to attend to improving structures and policies to support workplace learning (Kwakman, 2003).

### **Conclusion and Recommendations**

Teacher learning was explored through the learning activities that IT/CS

### *Teacher Learning in Action Research*

teachers engaged in, the change in learner outcomes and the challenges they faced in implementing AR projects in their school. Teacher learning included consideration of one's practice and the freedom to explore change in their classrooms. While some of these AR projects may not serve the wider community, as they are case specific and cannot be generalised, there were positive changes in cognition and practice. Student-teachers also gained confidence and competence in practice; an important learning outcome. Analyses of submitted AR reports can enhance understanding of what student-teachers learnt during the course. Student-teachers seemed motivated throughout the process even though they had much to learn in a short period of time and faced various challenges at their schools. Further research is needed to describe the processes of self-regulation that participants may have adopted throughout the course. Teacher learning in this study indicates the critical role of the learning environment in the PGDipEd's AR course, which may have directly led to successful AR projects. Learning activities were designed to engage the participants. Research skills were gained, and it is likely that the quality of academic supervision was also significant in mitigating cognitive disequilibrium. This study highlighted the pivotal role of research supervision. After the course is over and supervision has ended, exploring a system of mentoring after the PGDipEd can be considered for teacher continued involvement in AR.

These findings are particular to that of the IT/CS PGDipEd experience, and are helpful to course lecturers and authors of this paper. Data across year groups combined with interviews and analyses of documents, such as reflection journals and AR reports, can provide even deeper understanding of teacher learning.

### **References**

- Ali, S., Augustin, D. S., Herbert, S., James, F., Phillip, S., Rampersad, J., and Yamin-Ali, J. (2012). Is anybody listening? Stakeholders' perspectives on the in-service Diploma in Education Programme at the School of Education, The University of the West Indies, St. Augustine Campus. *Caribbean Curriculum*, 19, 171-194.
- Allwright, D. (2015). Putting 'understanding' first in practitioner research. *Teacher-Researchers in Action*, 19-36.

Vimala Judy Kamalodeen and Michele Taylor

- Bakkenes, I., Vermunt, J. D., & Wubbels, T. (2010). Teacher learning in the context of educational innovation: Learning activities and learning outcomes of experienced teachers. *Learning and Instruction, 20*(6), 533-548.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Barr, R. B., & Tagg, J. (1995). From teaching to learning—A new paradigm for undergraduate education. *Change: The Magazine of Higher Learning, 27*(6), 12-26.
- Bereiter, C. & Scardamalia, M. (2014). Knowledge building and knowledge creation: One concept, two hills to climb. In S. C. Tan, H. J. So, & J. Yeo (Eds.) *Knowledge creation in education* (pp. 35-52). Singapore: Springer.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15.
- Bryman, A. (2006). Integrating quantitative and qualitative research: how is it done? *Qualitative Research, 6*(1), 97-113.
- Burns, D. (2015). How change happens: The implications of complexity and systems thinking for action research. In H. Bradbury (Ed.) *The SAGE Handbook of Action Research* (3rd ed., pp. 434-445). London: SAGE.
- Butler-Kisber, L. (2010). *Qualitative Inquiry*. London: SAGE.
- Clayton, K., Blumberg, F., & Auld, D. P. (2010). The relationship between motivation, learning strategies and choice of environment whether traditional or including an online component. *British Journal of Educational Technology, 41*(3), 349-364.
- Cochran-Smith, M. & Lytle, S. (1999). The teacher research movement: A decade later. *Educational Researcher, 28*(7), 15-25.
- Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. Washington, DC: National Staff Development Council.
- Deci, E. L. (1980). *The psychology of self-determination*. Glencoe, IL: Free Press.

*Teacher Learning in Action Research*

- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, 38(3), 181-199.
- Feiman-Nemser, S. (2008). Teacher learning: How do teachers learn to teach. In M. Cochran-Smith (Ed.) *Handbook of research on teacher education: Enduring questions in changing contexts* (3rd ed., pp. 45-69). New York: Routledge.
- Graesser, A. C., & D'Mello, S. (2012). 5 emotions during the learning of difficult material. *Psychology of Learning and Motivation-Advances in Research and Theory*, 57, 183.
- Helm Jr, H. W., & Bailey, K. G. (2013). Perceived benefits of presenting undergraduate research at a professional conference. *North American Journal of Psychology*, 15(3), 527.
- Hien, T. T. T. (2009). Why is action research suitable for education? *VNU Journal of Science: Foreign Studies*, 25 (2), 97-106.
- Herr, K., & Anderson, G. L. (2014). *The action research dissertation: A guide for students and faculty*. (2nd ed.). Thousand Oaks, CA: SAGE.
- Hoekstra, A., & Korthagen, F. (2011). Teacher learning in a context of educational change: Informal learning versus systematically supported learning. *Journal of Teacher Education*, 62(1), 76-92.
- James, F., Phillip, S., Herbert, S., Augustin, D. S., Yamin-Ali, J., Ali, S., and Rampersad, J. (2013). Is anybody listening? Teachers' views of their in-service teacher professional development programme. *Caribbean Curriculum*, 20, 77-100.
- James, F. & Augustin, D. (2017). Improving teachers' pedagogical and instructional practice through action research: potential and problems. *Educational Action Research*, 26 (2), 1747-5074.
- Johnson, B., & Christensen, L. (2008). *Educational research: Quantitative, qualitative, and mixed approaches*. Los Angeles: SAGE.
- Kamalodeen, V. (2014). Teacher learning in an online social networking website. *Caribbean Curriculum*, 22, 133-155.

*Vimala Judy Kamalodeen and Michele Taylor*

- Kember, D. (2002). Long-term outcomes of educational action research projects. *Educational Action Research*, 10(1), 83-104.
- Kemmis, S., & McTaggart, R. (2005). Communicative action and the public sphere. In N. K. Denzin & Y. S. Lincoln. *The SAGE handbook of qualitative research* (3rd ed., pp. 559-603). Thousand Oaks, CA: SAGE.
- Kemmis, S., McTaggart, R., & Nixon, R. (2013). *The action research planner: Doing critical participatory action research*. Singapore: Springer Science & Business Media.
- Knowles, M. (1990). *The adult learner: A neglected species*. Houston, TX: Gulf Publishing.
- Knowles, M. S., Holton, E. F., & Swanson, R. A. (2005). *The adult learner* (6th ed.). Burlington, MA: Elsevier.
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs: Prentice-Hall.
- Krosnick, J. A. (2018). Questionnaire design. In D. L. Vannette & J. A. Krosnick (Eds.), *The Palgrave handbook of survey research* (pp. 439-455). Cham, Switzerland: Palgrave Macmillan.
- Kwakman, K. (2003). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education*, 19(2), 149-170.
- Malcolm, J., Hokinson, P., & Colley, H. (2003). The interrelationships between informal and formal learning. *Journal of Workplace Learning*, 15(7/8), 313-318.
- McNiff, J. (2001, January). Action research and the professional learning of teachers. [Paper presentation]. Qattan Foundation, Palestine.
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco: Jossey-Bass.
- Opfer, V. D., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research*, 81(3), 376-407.
- Patton, K., Parker, M., & Tannehill, D. (2015). Helping teachers help themselves: Professional development that makes a difference. *NASSP Bulletin*, 99(1), 26-42.

*Teacher Learning in Action Research*

- Rowell, L., & Hong, E. (2013). Academic motivation: Concepts, strategies, and counseling approaches. *Professional School Counseling, 16*(3), 158–172.
- Seider, S. N., & Lemma, P. (2004). Perceived effects of action research on teachers' professional efficacy, inquiry mindsets and the support they received while conducting projects to intervene into student learning. *Educational Action Research, 12*(2), 219-238.
- Trinidad and Tobago, Parliament. (n.d.). *The response of the Ministry of Education on the findings and recommendations contained in the 1st report of the Joint Select Committee on social services and public administration on an inquiry into the current level of violence among students in schools with particular focus on physical and cyber bullying.*
- Vermunt, J. D., & Endedijk, M. D. (2011). Patterns in teacher learning in different phases of the professional career. *Learning and Individual Differences, 21*(3), 294-302.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.
- Yamin-Ali, J. (2014). *Data driven decision-making in schools: Lessons from Trinidad*. New York: Palgrave Macmillan.
- Zeichner, K., & Conklin, H. (2008). Teacher education programs as sites for teacher preparation. In M. Cochran-Smith, S. Feiman-Nemser, J. McIntyre, & K. Demers (Eds.), *Handbook of research on teacher education: Enduring issues in changing contexts* (3rd ed., pp. 269-289). New York: Routledge.

## **IMPROVING LITERACY IN SECONDARY SCHOOL GEOGRAPHY**

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

The aim of this research was to find the extent to which the literacy levels in reading comprehension of students entering a secondary school with low levels of reading and writing, would improve through content enhancement to aid in their cognitive development. The research was conducted in a secondary school in an educational district in Trinidad and Tobago that has one of the lowest primary school performance in the country. Form 1 Geography students at the secondary school, aged 11-13, expressed frustration in understanding geographical terms and concepts, thereby preventing them becoming proficient in the subject. They felt that teachers should help them understand the complex jargon in the subject. The *Qualitative Reading Inventory-4 (QRI-4)* diagnostic test was conducted prior to the intervention, to assess literacy levels for grade levels 4-6. Results from the diagnostic test indicated that the students' literacy level was below grade 7, which is the required level for Form 1. An action research approach, using three literacy strategies, namely, the Frayer Model, Audience-Centred teaching and Learning Logs, were implemented as the intervention during and at the end of each lesson over five weeks. Numerical and non-numerical data on students' performance and attitude to reading were collected and analysed. Overall, students improved in their reading comprehension, which resulted in an elevated level of writing through Audience-Centred Teaching, advancement in vocabulary use with the Frayer model, and student self-reflection by using Learning Logs. They made connections between text in the lesson, other subjects and their real life. They were also more engaged in class as they began to read, write and construct meaning in Geography. The main implication of this study is that all teachers should consider integrating literacy strategies within their classroom practice to assist their students in becoming proficient in reading comprehension.

## **Introduction**

Conrad, Forteau-Jaikaransingh, and Popova (2013), citing Allington (2006) and Miller (1994), noted that students with reading challenges in Trinidad and Tobago, face a higher risk of reading underachievement in secondary school; especially boys who come from low-income families. They suggest that a student-centred pedagogy is needed that takes into consideration students' prior knowledge, skills, and socio-economic background to address the reading challenges. According to the Division of Educational Research and Evaluation, Ministry of Education, Trinidad and Tobago (2003), the Dream Catcher (DC) (pseudonym) Secondary School is in the second lowest of all eight educational districts in the country, reflecting one of the lowest primary school performances as measured by the mean Secondary Entrance Assessment (SEA) score (2001-2004), and the Academic Performance Index (API) for 2005-2007 (De Lisle, Smith & Jules, 2010). This poses a serious challenge for teachers to find appropriate literacy strategies for improving academic performance and developing a greater interest in academics and therefore in the Geography curriculum. As the acts of reading and writing are the bedrock of literacy, students with low levels of literacy experience difficulty in assimilating subject content and constructing meaning when learning Geography. These acts are complex and multi-dimensional. This study is important as it sought to investigate and bridge that gap between assimilating and constructing meaning.

## **Situational Context**

The Dream Catcher Secondary School is a seven-year school located in an urban area in Northeast Trinidad with a population of approximately 950 students. The ages of the students range from, 11-19 years. Many of them belong to middle-income families. Each year, the DC Secondary School admits about 220 students in Form 1, most of whom scored above 50% average at the Secondary Entrance Assessment (SEA). The staff consists of 78 teachers: 23 males and 45 females. In 2001, the Universal Secondary Education (USE) was implemented in Trinidad and Tobago and the prior Common Entrance Examination, which students wrote in order to move from primary to secondary school, was replaced with the SEA.

The primary researcher was engaged in an action research course, *The Reflective Practitioner*, which was a requirement for completing the in-service post-graduate Diploma in Education Programme of the School of Education, The UWI St Augustine Campus in 2014 -15. As such, the primary researcher, an experienced classroom teacher at the DC school, observed that the overall trend for the pass rate for Geography at the CXC, Caribbean Secondary

### *Improving Literacy in Secondary School Geography*

Education Certificate (CSEC) level had been fluctuating. The results for 2014 was one of the lowest, at 56%, with only one student attaining a Grade 1. Whilst assessing this dilemma, she realised that students' ability to verbally express themselves far exceeded their ability to write coherently, and this trend was likely to continue. With this in mind, the researcher therefore believed that improving students' writing ability should be done as early as possible, namely, within the first year of entering the school. As such, for the intervention, the researcher, a Geography teacher, selected literacy strategies suitable for a Form 1 class that she taught, in an attempt to improve the reading and writing skills of the students.

#### **The research purpose**

The research sought to determine whether low academic performance and poor attitude to content-oriented reading and writing in a Form 1 Geography class would improve through the implementation of specific literacy strategies. A Likert-scale questionnaire, on students' attitude to reading and writing in class, was administered before the intervention. It revealed that 90% of the students scored less than 50% on the test. This indicated a poor attitude to reading and writing. As such, the researcher decided to implement specific reading and writing strategies, to aid students in cognitive processing, such as the Frayer Model, Learning Logs (Billmeyer & Lee Barton, 1998), and Audience-Centred Teaching (Butt, 1998). The study aimed to show that improving literacy levels of students, through strategies for content-oriented reading and writing, can improve their expression and their attitude to reading informational text in class. It is hoped that learning Geography might be more appealing if strategies for improving literacy levels can start from as early as Form 1, and continue throughout the higher forms. The following research questions were developed to realise the research purpose.

- 1. To what extent has the implementation of specific reading and writing strategies (Frayer Model, Audience-Centred Teaching and Learning Logs) improved students' literacy levels in a Form 1 Geography Class?*
- 2. To what extent has the implementation of reading and writing strategies aided in fostering a positive attitude towards reading and writing for meaning in a Form 1 Geography class?*

#### **Review of the Literature**

Cognitive development is an area of interest found both in psychology and neuroscience, targeting children's abilities and aptitudes in relation to their learning and behaviour when compared to that of an

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

adult (Piaget, 1969). This theory of cognitive development proposed that learning is a dynamic process where learners create knowledge for themselves, but did not take into consideration the influence of the social context and interaction on learning that the constructivist view of learning promoted. According to John Dewey (1938), significant learning must incorporate an increased involvement and examination of one's thinking coupled with introspection and, as such, students should be provided with opportunities to think and articulate their thoughts.

Reading comprehension is the mental process whereby a reader constructs meaning from text. It is the process of "generating, articulating, negotiating, and revising interpretations and understandings within a community of readers" (Khezrlou, 2012, p. 83). It requires knowledge of reading strategies on the part of the learner and the teacher. O'Malley and Chamot (1990) categorised reading strategies as metacognitive, cognitive, and social/affective. They define a metacognitive learning strategy as one that 'involves thinking about or knowledge of the learning process, planning for learning, monitoring learning while it is taking place, or self-evaluation of learning after the task has been completed' (p. 231). Cognitive strategies refer to the steps or operations used in learning or problem-solving, beyond word identification. Oxford (2003) elaborated on the use of cognitive strategies by noting that "cognitive strategies enable the learner to manipulate the language material in direct ways, for example, through reasoning, analysis, note-taking, summarising, synthesising, outlining, reorganising information to develop stronger schemas (knowledge structure), practising in naturalistic setting, and practising structures and sound formally" (p.12). Reading comprehension is affected by background characteristics of the reader, the nature of the text and the ability of the teacher to apply cognitive strategies in the classroom. Lenz (n.d.) noted that the readers' prior knowledge of the topic, their desire to want to read, knowledge of language structures, how the text is structured, exposure to different genres of writing, reasoning ability, nature of engagement, and their learning style, all affect the reader's ability to comprehend text. Reading material that is organised, easy to read and suitable for their grade level can appeal to readers, whereas text that is poorly organised, complex and above or below their grade level can dissuade readers from interacting with text. Teachers can also affect reading comprehension as they play a crucial role in bridging the gap between the students and the content they have to learn. (Jordan, n.d). By the application of content enhancement devices or techniques, such as advance organisers, graphic organisers, mnemonic devices and peer-tutoring; and content enhancement routines such as comparison routine, and concept mastery routine (Sencibaugh, 2005)

### *Improving Literacy in Secondary School Geography*

and through direct, systematic instruction, teachers model the process of learning to read.

Aarnoutse and Schellings (as cited in Sahan, 2012) noted that there are eight essential strategies that promote effective reading. These are 1) determining a reading objective; activating and using one's own knowledge with regard to the content of the text; 2) drawing connections or relations between words, sentences and paragraphs, predicting information and creating representations; 3) exploring the nature and structure of different types of texts; 4) discovering the theme and the main ideas in the text along with a summary; 5) posing and answering one's own questions; 6) planning, steering, monitoring and correcting one's own reading behaviour; 7) evaluating texts for their value; and 8) reflecting on the reading activities which have been executed and their results (p. 5).

The processes of reading and writing can help to enhance learning Geography in a more productive and meaningful manner, as prior knowledge or schema and new knowledge combine to build conceptual relationships (Glynn, 1991). Although relevant prior knowledge cannot guarantee meaningful learning, activation of prior knowledge is definitely a first step of instruction and should not be left to chance. For this, advance organisers have been considered as an effective way to activate it. According to Denham (2018), advance organisers are tools used before classroom instruction, which serve as a bridge between students' prior knowledge and what they are about to learn. He went on to state that, theoretically, advance organisers help to increase retention of new knowledge and skills by identifying the most important information, showing connections between concepts, and also help to activate prior knowledge.

Two ways whereby skills necessary for literacy and studying can be attained are by direct instruction where literacy skills are taught separately from content knowledge, or by functional instructions where literacy skills are ingrained within the context. According to Vacca (2002), research conducted on functional approaches paved the way for the shift from a skills paradigm to a cognitive paradigm. This action research followed a functional approach in the cognitive paradigm, with emphasis on learning from text using various instructional strategies.

In their research on increasing reading comprehension, Guthrie et al. (2004) integrated motivational practices with cognitive practices in a 3rd-grade class. They found that when teachers used a set of instructional strategies for concept-oriented reading along with motivation-supporting practices, their students performed better in reading comprehension, and were more engaged in reading than the class without the integration. The motivation-supporting practices included hands-on activities, giving students choices, providing

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

interesting texts and allowing collaboration in reading. According to Ulusoy and Dedeoglu (2011), content area literacy assumes that all students can be taught to read and write better. The concept of content area reading and writing allows students to comprehend content material by not only reading and writing but discussing, questioning, investigating, exploring, and organising (French et al., 1989). The main idea is to use language parts effectively to maintain high-level learning (Ulusoy & Dedeoglu, 2011). Content area reading and writing includes using strategies in class that model how to think about what is read, previewing content-specific vocabulary words, and asking questions while reading, among others (McGlynn & Kelly, 2018). Thus, collaboration between content area specialists and literacy specialists is key to finding ways to support all students in the content area classroom (Brozo, Moorman, Meyer & Stewart, 2013).

Many researchers have implemented literacy strategies in content areas over the years, with varying degrees of success across age groups. In a study conducted in Karachi, Pakistan by Nasir, Naqvi and Bhamani (2013), 39 students of a 5th-grade class were given a baseline assessment to explore pre-intervention writing skills at primary level. The authors shared the view that young students were lacking writing skills and teachers did not seem to be using proper writing processes. They then implemented literacy support strategies for 8 weeks using flash cards, word bank and journals for vocabulary development, after which they administered a post-test to determine if there was improvement in writing skills. The study found that 75% of the students showed the greatest improvement in the areas of vocabulary and grammar as well as structuring. Campbell and Parke (2018) investigated 23 8th-grade students who were taught how to use paragraph writing frames over a 12-week period. At the end of the study, quantitative data gathered revealed a significant improvement in students' writing in the areas of purpose, organisation, elaboration and evidence.

Literacy strategies for content area were researched by Fisher, Frey and Williams (2002), and Ming (2012). Fisher, Frey and Williams at Hoover High School in the United States, implemented seven literacy strategies across content areas including English, Social Studies, Art, Physical Education, Music, and Shop. The strategies selected were read aloud, K-W-L charts, graphic organisers, vocabulary instruction, writing to learn, structured note taking and reciprocal teaching. This school-wide focus on content area reading and writing led to increased student achievement. Ming selected strategies to ensure authentic writing. These were response journals for students to share their thoughts and emotional reactions toward text, and learning logs to keep track of their learning. Anticipation guides were also suggested as an effective strategy to activate reading that was done independently, as pair work or in a small group setting.

### *Improving Literacy in Secondary School Geography*

Cavanagh (2005) noted that the scientist reads and writes differently when compared to a historian or mathematician. Therefore, the content area teacher needs to choose the appropriate strategy for the course material. Nevertheless, Billmeyer and Lee Barton (1998) found that there was no significant increase in academic performance despite the use of content area strategies, thereby implying no sound guarantee that the utilisation and implementation of reading and writing strategies will in fact increase academic performance.

#### **Reading strategies selected for the intervention**

Popham (2001) asks, in an era of high-stakes and high-stress testing, how do we ensure that classroom instruction does not give way to inappropriate teaching? It is common to believe that literacy instruction is solely the charge of language arts teachers. Moore, Bean, Birdyshaw, Thomas, and Rycik (1999) noted that adolescents entering the adult world in the 21st century will read and write more than at any other time in human history. Thus, literacy should be at the forefront of education. Dikmenli (2014) proposed that there are 34 new literacy fields, one of which is 'geographic literacy'. He defined geographic literacy as an approach towards events, situations and places, which requires understanding, comprehension and analytical skills. Improving comprehension skills is therefore necessary to improve geographic literacy and, as such, became the area of interest for this action research. Based on Billmeyer and Lee Barton's (1998) work, the three reading comprehension strategies for reading informational texts selected for the intervention were the Frayer model, Audience-Centred Teaching, and a learning log. The Frayer model is an essential tool for vocabulary development, which is the first strategy implemented. In Geography, it is useful for students to clarify their understanding of terms and concepts (Frayer, Frederick, & Klausmeier, 1969), hence its use in this study.

In the late 1980s, Andy Buck of the Institute of Education in London, first utilised audience-centred teaching for Geography (Butt, 1998). He investigated two groups of students, those who were assigned a task using audience-centred teaching as opposed to those who took notes. Slater (1989) using samples of the writing of Buck's students asked a group of geography educators to judge them. They found that the audience-centred pieces were more interesting whilst the note-taking pieces lacked life, were poorly structured and quite confusing. According to Butt (1993), some pre-conditions were necessary for getting students to write well. These were establishing trust between teacher and students; audience-centred writing had to be embedded in the scheme of work; and that the audience-centred writing strategies had to be plausible for students to attempt, such as card sorting. Such tasks appear to help many students pass through

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

‘intermediate’ stages of understanding towards the eventual completion of high-quality writing. Butt (1998) noted, however, that audience-centred teaching on its own could not account for improvement in writing. He suggested that further research should be done on the type of teacher support that students received. Additionally, he felt that research needed to be done to determine the extent to which class and group discussion and formative assessment could account for improvements made. The different audience-centred writing strategies, such as card sorting and writing frames, which tapped into students’ creativity, were selected as the second strategy for use in the study, through collaborative group work and individual work.

Billmeyer and Lee Barton (1998) supported the view that a learning log is a type of reflection strategy that could be used as the final strategy as it allowed students to express their feelings and observations of the strategies experienced. Learning logs help teachers to monitor students’ reading outside of class, promote reflection and provide solid foundations for student interaction, class discussion and conferencing (McLaughlin, 2010). Learning logs were therefore implemented in the study to allow students to write in a reflective manner.

### **Attitude to reading**

In their review of the literature on the link between achievement and reading, Nootens et al. (2019) found that reading has an affective component. It is related to a student’s interest, engagement, motivation, self-concept and attitude to reading. Fishbein and Ajzen (1975) defined attitude as a “learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object” (p. 6), the term object referring to either entities (people, groups) or behaviours (e.g., reading) (Ajzen & Fishbein, 2005). The goals of reading are mainly for leisure or for academic purposes as required by the teacher. Factors that influence reading habits are the reading environment, both at home and at school, and the role of the teacher who does not see reading as a feminine pursuit. Nootens et al. (2019) reviewed a study conducted in the US in 1995, which revealed that there was an overall negative trend in attitude towards reading from Grades 1 to 6, with students in Grade 6, in particular, showing indifference and negativity towards academic reading. Further research in the US (1999, 2000, 2012), Singapore (2008) and Croatia (2014) noted that a worsening of positive attitudes towards academic reading did not necessarily coincide with transitioning from primary to secondary school but rather with the onset of adolescence. This is the stage in which young people’s interests extend over a wide range of leisure activities which may see

## *Improving Literacy in Secondary School Geography*

a decline in reading both for leisure and for academic purposes. Nootens et al. (2019) found that this transition period has been under-researched; reading attitudes change when students move from primary to secondary schools, and required further research. The claim that instruction in the content areas boosts literacy achievement has been put forward for decades. Existing insights advocate that literacy in the content area stimulates interest in reading and writing, and increases students' achievement.

### **Methodology**

The design of the study utilised classroom action research. It is 'an act undertaken by teachers to enhance their own, or a colleague's, teaching to test the assumptions of educational theory in practice, or as a means of evaluating and implementing whole school priorities (Hopkins, 1993, p.1). Mertler (2016) noted that action research conducted by teachers can improve their effectiveness in studying their own classrooms with the aim of improving their practice in their particular contexts. The results of action research are neither right nor wrong. The tentative solutions are based on observations and other data collection methods. Action research requires monitoring and evaluation of the process in order to identify strengths and limitations. Conducting action research involves four steps (Mills as cited in Mertler, 2016). These are identifying an area of focus; collecting data; analysing and interpreting the data; and developing a plan of action. Although teachers may face some problems conducting action research, there is great potential to improve pedagogical practices. James and Augustin (2017) noted that if time and resources are allocated, at both the individual and institutional levels, gains in student achievement, improvement in teachers' practice and school improvement can be achieved.

#### **Reconnaissance: Surveying the landscape**

The primary researcher conducted the action research in two phases, that is, before the intervention (reconnaissance); and after the intervention (post reconnaissance). The first phase involved three aspects, namely, 1) the collection of demographic data on the students and their prior academic performance, and learning preferences; 2) the conduct of a diagnostic test to assess their reading comprehension level; and 3) the administration of the Likert Scale questionnaire on their attitude to reading.

#### **Characteristics of the target population**

The Form 1 target group was purposively selected, having been taught by the primary researcher during the previous term. The

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

class comprised 39 students (20 boys and 19 girls) between the ages of 11-13, of which 14 were age 11, 20 were age 12, and five were 13 years old. The catchment area of the students reflected rural areas and districts from the main town and its environs in northeast Trinidad. Permission was obtained to conduct the study from the students of the Form1 Geography class and their parents, colleagues, and the school's administration. Pseudonyms were used to ensure anonymity of the students. To foster collaboration, the primary researcher requested that the Head of the Modern Studies Department, Vice-Principal and other teachers who had completed their Masters in Literature and Linguistics as well as other English Language and Literature subject teachers conduct clinical supervision of the lessons when possible. The primary researcher is not a reading specialist, but was concerned enough to attend to the literacy issue by searching online for free diagnostic reading methods, given the fact that there were no funds available for the purchase of other relevant reading and writing diagnostic tests.

The 2014 SEA results for the target group indicated that the Mathematics marks ranged from 52-97% and the English A marks ranged from 52-85%, placing them in the second lowest of all eight educational districts in Trinidad and Tobago. Over 64% of this group scored less than 75% at SEA, with five students scoring the lowest marks ranging from 44-60%. The English Language Assessment (ELA), having a maximum mark of 50, highlighted that approximately 50% of the target group acquired <75% for SEA, with 10 students obtaining the lowest marks ranging from 24.4-32.6. Marks obtained from mid-term test for Term 1 for September 2014 to December 2014 revealed that three students scored above 75% whilst the remaining 36 students scored between 17-72%. The end of term marks showed that only two students scored above 75% with 37 students scoring 26-72%.

Despite the fact that 97% of the target group had access to a television, only 5% owned a computer, 3% had access to the internet, 59% had access to a Digital Versatile Disc (DVD) player and 36% owned their own cell phone. The conduct of a Visual, Aural, Read/Write and Kinesthetic (VARK) learning style test revealed that the students were multimodal. The primary researcher used this information to assess the resources needed and available to the students. This allowed her to plan lessons more effectively. The target group also comprised students who relied on government assistance, in that, over 12% of the parents/guardians received government assistance, 21% and 33% of the students received breakfast and lunch at school, respectively, and 44% relied on government transport to get to and from school on a daily basis.

### **Diagnostic test used**

*Improving Literacy in Secondary School Geography*

The primary researcher needed to assess the nature of the literacy problems to guide the selection of the reading comprehension strategies. This required the conduct of a reading diagnostic test before the intervention. Leslie and Caldwell's (2006) *Qualitative Reading Inventory-4 (QRI-4)* diagnostic test, freely available online, was used to assess students' literacy levels, using passages for Grades 4, 5 and 6. (*QRI-4*) is an informal assessment instrument for word identification, fluency and comprehension for emergent to advanced readers. Teachers were allowed to reproduce appropriate pages from Chapter 15 of this publication for classroom use. The diagnostic test which was delivered in three steps, assessed literacy levels for Grade levels 4-6. Word Lists for Grades 4, 5 and 6 were provided along with the following rubric to identify students who were at the Independent, Instructional and Frustration levels of reading. (See Table 1).

**Table 1: Rubric Used to Score Word List (word list total = 20)**

<b>LEVELS</b>		
<b>Independent</b>	<b>Instructional</b>	<b>Frustration</b>
18-20	14-17	below 14
90-100%	70-85%	below 70%

Each of the expository passages for Grades 4 to 6 asked concept questions of the students. The Grade 4 passage was on plant structure for survival, the Grade 5 passage was on farming on the Great Plains, and the Grade 6 passage was on temperature and humidity, all topics relevant to Geography. Scoring rubrics for miscues and With Look-Backs were provided for the teacher for each passage.

The first step of the diagnostic test implemented was the use of word lists from grades 3 to 6. Each of the *QRI-4* word lists contained 20 words selected from passages at the same level of readability, and were designed to assess accuracy of Word Identification (WI), speed and automaticity of WI, and to determine the starting point for reading the initial passage. Table 1 shows the scoring rubric for the word list for each level.

The second step involved an Oral Reading Miscue Analysis. There are three types of miscues made while reading orally: whole-word substitutions, such as "tried" for "trade"; non-word substitutions, such as "trad" for "trade"; and omissions and insertions of words. By counting all miscues, the independent, instructional and frustration levels were obtained for each student. The total accuracy method was applied where the number of miscues were subtracted from the number of words in the passage and then a percent was derived, for example,

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

the passage “a trip” has 119 words, a student made 8 total miscues:  $119 - 8 = 111$ ;  $111 \div 119 = .93$ ;  $.93 \times 100 = 93\%$ .

The third step involved Assessment of Comprehension through Look-Backs. After asking the student to answer questions through writing, the researcher asked the student to look back in the text to locate answers to missed questions and/or to find answers to incorrect responses. Results from the diagnostic test administered for Comprehension through Look-Backs suggested that their level of literacy was below Grade 7, the required level for Form 1, as the students’ readability level ranged from Grades 4 to 5.

The diagnostic tests showed that, from the word lists administered in the first step, 80% of the students were in the Independent Level for Grade 3 whereas the 20% were in the Instructional Level indicating that students’ literacy levels were adequate for this Grade. However, at Grade 4, 28% of the students were at the Independent Level and 56% at the Instructional Level. Frustration Level increased from 15% at Grade 4 to 62% in Grade 6 (see Table 2). Table 2 shows the results of the students’ performance from the word lists based on the diagnostic tests, before the intervention. This indicated that the intervention could be conducted from the Grade 4 level since no one was at the Frustration Level in Grade 3.

**Table2: Before the Intervention: Students’ Performance From the Word Lists for Each Level**

Grade Level	Independent Level	Instructional Level	Frustration Level
Grade 3	80%	20%	0%
Grade 4	28%	56%	15%
Grade 5	10%	51%	38%
Grade 6	5%	33%	62%

For the Oral Reading Miscues in the second step, the rubric used to assess miscues for passages (see Table 3) and the students’ performance oral reading miscues analysis (see Table 4) show that as the Independent Level decreased, Frustration Level increased.

**Table 3: Rubric Used to Assess Reading Miscues for Passages Read**

Independent Level	Instructional Level	Frustration Level
98% Accuracy	90% to 97% Accuracy	less than 90% Accuracy

**Table4: Before the intervention: Students’ % Accuracy for the Oral Reading Miscue Analysis**

Grade Level	Independent Level	Instructional Level	Frustration Level
Grade 4	8%	79%	13%

### *Improving Literacy in Secondary School Geography*

Grade 5	3%	59%	38%
Grade 6	0%	23%	77%

For assessing Comprehension through Look-Backs in the third step, after asking the student to answer questions through writing, the researcher asked the student to look back in the text to locate answers to missed questions and/or to find answers to incorrect responses. If they got eight answers correct, they were at the Independent Level; at the Instructional Level with six-seven answers correct; and at the Frustration Level with less than five answers correct.

**Table 5: Before the intervention: Students' performance of Comprehension through Look-Backs**

Grade Level	Independent Level	Instructional Level	Frustration Level
Grade 4	8%	79%	13%
Grade 5	3%	59%	38%
Grade 6	0%	23%	77%

The assessment of Comprehension through Look-Backs showed that as the Grade Level increased so did the Frustration Level (see Table 5).

#### **The Attitude Test**

The attitude test consisted of seven questions designed to capture students' attitude to reading for enjoyment (two questions), and for capturing their experiences of academic reading in the classroom (five questions), providing the researcher with insight into their self-esteem as readers. A 5-point Likert Scale questionnaire, with options ranging from strongly agree to neutral to strongly disagree, had been previously created and tested in a similar classroom action research conducted by a colleague of the primary researcher (unpublished Diploma in Education Action Research, 2011). It was administered before the reading intervention strategies to assess the students' reading attitude, which can be seen as their attitude upon leaving primary school, and later administered after the intervention to capture their attitude to reading as students in their first year of secondary school. Their responses were scored numerically, and analysed using descriptive statistics.

#### **Reconnaissance: Planning for the intervention**

For the second aspect of the reconnaissance phase of the research, that is, planning for the intervention, the Theme, "The World Around Us" was selected. It encapsulated both the Natural and Human systems of Geography as outlined in the revised version of the Form 1 SocialStudies Curriculum of the Ministry of Education. The unit of

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

lessons prepared by the teacher began from a Grade 4 to Grade 6 to facilitate scaffolding. A textbook at the readability level of Grades 4 to 5 was used for content for lessons one, four and five and the content derived from the various websites was obtained for the appropriate grade level.

Based on the literature reviewed, three specific reading and writing strategies were used to develop reading comprehension. These strategies were the Frayer Model, Audience-Centred Teaching, and Learning Logs. The Frayer model (1969) was a strategy used to aid in vocabulary development and understanding concepts. Audience-centred teaching aimed at involving children in writing to, or for, audiences different from the ones they would normally encounter in the geography classroom, that is transactional or academic writing, usually required by the teacher. Butt (1998) suggested that the effectiveness of audience-centred teaching may be increased by using a range of 'intermediate' teaching strategies by structuring and prioritizing tasks. For example, before students attempt extended writing strategies, activities such as card sorting and writing frames, are encouraged as well as the use of different genres of writing.

Learning Logs allow reflection on either text content or on students' reading and learning processes. Students may reflect on how they feel, but it is always in relation to what is being learnt in the classroom (Billmeyer & Lee Barton, 1998). Therefore, they were allowed five minutes to process their thoughts and five minutes to write their views, during each lesson. Comparison of scores was made between those of lesson one to the final lesson for each of the three reading comprehension strategies that used Word Identification, Oral Reading Miscue Analysis, and Assessment of Comprehension through Look-Backs.

### **Post Reconnaissance: Applying the Intervention**

After the results of the diagnostic tests were analysed, data collection instruments were designed to answer the research questions. As research question one focused on students' academic performance, data was derived through scores from each of the reading and writing exercises for each lesson, and analysed with descriptive statistics.

For research question two that focused on students' attitude to the strategies used and overall attitude to reading and comprehension, both numerical and non-numerical data were collected. Scores for the attitude test were analysed using descriptive statistics. Non-numerical data included teacher's journals to track students' behaviour and performance, and students' learning logs collected after each lesson. They were analysed for significant trends by coding and analysis of text to arrive at themes. A teacher-made checklist was used to track students' performance and behaviour during the intervention. In

### *Improving Literacy in Secondary School Geography*

addition, each lesson was video-taped and analysed within one day of recording to capture students' responses to the reading strategies. Data recorded in tables and graphs displayed trends in students' performance. The collection of non-numerical and numerical data before and after the intervention ensured trustworthiness of the study.

#### **Implementation**

Eight lessons, over five weeks, were taught during double periods (for a total of 560 minutes) from 12<sup>th</sup> January 2015 to 13<sup>th</sup> February 2015. The lessons based on the unit of "The World Around Us" dealt with the spatial variations of the world in relation to international, regional and local scales. The students had never been taught the concepts before. The attributes of the Frayer Model were explained to the students. The teacher incorporated the reading and writing strategies of the Frayer Model, Audience-Centred Teaching and Learning Logs in each lesson. The Frayer Model was used throughout the entire intervention to facilitate vocabulary development, which constitutes the first strategy in reading comprehension. This strategy aligned with the word list aspect of the diagnostic test. Using the Frayer Model, students analysed a word or concept by defining it and listing its characteristics. They also refined their understanding by choosing examples and non-examples of the concept because in order to understand completely what a concept was; one needed to know what it was not. The model completed in the first lesson comprised words and phrases as answers, but as the intervention continued, the answers consisted of sentences. Information on the use of the Frayer Model was obtained from teacher-led discussions, teacher-made hand-outs, students' responses and the dictionary. Students were allowed to work individually, in pairs, and in groups to complete the model.

The Audience-Centred Teaching method was chosen to improve the writing skills of the students. The lessons were scaffolded by using a range of 'intermediate' teaching strategies for structuring and prioritising tasks in such a way that the students worked in pairs, in groups for the first few lessons, then individually for the last three lessons, using a variety of genre writing (see Table 6).

**Table 6: Audience-Centred Teaching Strategies Implemented for Lessons 1 to 8**

<b>Lesson #</b>	<b>Audience-Centred Teaching Strategies in each Lesson</b>
1	Genre Writing - Expository Writing – Creation of a Poster (Group Work)
2	Writing Frames used to create a song (Group Work)
3	Writing Frames used to create Paragraphs (Individual Writing)
4	1. Card Sorting Activity (Individual activity)

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

	2. Genre Writing-Persuasive Writing (Advertisement Poster) (Group Work)
5	Genre Writing- Expository Writing- Poster (think-pair-share)
6	Writing Frames for Paragraphs to compare and contrast (Individual Writing)
7	Genre Writing – Poetry Writing (Individual Writing)
8	Genre Writing- Descriptive Writing (Individual writing)

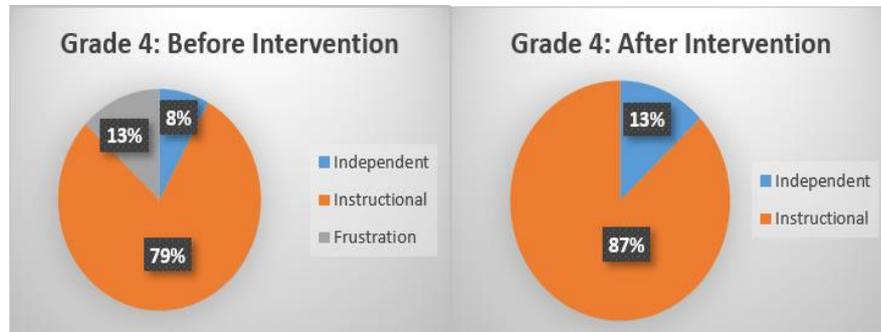
Informational text prepared by the teacher consisted of lessons with increasing readability levels. Informational text for lessons 7 and 8 extracted from the text possessed a readability level at Grade 6 to facilitate scaffolding. Each lesson was monitored by the teacher. Tracking of students during the intervention enabled the researcher to determine a change in attitude towards reading and writing in Geography. Teacher journals and learning logs were considered essential to determine if changes in attitude towards meaningful reading and writing did transpire. The teacher prepared a post-test at a readability level of Grade 6. This was in the form of a written test with five questions aimed at assessing content delivered during the intervention. It emphasised the cognitive domains since the study focused on the teaching of reading and writing. All the passages administered for Grades 4-6 (pre-diagnostic) were re-administered at the end of the intervention (post-diagnostic).

### **Summary of Findings**

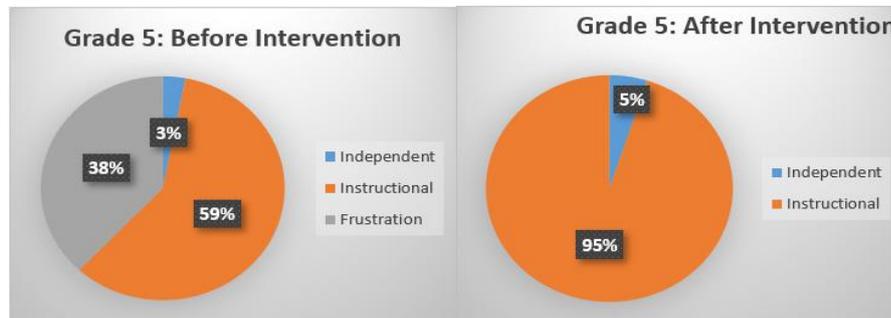
#### **Research Question 1: To What Extent has the Implementation of Specific Reading and Writing Strategies (Fraye Model, Audience-Centred Teaching and Learning Logs) Improved Student Literacy Levels in a Form 1 Geography Class?**

The Frayer Model, which helped develop vocabulary and jargon relevant to Geography, was incorporated into all lessons and assessments, and therefore was not analysed separately. Figures 1 to 3 show the results of the implementation of the Oral Reading Miscue Analysis before and after the intervention using the reading and writing strategies for Grades 4, 5 and 6. Of particular interest is that for Grade 6, the students' Frustration Levels decreased from 77% to 3% and their Instructional Level increased from 23% to 97% after the intervention (see Figure 3).

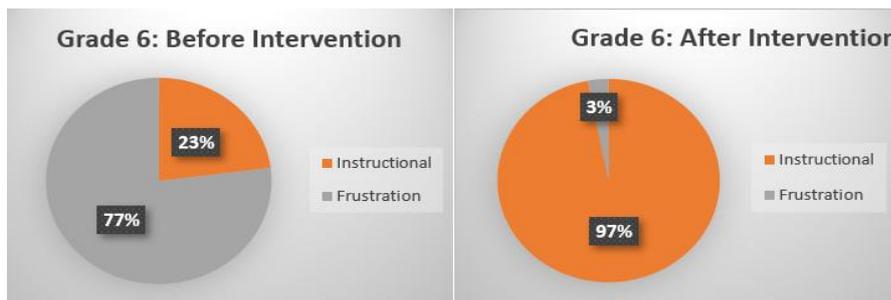
*Improving Literacy in Secondary School Geography*



*Figure 1.* Accuracy Level for Oral Reading Miscues before and after intervention for Grade 4 passage



*Figure 2:* Accuracy Level for Oral Reading Miscues before and after intervention for Grade 5 passage



*Figure3:* Accuracy Level for Oral Reading Miscues before and after intervention for Grade 6 passage

The mean score for accuracy levels for the Oral Reading Miscues increased at each level after the intervention. For Grade 4 level, the mean score increased from 93% to 95%, for Grade 5,

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

students' marks increased from 90% to 94%, and for Grade 6, students' marks increased from 88% to 93% thereby increasing accuracy levels in their reading. Scores obtained from this intervention suggest that there was an increase in academic performance.

The diagnostic tests administered for writing involved Comprehension with Look-Backs. This strategy also appeared to increase performance in literacy. Writing scores revealed that after the intervention at Grade 4, 100% of the students were at the Independent and Instructional Levels, at Grade 5, 33 % were at the Independent Level, 62% at the Instructional Level, and 5% at the Frustration Level. Grade 6 results showed that 23% were at the Independent Level, 69% at the Instructional Level and 8% at the Frustration Level. Even though students remained at the Frustration Level for Grades 5 and 6, there was an increase in marks for these students. This increase was probably due to the change in teaching strategies, which may be more suitable to the multi-modal learning preferences of these students.

The scores derived for Comprehension with Look-Backs showed an increase for all the Grade levels after the intervention. The mean score for Grade 4 level increased from 5.6 to 7.2 (maximum mark being 8 for all levels), for Grade 5 from 4.6 to 7.1 and for Grade 6 from 4.2 to 6.7 (see Table 7). In all Grades, the standard deviation was smaller after the intervention than before, indicating that many students were becoming more competent in writing.

**Table 7: Results Derived from Comprehension with Look Backs for Writing Assessment(Maximum score of 8)**

Calculations	Grade 4		Grade 5		Grade 6	
	Before	After	Before	After	Before	After
Mean	5.6	7.2	4.6	7.1	4.2	6.7
Mode	6	8	4	7	5	7
Median	6	7	4	7	4	7
Range	2-8	6-8	3-7	5-8	2-6	5-8
Standard Deviation	1.069	0.767	1.208	0.857	1.167	0.910

Results for the Audience-Centred Teaching strategy were positive. This strategy was chosen to improve the writing skills of the students, and followed a scaffolding technique where students moved from paragraph writing to essay writing. Marked improvement for writing was observed after lesson #3, and from lessons #4 to lesson #8 there was a progressive increase in writing skills (see Table 8).

**Table 8: Students' Performance for the Audience-Centred Teaching strategy**

*Improving Literacy in Secondary School Geography*

Lesson #	Audience-Centred Teaching Strategy used for each lesson	N (number of groups or students present for strategy)	Mean score (%)	Range (%)
1	Genre Writing - Expository Writing – Creation of a Poster (Group Work)	13	91.0	25-100
2	Writing Frames used to create a song (Group Work)	6	58.7	42-77
3	Writing Frames used to create Paragraphs (Individual Writing)	39	47.8	10-80
4	1. Card Sorting Activity (Individual)	39	97.9	86.7-100
	2. Genre Writing- Persuasive Writing (Advertisement Poster) (Group Work)	6	88.3	80-100
5	Genre Writing- Expository Writing- Poster (think-pair-share)	19	91.8	75-100
6	Writing Frames for Paragraphs to compare and contrast (Individual Writing)	39	85.4	83.3-100
7	Genre Writing – Poetry Writing (Individual Writing)	39	93.3	83.3-100
8	Genre Writing- Descriptive Writing	39	94.6	87.5-100

At the end of the intervention, notable observations were made. Scores improved from lesson #1 in which six students out of the class of 39 students obtained 19%, 24 students obtained 38% and nine students obtained 56%; whilst for lesson #8, six students obtained 88%, 22 students obtained 94%, and 11 students obtained 100%. A post-test was given at the end of the intervention based on definitions, using the Frayer Model, concept maps paralleling audience-centred writing, and spatial location in keeping with Geography content. The results showed that four students scored 100%, 32 students scored between 90-99% and three students scored 89%.

**Research question 2: To What Extent Will the Implementation of Reading and Writing Strategies aid in Fostering a Positive Attitude Towards Reading and Writing for Meaning in a Form 1 Geography Class?**

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

Results were analysed from the attitude test, students' written reflections through the learning logs administered, and teacher observations at the end of each class. The results of the attitude test before and after the intervention (see Table 9) show a positive change for most students in attitude to reading for enjoyment, and for academic purposes, where the mean, median and modal scores all increased. The increase in the standard deviation values, however, showed that there were some (three) students who scored low on the attitude test, thus accounting for the higher value after the intervention. For those students, reading may still be seen as a challenge.

**Table 9: Results of the Attitude test**

	<b>Total score</b>	<b>Mean</b>	<b>Median</b>	<b>Mode</b>	<b>Std Deviation</b>
<b>Before</b>	35	17.01	17	16	3.7
<b>After</b>	35	27.4	27	23	5.2

Students' written reflections indicated evidence of the schema theory as students made connections with the text in the lesson to other classes, and even to their real life (see Table 10). The intervention seemed to have had an impact on their understanding as one student stated that '*I wrote a song for the first time*'. There was an increase in the level of motivation since the majority of students wrote that they were '*more interested in the topic*', as lessons proceeded, not having done it before. The phrase, '*made me better*' suggested that the change of teaching strategies stimulated interest and encouraged students to work harder. Working in pairs and in groups appeared to have fostered cooperation. During the early phase of the intervention, the majority of students did not write much content in their learning log, but as the study progressed, there was an increase in the number of words and the quality of content in the learning logs. This indicated that students began to read, write and construct meaning in Geography.

**Table 10: Themes from students' learning logs**

<b>Themes</b>	<b>Words/phrases</b>	<b>Conclusion</b>
1. Instructional strategy	Enjoyed learning today Enjoyed working with others	Students seemed to enjoy and embrace this method of teaching
2. Assessment	Rubric helped me understand what to write	Students grasped the idea of what is required when being tested.
3. Students' understanding	Wrote a song for the first time Helped me to write poetry better	The reading strategies were generally effective and facilitated a better understanding of concepts.
4. Student engagement and involvement	Made me better	The change of teaching strategies stimulated interest and encouraged students to work harder.
5. Schema	Text to text: Reminds me of English class Text to self: Topic (Borders and Boundaries) reminded me of my trip to the United States	The implementation of the reading strategies allowed the students to use their prior knowledge. Reading and writing comprehension skills were being developed.

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

6. Motivation to read	More interested in topic	Students displayed willingness to read and write more, impacting on a positive attitude.
7. Cooperation among students	Appreciated working with others	Students working in groups and pairs presented the opportunity for students to receive and respond to ideas in a positive and harmonious way

As the intervention proceeded, the students became more participative, committed and enthusiastic. Audience-Centred Teaching promoted a level of independence and understanding among the students as they appeared to enjoy the opportunity to work on their own or with others of their choosing. Students' use of handouts, the notes they produced from discussions and the dictionary indicated that they completed the Frayer Model at an increasing level of detail for definitions, descriptions and examples.

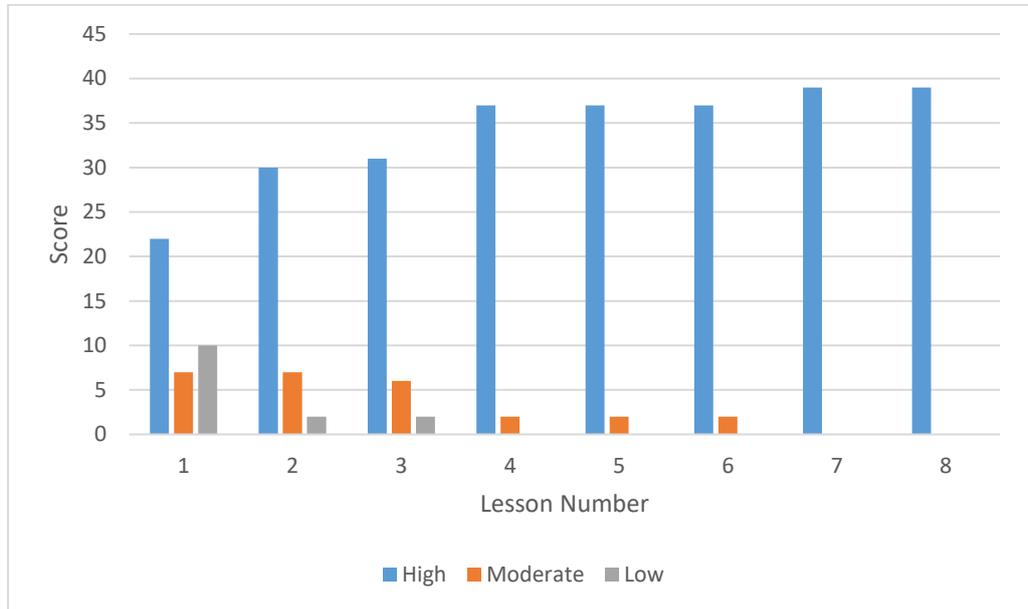
Phrases extracted from the teacher's journal, and observations, indicated that there was a positive change in the students' attitude towards reading and writing. By lesson 5, the teacher researcher made the following observation:

*I am hearing fewer questions as well as students are less reluctant to approach the techniques implemented in the study. This leads me to believe that students' confidence has increased and they are reaching a level of self-instruction. Students seemed to be quite enthusiastic and willing to contribute to class activities more readily.*

By the end of lesson 8, the teacher observed:

*It is truly a joy to see my students reach a different and new level. They display a higher level of maturity and self-instructed learning. It is really amazing to see these students use their Atlas on their own, to listen to meaningful discussions without much teacher guidance, question what they are receiving and probe more into the 'why' aspects of their learning. The higher order thinking was truly untapped and even the discipline level has increased as students appear to be more settled and focused.*

The teacher observation checklist looked at students' level of participation, and response to oral questions, and willingness to present work in class. Results from the analysis of the videos of each lesson, are shown in Figures 4 to 6.



**Figure 4: Level of students' participation throughout the intervention**

Note: High level: students participated in all activities; Moderate level: students participated in some activities; Low level: students participated in few or no activities.

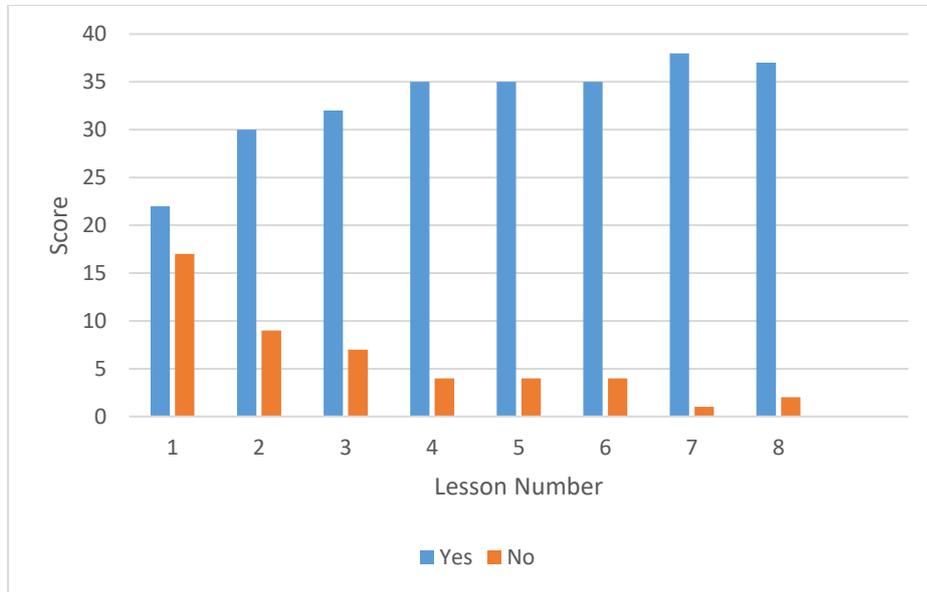


**Figure 5: Response to oral questions throughout the intervention**

Note: Excellent: Student answered 9-10 times; Very good: Student answered 7-8 times; Good: Student answered 5-6 times; Fair: Student answered 3-4

### *Improving Literacy in Secondary School Geography*

times; Poor: Student answered 0-2 times (done by taking a sample of students during each lesson).



**Figure6: Students' willingness to present work to class throughout the intervention**

Note: 'Willingness': Eagerness to complete tasks and present work in a given time taken from a sample of those who voluntarily responded; 'No': No work submitted during that time.

The findings obtained from this study suggest that there was a general improvement in the students' academic performance and a positive attitude towards reading for meaning in Geography.

### **Discussion**

This classroom action research began with the idea that all students can learn to read and write better. Graphic organisers, vocabulary instruction, and writing to learn were some of the literacy strategies that Fisher et al. (2002) used in the Social Studies content area. These were incorporated in this present study through selected strategies for reading and writing, namely, the Frayer Model, Audience-Centred Teaching and Learning Logs in a Form 1 Geography class. Overall, these appeared to have had a positive impact on the students' academic performance. Through these strategies, most students were able to relate better to the content area of Geography as they were encouraged to question, explore, investigate, discuss and organise before writing, an approach that promoted high-level learning (Ulusoy & Dedeoglu, 2011). French et al. (1989) and Guthrie et al. (2004) suggested that

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

when teachers integrated literacy instruction in the content areas and students are given more opportunities to read and write, the result was an escalation in conceptual knowledge, reading comprehension and problem-solving skills thereby elevating academic performance.

From the diagnostic tests for Grades 4-6, progress was recognised in the three phases of cognitive development. This included an elevated level of writing from the usage of Audience-Centred Teaching, advancement in vocabulary use supported by the introduction of the Frayer Model and reflection by using a learning log at the end of each lesson. Billmeyer and Lee Barton (1997) argued that literacy in the content areas does not guarantee an increased performance. However, even though some students remained at the Frustration Level, findings from this classroom action research showed the opposite with 100% of the students showing gradual improvements in both reading and writing from Grade 4 to Grade 6. However, for the student who remained at the Frustration Level for the Oral Reading Miscue Analysis, the selected cognitive strategies may have impeded the student's understanding of the text and also may not have been suitable to that student's learning preference.

Audience-Centred Teaching exposed students to a variety of writing genres from poem and poster creation to expository writing. This gave students the opportunity to develop their comprehension and analytical skills, building their geographic literacy skills, one of 34 literacy skills proposed by Dikmenli (2014). Students' mean scores produced from writing frames that were done individually by students in lessons #3 and #6 were 47.8% and 85.4%, respectively. This increase in mean scores were similar to findings of Campbell and Parke (2018) who found that there was significant improvement by 8th-Grade students who used writing frames. Their study, however, was conducted over 12 weeks as opposed to five weeks in this study. Card sorting, as part of the Audience-Centred Teaching as suggested by Butt (1998), was well-received as the mean score for this activity was 98%. This suggests that the scaffolding of strategies in Audience-Centred Teaching appeared to build students' confidence to move onto more demanding reading and writing tasks.

The use of the Learning Logs gave students the opportunity to engage in authentic writing as they shared their thoughts and emotional reactions to texts and to keep track of their learning, similar to Dewey's (1938) observation that introspection was needed for significant learning and Ming's (2012) study for content areas of Art, Mathematics, Music and Physical Education. In this way, the primary researcher was able to assess their reactions to the strategies and gain insights into their attitude to reading and writing. Learning Logs also helped the teacher monitor students' reading outside class, where they were able to make links with other subjects, a finding similar to that of McLaughlin (2010). In addition, the comments from the students'

### *Improving Literacy in Secondary School Geography*

Learning Logs suggest that they were on their way to becoming effective readers, through reflection on their work, as suggested by Aarnoutse and Schellings (as cited in Sahan, 2012).

With respect to changing their attitude to reading and writing, the students' responses through their reflections and the attitude test showed that there was an overall positive attitude to reading and writing in the content area of Geography, as they improved in their Oral Miscues, and Comprehension through Look-Backs. These results align with Johnson and Giorgis (2001), who suggest that reading and writing in the content areas motivate students to read and write. According to Slavin (2006), learners must individually discover and transform complex information if they are to make it on their own. In this study, students were given the chance to work individually but only after they developed the confidence by working in groups. Accessing prior knowledge in each lesson encouraged students to respond to assignments, leading to improvement in their scores, a finding reached by Glynn (1991), who noted that learning was enhanced by building conceptual relationships onto existing schema.

The advance organisers used in each lesson consisted of many geographical examples, and images that may have contributed to the improved results. This finding reflects those of Park (2005), who found that use of visual imagery contributed to improved reading and writing. Content enhancement techniques such as advance organisers, graphic organisers (the Frayer Model) and peer-tutoring appeared to aid in the students' ability to comprehend text as suggested by Sencibaugh (2005). Combining instructional strategies in the content area through the use of the Frayer Model, Audience-Centred Teaching, and Learning Logs may have led to the improved performance of the students. This is in keeping with the findings of Guthrie et al. (2004) for improving reading in the content area. The exposure to creative writing skills through the use of different writing genres appeared to improve students' writing skills. These results were similar to the findings of Nasir et al. (2013) where creative writing led to improvement in vocabulary and grammar and better structure to students' writing.

### **Implications of study**

The positive results of this study conducted over five weeks suggest that there is merit in integrating literacy strategies in content areas other than Language Arts. The findings suggest that the study should be a longitudinal one, for example, following this same Form 1 up to Form 5 to see if the improvement in reading and writing can be sustained or improved in the teaching of Geography. In this way, there could be improved academic performance in Geography at the CSEC

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

level, the concern that drove this study. Other strategies can also be integrated to suit the level of cognitive and emotional development of the students. In order to improve overall student academic performance at the CSEC level, there should be a whole school approach in all subject areas to integrate similar literacy strategies in all Forms starting in Form 1, as literacy skills in one subject can be transferred to other subject areas. The study could be extended to assess the literacy levels of household members of the students with the aim of creating better support in the home environment for the student, and so foster a better home-school relationship.

As Brozo et al. (2013) suggested, collaboration between content area specialists and literacy specialists is key to finding ways to support all students in the content area classroom and, in the absence of a literacy specialist, the teacher as researcher in classroom action research can fill that gap. The use of a diagnostic test provided an objective way to determine the nature of students' reading issues rather than guesswork on the part of the teacher, and in this way, the reading comprehension strategies could be targeted to specific reading challenges they face, making teaching effective. Nootens et al. (2019) concluded in their literature review of literacy challenges in schools that there is a worsening in attitude to reading as an adolescent gets older, given their widening range of interests in schools. As such, classroom action research could provide further insights into this apparent trend. This action research provided an overview of useful cognitive strategies, such as reading comprehension, organising lesson plans, resources and assessment instruments, for the classroom teacher, who might not be a reading specialist, to implement. The acts of reading and writing are the foundation of literacy, which are the key elements for students' growth. It is vital for both the academic and emotional well-being of the student and is a core ingredient in the crafting of a holistic child.

### **Recommendations**

Diagnostic tests should be conducted to get a more accurate assessment of the nature of students' reading comprehension challenge, and for selecting relevant literacy strategies to meet those challenges. Opportunities should be given to teacher-researchers to conduct classroom action research regularly and to share their findings, with the aim of critiquing the methodology for other teachers. In order for validity and reliability to be maintained, the study should be conducted over a longer period. A longitudinal study should be conducted with the students from Form 1 to Form 5 to see the extent to which the reading comprehension strategies improved their academic performance, and to what extent use of these strategies could reverse a possible decline in a positive reading attitude. A wider range

### *Improving Literacy in Secondary School Geography*

of strategies should be explored to suit the nature of the students as they progress through their years at the school. Other teachers should be encouraged to implement these or similar strategies in other classes to arrive at best teacher practices. In the absence of a literacy specialist, all teachers with an interest in teaching reading in the content area should be encouraged to collaborate with other colleagues in Geography and other subject areas and share their findings to improve literacy in all classrooms.

### **Conclusion**

Three specific reading and writing strategies of the Frayer Model, Audience-Centred Teaching and Learning Logs were implemented in this action research to improve literacy in Geography. Literature based on these strategies, and the results derived, suggest that the intervention may have had a positive impact on the cognitive development of the students. The findings obtained from this action research imply that there was a general improvement in the students' academic performance and a positive attitude towards reading for meaning in Geography. As the sample size is relatively small, and as the duration of the action research was short, no significant generalisation can be made from the results. This research was carried out only in one group in one school by the primary researcher, a classroom teacher. While the size of the study may not allow for generalisations beyond the research site, the results of the study, can provide a stimulus for other teachers to conduct similar research to attend to the issue of low levels of literacy in secondary schools, taking into consideration contextual differences in academic levels, setting, population, teaching staff, and resources.

## References

- Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The Handbook of Attitudes* (pp.173–221). Mahwah, NJ: Erlbaum.
- Barton, M. (1997). Addressing the literacy crisis: Teaching reading in the content areas. *National Association of Secondary School Principals (NASSE) Bulletin*, 81, 22-30.
- Billmeyer, R., & Lee Barton, M. (1998). *Teaching reading in the content areas* (2nd ed.). Dever, CO: McREL.
- Brozo, W. G., Moorman, G., Meyer, C., & Stewart, T. (2013). Content area reading and disciplinary literacy: A case for the radical centre. *Journal of Adolescent & Adult Literacy*, 56(5), 353-357.
- Butt, G. (1993). The effects of audience-centred teaching on children's writing in geography. *International Research in Geographical & Environmental Education*, 2(1), 11-24.
- Butt, G. (1998). Increasing the effectiveness of 'Audience-centred' teaching in geography. *International Research in Geographical & Environmental Education* 7(3), 203-218.
- Campbell, Y., & Parke, N. (2018). Using paragraph frames to scaffold the text-based argumentative writing experiences of low-performing eighth-grade students. Retrieved from [https://www.researchgate.net/publication/323627489\\_using\\_paragraph\\_frames\\_to\\_scaffold\\_the\\_text-based\\_argumentative\\_writing\\_experiences\\_of\\_low-performing\\_eighth-grade\\_students](https://www.researchgate.net/publication/323627489_using_paragraph_frames_to_scaffold_the_text-based_argumentative_writing_experiences_of_low-performing_eighth-grade_students)
- Cavanagh, S. (2005). Cross-curricular standards issued for reading coaches. *Education Week*, 25(11), 10.
- Conrad, D., A., Forteau-Jaikaransingh, B., & Popova, D. (2013). Poetry to rapso: Localized narrative in the classroom. *Caribbean Curriculum*, 20, 1–29

*Improving Literacy in Secondary School Geography*

- De Lisle, J., Smith, P., & Jules, V. (2010). Evaluating the geography of gendered achievement using large-scale assessment data from the primary school system of the Republic of Trinidad and Tobago. *International Journal of Educational Development*, 30(4), 405-417.
- Denham, A. R. (2018). Using a digital game as an advance organizer. *Educational Technology Research and Development*, 66(1), 1-24.
- Dewey, J. (1938). *Experience & Education*. New York: Collier Books.
- Dikmenli, Y. (2014). Geographic literacy perception scale (GLPS) validity and reliability study. *Mevlana International Journal of Education (MIJE)*, 4(1), 1-15
- Division of Educational Research and Evaluation. (August, 2003). *Evaluation Report*. Port-of-Spain: Trinidad & Tobago: Ministry of Education.
- Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley
- Fisher, D., Frey, N., & Williams, D. (2002). Seven literacy strategies that work. *Educational Leadership*. Retrieved from <https://web-a-ebSCOhost-com.ezproxygateway.sastudents.uwi.tt/ehost/pdfviewer/pdfviewer?vid=1&sid=ffee1b24-26ba-4ccb-be91-95451d8ddeb%40sessionmgr4008>
- Freyer, D., Frederick, W.C., & Klausmeier, H.J. (1969). *A schema for testing the level of cognitive mastery*. Madison, WI: Wisconsin Centre for Education.
- French, M., Danielson, K., Conn, M., Gale, W., Lueck, C., & Manley, M. (1989). Reading and writing in content areas. *The Reading Teacher*, 43(3), 266-266. Retrieved from <http://www.jstor.org.ezproxy.sastudents.uwi.tt:2048/stable/20200355>

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

- Guthrie, J.T., Wigfield, A., Barbosa, P., Perencevich, K.C., Taboada, A., & Davis, M.H. (2004). Increasing reading comprehension and engagement through concept-oriented reading instruction. *Journal of Educational Psychology*, 96, 403-423.
- Glynn, S. Y. (1991). *A constructive view of learning science*. Hillsdale, NJ: Erlbaum.
- Hopkins, D. (1993). *A teacher's guide to classroom research*. Milton Keynes: Open University Press.
- James, F., & Augustin, D.S. (2017). Improving teachers' pedagogical and instructional practice through action research: Potential and problems. *Educational Action Research*.doi: 10.1080/09650792.2017.1332655
- Johnson, N. & Giorgis, C. (2001). Children's books: Interacting with the curriculum. *The Reading Teacher*, 55(2), 204-213.
- Jordan,L.(n.d.).Cognitivestrategies. Retrieved from [http://www.specialconnections.ku.edu/~kucl/cgi-bin/drupal/?q=instruction/cognitive\\_strategies](http://www.specialconnections.ku.edu/~kucl/cgi-bin/drupal/?q=instruction/cognitive_strategies)
- Khezrlou, S. (2012). Cognitive strategy training: Improving reading comprehension in the language classroom. *The Journal of Teaching Language Skills*,3(4), 77-98.
- Leslie, L.,& Caldwell, J. S. (2006). *Qualitative reading inventory-4*. New York: Pearson Education.
- Lenz, K, (n.d.). *Reading comprehension*. Retrieved from [https://specialconnections.ku.edu/~kucl/cgi-bin/drupal/?q=instruction/reading\\_comprehension](https://specialconnections.ku.edu/~kucl/cgi-bin/drupal/?q=instruction/reading_comprehension)
- McGlynn, K., & Kelly, J. (2018). Demystifying reading in the science classroom.*Science Scope*,42(3), 14-21. Retrieved from <https://search-proquest-com.ezproxy.sastudents.uwi.tt/docview/2113235727?accountid=45039>

*Improving Literacy in Secondary School Geography*

- McLaughlin, M. (2010). *Content area literacy: Teaching and learning in an age of multiple literacies*. Boston, MA: Pearson.
- Mertler, C. A. (2016). *Action research: Improving school and empowering educators*. (5<sup>th</sup>ed.) Thousand Oaks, CA: Sage.
- Ming, K. (2012). Content-area literacy strategies for art, mathematics, music, and physical education. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 85(6), 213-220.
- Moore, D., W., Bean, J. A., Thomas, W.; Birdyshaw, D., & Rycik, J.A. (1999). *Adolescent literacy: A position paper for the Commission on Adolescent Literacy Association*. Newark, NJ: International Reading Association.
- Nasir, L., Naqvi, S.M., & Bhamani, S. (2013). Enhancing students creative writing skill- An action research project. *Acta Didactica Napocensia*, 6(2), 27-32.
- Nootens P., Morin, M-F., Alamargot, D., Gonçalves C., Venet, M., & Labrecque, A-M. (2019). Differences in attitudes toward reading: A survey of pupils in grades 5 to 8. *Frontiers in Psychology*, 9, (2773). doi: 10.3389/fpsyg.2018.02773.
- O'Malley, J. M. & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. Cambridge: Cambridge University Press.
- Oxford, L. R. (2003). Language, learning style and strategies: An overview. *Oxford, GALA*, 12. Retrieved from <http://web.ntpu.edu.tw/~language/workshop/read2.pdf>
- Park, Y. (2005). *Unit 3: Meaningful learning and schema theory*. Retrieved from [https://www.scholar.vt.edu...Ypark\\_4\\_](https://www.scholar.vt.edu...Ypark_4_)
- Piaget, J. (1969, February 9). The theory of stages in cognitive development. *An address ... to the CBT/Mc Graw-Hill*

*Aileen Rampersad, Shahiba Ali and Nafeesa Ali*

*Invitational Conference on Ordinal Scales of Cognitive Development*. Monterey, CA: CBT/McGraw-Hill.

Popham, W. (2001). Teaching to the test. *Educational Leadership*,16-20.

Sencibaugh, J. M. (2005). *A synthesis of content enhancement strategies for teaching students with learning problems at the secondary level*, Council for Exceptional Children International Conference Baltimore, MD, April 7, 2005. Retrieved from <https://files.eric.ed.gov/fulltext/ED494310.pdf>

Şahan, A. (2012). Cognitive reading comprehension strategies employed by ELT students. *Sosyal Bilimler Enstitüsü Dergisi Sayı*, 33(2), 1-22.

Slater, F. (1989). *Language and learning in the teaching of geography*. London: Routledge.

Slavin, R. (2006). *Educational theory and practice* (8th ed.). Boston, MA: Pearson Education.

Ulusoy, M., & Dedeoglu, H. (2011). Content area reading and writing: Practices and beliefs. *Australian Journal of Teacher Education*,36(4). <http://dx.doi.org/10.14221/ajte.2011v36n4.1>

Vacca, R. (2002). Making a difference in adolescents' school lives: Visible and invisible aspects of content area reading. In A. E. Farstrup,&S.J. Samuels (Eds.),*What research has to say about reading instruction*. Newark, NJ: International Reading Association.

## **THE IMPACT OF LITERACY STRATEGIES ON FORM 1 SECONDARY STUDENTS' MOTIVATION AND PERFORMANCE IN INTEGRATED SCIENCE**

*Ambika Sandhya Persad and Rawatee Maharaj-Sharma*

In this work, literacy strategies were used to teach a unit of integrated science to a group of 30 form 1 secondary school students of ages 12-14 in Trinidad and Tobago. Student motivation questionnaires and pre and post intervention scores were used to determine (1) the effect of literacy strategies on students' levels of motivation in Integrated Science, and (2) the impact of literacy strategies on the academic performance of the students in Integrated Science. Pre and post test scores as well as student motivation questionnaires were used to assess the impact of the intervention on students' levels of performance and motivation levels. Comparison of pre and post intervention scores revealed that 83% of the class scores improved after the intervention. Statistical analysis using t-test also showed that the use of literacy strategies had a positive impact on both performance and motivation levels. The findings from this study offer promise for the use of literacy strategies for improving motivation and student performance in Integrated Science.

### **Introduction**

The Minister of Education of Trinidad and Tobago, revealed that on average 10% of students who wrote the CSEC (Caribbean Secondary Education Certificate) examination in 2018 did not achieve a passing grade in any subject (Gioannetti, 2018). In a parallel observation of performance at the primary school level, the Trinidad and Tobago Unified Teachers Association (TTUTA) noted a similar trend in respect of the Secondary Entrance Assessment (SEA) examination and commented that 2,595 students scored less than 30% in the 2018 SEA examination (TTUTA, 2018). These figures are suggestive of an underlying learning issue among a large percentage of primary school students. In the Trinidad and Tobago context students in both these categories are classified as remedial (or below grade level) and are often branded as students for whom the formal curriculum is unsuitable (Doughty, 2018). Students with low SEA scores in

*Ambika Sandhya Persad and Rawatee Maharaj-Sharma*

language are often placed in remedial classes when they enter secondary school. The intent is that remediation will help them overcome their reading, numeracy and comprehension challenges. Teachers of remedial classes have attested that their students are overwhelmed by text and, even if text materials are narrated to them, most are unable to comprehend ideas, concepts and relations. Furthermore, they are unable to provide responses to lower order questions based on text materials they have interacted with (Alexander, 2008).

In Trinidad and Tobago, students are placed in secondary schools based on their SEA scores. The SEA examination assesses students' performance in Language Arts, Mathematics and Creative Writing. Although science is taught at every level of the primary school system, science is not tested in the SEA examination. Despite science not being assessed at the end of primary school training, all students entering secondary school are required to study Integrated Science (a thematic subject which focuses on a blend of content from the 3 main science subjects - biology, chemistry and physics), for the first three years of their secondary school training. Science teachers have observed that the remedial students experience great difficulty interacting with science content. Poor literacy skills hinder their understanding of basic science concepts, and negatively impact the development of fundamental scientific literacy. Their low scientific literacy makes science learning very challenging for most remedial students and the result is that they consistently perform poorly in science assessments. In addition, their language and comprehension deficiencies seem to demotivate them to the extent that they are reluctant to engage and participate in science learning. Irvin, Meltzer, Dean, and Mickler (2009) have reported that science students who have literacy challenges and who suffer a sense of demotivation, which may or may not be associated with their literacy challenges, are consistently poor performers in science. In fact, Glynn, Brickman and Taasobshirazi (2011) have stated that students are motivated to learn when they understand what is told to them, and that highly motivated science students are more likely to develop sound conceptual understandings during science lessons, and demonstrate high levels of achievement. In other words,

students who are highly motivated are likely to do well in science courses and the converse is also true.

Recognising the effect of the low literacy scores earned by a notable fraction of SEA graduates on their levels of motivation to learn science, and hence on their development of scientific literacy, this study sought to explore the impact of using specific literacy strategies during the teaching of a unit of science entitled 'Energy', on the levels of motivation and performance of a group of Form1 science students.

### **Background**

Literacy is a critical component of the digital age and is one of the four domains that have been identified as a 21<sup>st</sup> century skill that must be acquired by the future generation, to overcome the challenges faced in scientific and technological literacy (Turiman, Omar, Daud, & Osman, 2012). In the context of this work, literacy refers to the ability of secondary school students to completely read, write, think about, discuss and present text- based information and ideas using a wide variety of print formats, including electronic and multimedia (Wise, 2009). Literacy therefore, is an essential skill upon which all other academic successes hinge (Wise, 2009). In spite of this fundamental acknowledgement, Schleicher (2019), reporting on PISA results for 2018, stated that over ten million fifteen-year-old students were not able to complete the most basic reading tasks. PISA defines literacy as understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society. Bybee, McCrae and Laurie (2009) reporting on PISA (2006) found that motivation to engage in science learning is linked to the development of scientific literacy which subsequently translates into performance outcomes in science. Being literate in science means more than just being a proficient reader. It means that students are capable of reading scientific text, decoding it, and processing it for application. Reading science text and textbooks require the same critical thinking, analysis, and active engagement as performing hands-on science activities (Finneran, 2017). One of the goals of the science class therefore should be to

*Ambika Sandhya Persad and Rawatee Maharaj-Sharma*

promote scientific literacy even while developing science process skills.

Literacy strategies such as, read aloud, Know-Wonder-Learn (KWL) and concept mapping, are common supporting techniques used by teachers to enhance student learning. The main purpose of using a literacy strategy is to help students connect ideas and organise scientific information that may otherwise seem overwhelming. In fact, literacy strategies such as those described above are well aligned to the views expressed by Piaget, which suggest that the human brain learns best when it is able to make meaningful connections among concepts and organise these in ways that can allow for logical retrieval (Artelt, Schiefele and Schneider, 2001).

Students possess varying abilities and different learning styles, so their academic performance is linked to the extent to which the format of lessons presented in the classroom aligns with their abilities and their learning styles. Literacy strategies are designed to target specific learning styles and academic levels (Alharbi, 2015). In that context Seddon (2017) found that integrating literacy into a science classroom can create more meaningful instruction and learning. Learning approaches, whether they include literacy strategies or otherwise, which align with students' abilities and learning styles, have the potential to activate prior knowledge and impact student learning (Lewis & Wray, 2000). Manoli & Papadopoulou (2012) showed that graphic organisers such as concept maps used in science class, can motivate student engagement and boost comprehension skills, because they provide a framework around which students can organise information in ways that can facilitate easy retrieval. In addition, Monahan (2012) explained that there is a close relationship between reading comprehension, learning of science content knowledge and academic performance in science assessments.

## **Literature Review**

### **Theory of Motivation**

As proposed by Maslow, all humans are motivated by a hierarchy of needs (1943). These needs are arranged such that basic

needs are met before higher ones, based on sociological status and level at any given point in time. The underlying assumption in this hierarchy of needs is the understanding that needs and accompanying behavior are multi-motivated. Maslow's work suggests that a student's deficiencies (in this work the lack of literacy skills) must be addressed first before growth and learning can occur; for only then can a student focus on curriculum and apply knowledge to develop their full potential (McLeod, 2018).

Seifert (2010) defines student motivation as a direct function of a student's expectation for academic success and the value students place on academics. In a 2016 study on the declining trends in student performance in the Netherlands, student motivation was found to be a major contributor to student performance. Wijsman, Warrens, Saab, van Driel, & Westernberg (2016), hypothesised that motivation and student performance are interconnected. In fact, Bryan, Glynn & Kittleson (2011) applied the social cognitive theory to examine what motivates high school students to learn science, and revealed that self-efficacy was the component most related to achievement. Much earlier, Bandura (1977) hypothesised that people who have a low self-efficacy for achieving a task may avoid it, put little effort into completing it and give up easily when they encounter difficulties. Motivation is boosted when students recognise that they can accomplish tasks and make progress during their learning, and as Schunk (1991) reported, when students work on assignments and become more skillful, they develop a sense of self-efficacy for performing well.

### **Student Motivation, Student Performance and Literacy Strategies**

Science literacy and scientific literacy are components for understating science content. Both terms, science literacy and scientific literacy, rest on a foundation of content knowledge and basic literacy skills. Visone (2009) suggests that tests of content-knowledge, such as standardised or benchmark science tests, may be assessing reading ability more than content knowledge. Croner (2003) found that many students have difficulty in science because they are passive readers, readers who receive information without understanding. In the course of reading subject content, a passive reader would not think about the subject, would find the text

overwhelming and would generally not be curious about the material. Passive readers are often distracted, may not comprehend (are unable to provide meaningful responses about the content in the text), do not reread, do not ask questions about the text and cannot make connections among ideas and/or concepts discussed or described in the text. (Schunk, 1991). In the Trinidad and Tobago context it has been noted that many level one secondary school students are passive readers and that they lack effective reading comprehension skills (De Lisle, 2012).

Reading strategies is one of the four factors that influence metacognition during reading. Metacognition, according to Croner (2003, p. 106), “is an awareness of how one thinks, and incorporating literacy strategies in science learning can improve students’ metacognition and understanding of major concepts.” Using graphic organisers in a science class as a reading strategy can promote student engagement, boost comprehension skills, and develop students’ abilities to make predictions and identify patterns (Manoli & Papadopoulou, 2012). For example, graphic organisers facilitate comprehension of the bigger picture. Another commonly used strategy, the K-W-L, first published by Ogle (1986), was effectively used to provide a mental framework for students through which they were able to activate background knowledge in preparation for the upcoming lesson (Crowther, 2010). Exit slips are another strategy that is simple and quick and can help teachers make decisions about what needs to be revisited or elaborated on in following lessons. (Finneran, 2017).

Seddon (2017) studied strategies for integrating literacy into a science classroom and found that it created more meaningful instruction and learning and that through the use of literacy strategies educators gained insights into the value of formative assessment and the ways in which such assessments can be used in their day to day instruction. In addition, Monahan (2012) found that there was a close relationship between reading comprehension and the ability to learn and be assessed on science content knowledge. In particular, the use of the Scientific Reading Intervention Model (SRIM) was found to result in noted improvements in scientific literacy through targeted reading strategies which developed students’ reading abilities and resulted in improved comprehension

of scientific text (Finneran, 2017). Overall, therefore, the literature has shown that the infusion of literacy strategies in science learning can promote motivation and hence encourage science learning.

### **Methodology**

This study is set in North-Eastern Trinidad and participants include students from a government-controlled secondary school with a school population of 700 students. In the lower form classes (Form 1 - Form 3), there is usually a minimum of 35 students per class with mixed academic abilities. The study focused on two main research questions:

1. What is the effect of lessons taught with the incorporation of literacy strategies, on Form 1 students' levels of motivation towards Science?
2. What impact does the use of literacy strategies used during the instruction of a unit of work have on Form 1 students' levels of performance in Science?

This study adopted a one-shot pre- post-test action research approach (Mills, 2007). It was deemed the most suitable approach because the researcher is the class teacher and she embarked on the research with the aim of improving her classroom practice. The intention was to explore the utility of literacy strategies in the learning context in relation to student motivation and academic performance.

### **Data Collection**

In this study the method of convenience sampling was used as the target group was accessible to the researcher who taught the class at the school. The participants comprised one class of 30 Form 1 lower secondary school science students. Their ages ranged from 12-14 years and the class consisted of 20 girls and 10 boys. The group was mixed in terms of ethnicity and previous academic performance. The class was taught Integrated Science by one teacher who was also their form manager. This Form 1 class had Integrated Science timetabled four times per cycle (a cycle was 6 days). The four teaching sessions consisted of one double period and three single periods with each period being 35 minutes long.

Students' scores obtained from a unit test on measurement, prior to the intervention was used as the baseline scores for performance in Science. A motivation questionnaire was administered to the students before the start of the intervention. Upon completion of the unit of work, a unit test was administered as a post-test to determine the effect of the intervention on the students' performance. The pre-intervention motivation questionnaire was administered before the start of the study and this was re-administered after students were taught the unit of lessons, to determine if there were any changes in the students' motivation toward Science.

The unit of science consisted of eight lessons that were taught over a four-week period. In each lesson at least one type of literacy strategy was incorporated. All strategies used were in alignment with the objectives of the lesson. An outline of the unit of work consisting of eight lessons and the corresponding literacy strategies used are shown in Table 1.

**Table 1: Outline of Lessons Taught in the Unit of Integrated Science**

<b>Lesson No.</b>	<b>Lesson Topic</b>	<b>Specific Objectives</b>	<b>Type of literacy being addressed</b>	<b>Literacy Strategy Implemented</b>
<b>1</b>	Matter and Energy	-Classify the three states of matter in terms of shape and volume - Illustrate the arrangement of the particles in solids, liquids and gases	Comprehension and Vocabulary	Read Aloud, KWL
<b>2</b>	The effect of energy on matter	- To determine if temperature is affected by increasing heat - To determine the effect of increasing heat on the state of matter of water	Comprehension and Vocabulary	Concept Map
<b>3</b>	Forms of Energy I	- Name different forms of energy and give examples	Comprehension and Vocabulary	Concept Map

*The Impact of Literacy Strategies*

		- Classify mechanical vs non-mechanical forms of energy		
4	Forms of Energy II	- Name different forms of energy and give examples - Classify mechanical vs non-mechanical forms of energy	Reading, Comprehension and Vocabulary	Read Aloud
5	Law of Conservation of Energy	- Explain the law of conservation of energy - Apply energy conversions to living and non-living things	Comprehension and Vocabulary	KWL Graphic Organizer
6	What's the big deal about plants?	- Explain how plants convert light energy into chemical energy - Recall the word equation for photosynthesis	Comprehension and Vocabulary	Concept Map
7	What happens to energy in nature?	- Explain that green plants are the only organisms that can convert sunlight energy to chemical energy and hence are producers of all food chains - Construct food chains to show how energy is passed on from organism to organism	Comprehension and Vocabulary	Exit Slip
8	How do energy	- Discuss the need for the	Comprehension and Vocabulary	Concept Map

	sources impact our environment?	implementation of renewable energy sources		
--	---------------------------------------	--	--	--

Research Question 1 was answered by analyzing quantitative data obtained by using the Student Motivation Questionnaire II (SMQ II) in its entirety as developed by Glynn, Brickman, & Taasobshirazi (2011). Studies done using this instrument with both science and non-science majors indicated that it is valid, reliable and efficient for assessing components of students' motivation to learn secondary school science courses.

SMQ II was completed twice by the participants,  $n = 30$ , once before the start of the intervention (giving the pre-intervention motivation score, (PREIMS)) and the second time after the entire unit was taught (giving the post-intervention motivation score, (POSTIMS)). These scores are the summation of five motivation items given as: never (0), rarely (1), sometimes (2), often (3) or always (4) and a possible total of 100 or a percentage of 100 converting the values into a standard score.

Research question 2 was also explored through the use of quantitative data derived from the unit post-test and students' baseline scores. The students had not been previously exposed to this unit of Science therefore, a pre-test on this topic would not have been meaningful. For that reason, students' baseline results from the previous end of term examination were used as the pre-test results (to give the pre-intervention (PREI) score). The post-test was administered when the unit of work was completed using the instructional strategies (giving the post-intervention (POSTI) score). The assessment given was based on the unit of lessons taught and consisted of questions of varying degrees of difficulty. These questions ranged from simple lower order (knowledge and comprehension) to complex higher order (application and analysis) in accordance with the designed table of specification (TOS) shown in Table 2.

*Ambika Sandhya Persad and Rawatee Maharaj-Sharma*

<b>Lesson No.</b>	<b>Remembering</b>	<b>Understanding</b>	<b>Applying</b>	<b>Analyzing</b>	<b>Evaluating</b>	<b>Creating</b>	<b>Total</b>	<b>%</b>
<b>1 – Matter and Energy</b>	1	1					2	<b>12.5</b>
<b>2 – The effect of energy on matter</b>			1		1		2	<b>12.5</b>
<b>3 – Form of Energy I</b>	1	1					2	<b>12.5</b>
<b>4 – Forms of Energy II</b>	1	1					2	<b>12.5</b>
<b>5 – Law of Conservation of Energy</b>		1	1				2	<b>12.5</b>
<b>6 – What’s the big deal about plants?</b>	1	1					2	<b>12.5</b>

*The Impact of Literacy Strategies*

<b>7 – What happens to energy in nature?</b>	1					1	2	<b>12.5</b>
<b>8 – How does energy sources impact our environment?</b>		1				1	2	<b>12.5</b>
<b>Total</b>	5	6	1	0	2	2		
<b>Percentage</b>	<b>31.3</b>	<b>37.5</b>	<b>18.8</b>	<b>0</b>	<b>12.5</b>	<b>12.5</b>		<b>100%</b>

**Table 2: Table of Specification (TOS) as Outlined by the Unit Plan on Energy**

Data collected from both the Student Motivation Questionnaires (SMQ II) as well as the summative achievement test were analyzed quantitatively. Descriptive and inferential statistics were analyzed and discussed to reveal findings and relations using computer generated software.

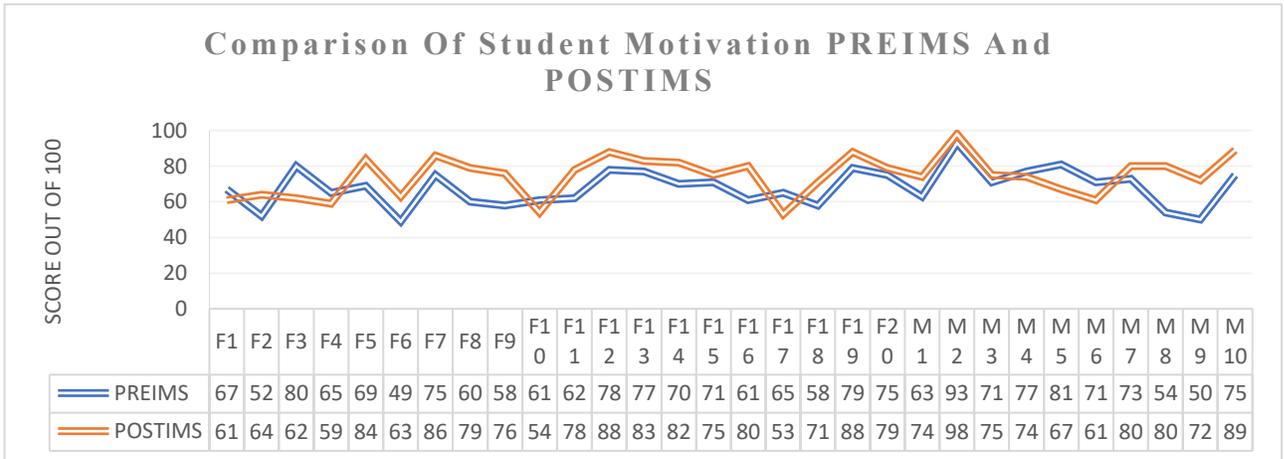
In this study, a paired t-test was used to analyse data pertaining to both research questions as the data were the result of one intervention on a single group of students. The use of this test was established by other researchers in similar circumstances (Wanakacha, Aloka and Nyaswa, (2018) and Owuor (2018)). T and P values were generated and compared to the suggested alpha value of 0.05 for educational research (Mertler, 2014), and an increase in students' levels of motivation as well as an improvement in their overall test scores was obtained.

### **Findings**

The SMQ II, was completed with one class before the intervention and again upon completion of the intervention (four weeks later), to reveal what students thought about their experience in Science. Figure 1 represents the results for student motivation and compares the pre and post intervention SMQII scores for each student. Generally, there was an 83% increase in motivation scores amongst

*The Impact of Literacy Strategies*

the class, where, only 17% of the students' motivation scores decreased post intervention.



**Figure 1** Line Graph comparing Student Motivation Scores

**Pre and Post Intervention**

An analysis of the pre-intervention motivation scores of the students revealed that the majority (67%) of the class could be classified as highly motivated according to the SMQ II categories and that no student ranked in the relatively low motivation category (Table 3).

Post-intervention categories revealed that no students were classified as having relatively low motivation towards science. The moderate and high categories decreased by 16% and 11% respectively (Table 3) This was attributed to the fact that five students moved up in motivation category from moderate to high. The very high category grew by 27% with eight students moving from high to very high and one from moderate to very high. Seven of the thirty students' motivation decreased post intervention.

**Table 3: Showing the percentages of the pre and post motivation scores for the four motivation categories**

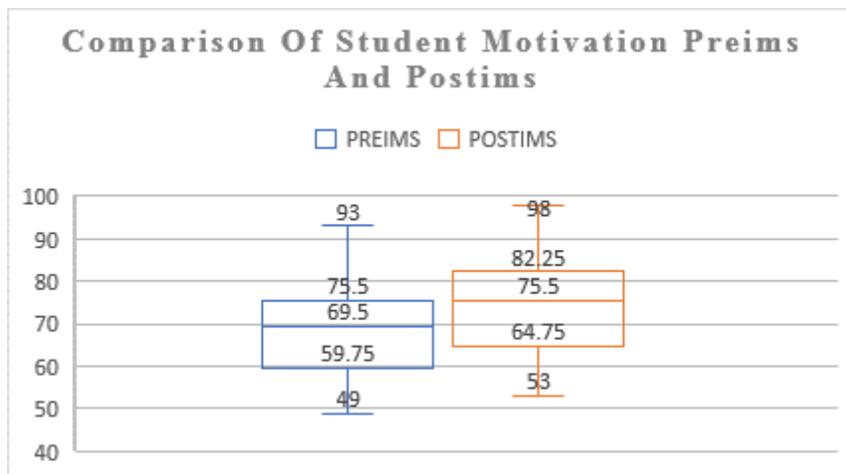
Motivation Category	Pre-Intervention		Post-Intervention	
	No. of Students	Percentage	No. of Students	Percentage
<b>Relatively low 0-39</b>	0	0	0	0

<b>Moderate 40-59</b>	7	23.3	2	6.67
<b>High 60-79</b>	20	66.7	17	56.7
<b>Very High 80-100</b>	3	10	11	36.7

Table 4 shows the values of mean, median, mode and standard deviation of motivation scores pre and post intervention. The average score increased by 6.5%, the middle score increased by 6%, the most occurring score increased from 75 to 80 and the standard deviation increased by .4%. This is illustrated in the box and whisker plots of Figure 2.

**Table 4: Central Tendencies for Students Scores in SMQII Pre and Post Intervention**

Central Tendencies	PREI	POSTI	Difference
<b>Mean</b>	68	74.5	6.5
<b>Median</b>	69.5	75.5	6
<b>Mode</b>	75	80	5
<b>Standard Deviation</b>	10.3	11.1	0.7



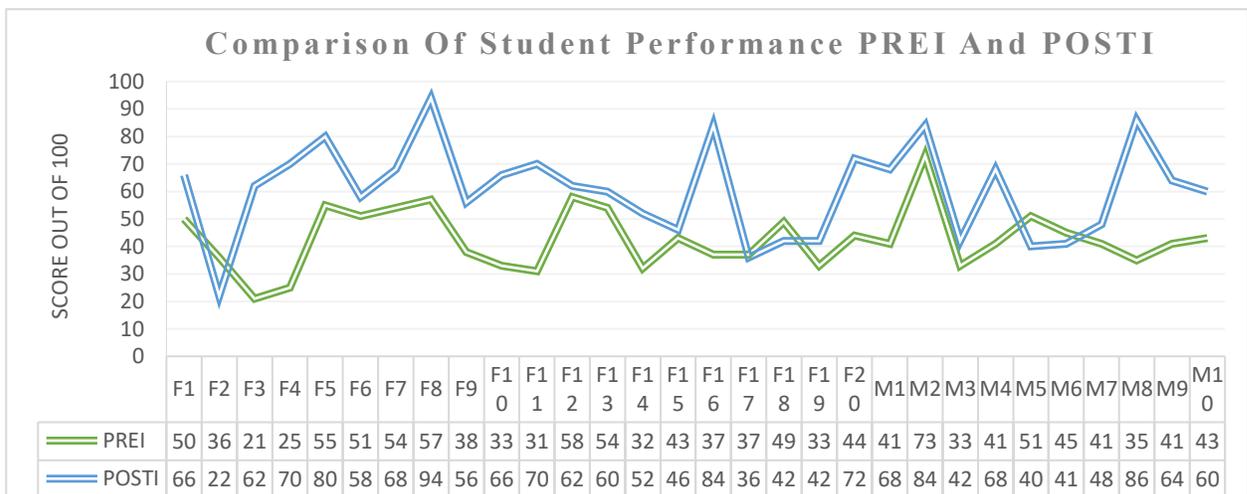
**Figure 2: Comparing Box and Whisker Plots for Student Motivation Toward Science Pre and Post Intervention**

The t value of a two-tailed pair sample for 29 degrees of freedom was calculated to be 3.40, whilst the P value is 0.00198 which is less than the significance level of 0.05. Therefore, the

*The Impact of Literacy Strategies*

intervention statistically had a significant impact on student motivation toward science.

Student Performance was measured using marks obtained from an end of unit examination against PREI end of term I marks for each student. Figure 3 compares examination scores out of 100 for each student in the class. Generally, there was an 83% increase in student performance with 17% of the students' scores decreasing post intervention. The pre and post intervention scores were analysed to produce mean, median, mode and standard deviation as shown in Table 5. Although the standard deviation increased POSTI, the mean score was 17.6% higher as depicted in Figure 4.



**Figure 3: Line Graphs showing Comparison of PREI and POSTI Unit Examination Scores per Student**

Although the lowest score only changed by 1%, the highest score obtained increased by 21%. The average score also increased by 21%. Scores for each quartile of PREI benchmark scores were lower than POSTI unit examination scores as depicted in Figure 4.

**Table 5: Showing Central Tendencies in Student Performance Pre and Post Intervention**

Central Tendencies	PREI	POSTI	Difference
--------------------	------	-------	------------

<b>Mean</b>	42.7	60.3	17.6
<b>Median</b>	41.0	62.0	21.0
<b>Mode</b>	41.0	68.0	27.0
<b>Standard Deviation</b>	11.0	16.8	5.8

In analysing the objectives, the percentage of marks obtained for each student for each taxonomy level assessed was analyzed to produce central tendencies for each level as shown in Table 6. In the end of unit examination 58% of the questions tested *remembering*, 34% tested *understanding* and 8% tested *application of knowledge*. Students scored highest in *applying* taxonomy, second in *remembering* and third in *understanding*. Fairly large standard deviation marks were obtained and that implies that students' scores were widely scattered about the mean.

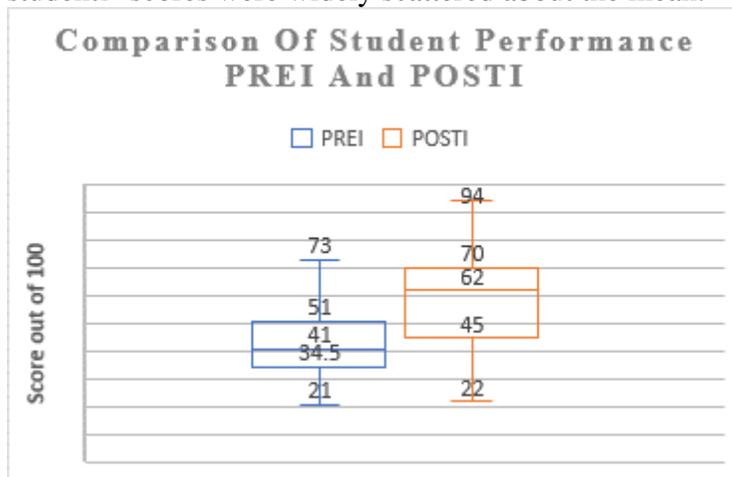


Figure 4: Box and Whisker Plots comparing Student Performance Pre and Post Intervention

Table 6: Analysis of the percentages obtained for the cognitive taxonomy level assessed in the end of unit examination

Order	Remembering	Understanding	Applying
<b>Mean</b>	61.0	52.9	90.0
<b>Median</b>	60.3	58.8	100.0
<b>Mode</b>	65.5	76.5	100.0
<b>Standard Deviation</b>	16.3	24.2	28.3

### *The Impact of Literacy Strategies*

The results of a paired t-test computation found  $t$  to be 2.04 and  $P = 6.59 \times 10^{-6}$  which is  $< 0.05$ . Therefore, statistically there was a significant difference in the mean student performance in the unit of work after using literacy strategies.

### **Discussion**

The infusion of literacy strategies appeared to have had a significant impact on the motivation of the students since student motivation for the class increased by 83%. This was confirmed by the t-Test statistic that showed that when the mean PREIMS scores were compared to the mean POSTIMS score there was a significant difference in mean motivation scores pre and post intervention. These results are aligned with the findings of Glynn & Muth (1994) and Schunk (1991), both of which showed that the use of literacy strategies in science lessons led to improved students' motivation. However, because this study is limited to a single classroom in a single school, further, more widespread studies are needed to comprehensively establish a link between motivation and the use of literacy strategies in science teaching in the Trinidad and Tobago context.

The infusion of literacy strategies appeared to have had a positive impact on student performance in lower form Integrated Science. The comparison of the end of term I examination scores (PREI) and POSTI unit examination scores revealed that scores for the class improved by 83%. The paired t-test revealed that there is a statistically significant difference in mean student performance scores post intervention. These results are supported by work done by Finneran (2017) which reported improved reading comprehension among students; Seddon (2017) which showed that more meaningful science learning occurred; and Monahan (2012) who revealed a positive correlation between reading comprehension and the ability to learn science.

Taken together, there are four students (F8, F16, M2 and M8) out of the class of thirty that stand out as having done extremely well in both motivation and performance in science scores. Through informal observations, these four have been consistently working through the unit of work and thus show maximum growth in the

class. It is possible that extending the period of the study may have provided an opportunity to influence a greater number of students.

### **Limitations**

Qualitative data such as student reflections could have been employed to challenge the students to think deeper about the role literacy strategies play in their motivation toward science. An in-depth analysis of the SMQII could have revealed insight into the specific components of motivation which may have been responsible for the overall lack of motivation toward science. As explained by Glynn (2011) the SMQII looks at five motivation components: intrinsic motivation, career motivation, self-determination, self-efficacy and grade motivation. This work did not examine which components were most influential in determining students' overall levels of motivation, but this examination can certainly be the focus of further work in this area.

An exploration of the differentiated learning types of the students before the intervention would have informed which literacy strategies were most matched to students' learning styles; e.g. more ICT-based literacy strategies may have wider appeal among the students. This oversight may have impacted the results obtained but can be a point of consideration for future research in this area. A closer look at the formative assessments given and the effort placed on completing worksheets may also be a factor worth considering in any further work. It may be that more time is needed for students to complete the formative assessment tasks.

### **Conclusion**

The results of this study imply that the incorporation of literacy strategies during the teaching of a unit of science to a group of Form One (1) Integrated Science students has a positive impact on student motivation and student performance. The literacy strategies employed facilitated improvements by supporting students' reading, vocabulary and comprehension of science content. As mentioned earlier, these findings are consistent with those revealed in other similar works (Monahan (2012); Seddon (2017); Finneran (2017)). While the findings of this work are instructive for contexts in which

### *The Impact of Literacy Strategies*

secondary school science students experience difficulties learning science due to literacy challenges, the approach described cannot be successfully implemented in the absence of relevant teacher training. Science teachers would need to interact in a formal way with literacy professionals to detect the nature of the literacy challenges students face and subsequently to identify appropriate literacy intervention strategies. Even further, science teachers may need support and guidance in the implementation process. The recommendation therefore is that targeted professional development for teachers who are required to teach science to remedial students or students with literacy challenges is necessary. In addition, access to resources and relevant teaching aids to effectively facilitate teachers' efforts in this regard are critical.

Finally, it is important to acknowledge that this study was conducted with a single, purposively selected group of students at a single school and while the findings are positive in this case, they cannot be generalized for all secondary school students experiencing challenges learning science. This work therefore presents a good starting point from which further investigations in this area can emerge.

### References

- Alexander, R.J. (2008). *Essays on pedagogy*. London: Routledge.
- Alharbi, M. A. (2015). Reading strategies, learning styles and reading comprehension: A correlation study. *Journal of Language Teaching and Research*, 6(6), 1257-1268.
- Artelt, C., Schiefele, U., & Schneider, W. (2001). Predictors of reading literacy. *European Journal of Psychology of Education*, 16(3), 363-383.
- Bandura, A. (1977). *Social learning theory*. New York: General Learning Press.

*Ambika Sandhya Persad and Rawatee Maharaj-Sharma*

- Bybee, R., McCrae, B., & Laurie, R. (2009). PISA 2006: An assessment of scientific literacy. *Journal of Research in Science Teaching*, 865-883.
- Croner, P. E. (2003). Strategies for teaching science content reading. *The Science Education Review*, 104-119.
- Bryan, R. R., Glynn, S. M., & Kittleson, J. M. (2011). Motivation, achievement, and advanced placement intent of high school students learning science. *Science Education*, 95(6), 1050-1064.
- Crowther, D. (2010). Science for English language learners. In A. Rodriguez (Ed.), *Science education as a pathway to teaching language literacy* (pp. 163-196). Rotterdam: Sense Publishers.
- De Lisle, J. (2012). Secondary school entrance examinations in the Caribbean: Legacy, policy, and evidence within an era of seamless education. *Caribbean Curriculum*, 19, 109-143.
- Doughty, M. (2018, September 8). Zero in on zero passes . *Trinidad and Tobago Newsday*. Retrieved from <https://newsday.co.tt/2018/09/08/zero-in-on-zero-passes>
- Finneran, M. L. (2017). *Improving scientific literacy through reading strategies: An action research study*. College of Education: University of South Carolina.
- Gioannetti, A. (2018, August 13). Garcia: 1,486 TT students got zero CSEC passes. *Trinidad and Tobago Newsday*. Retrieved from <https://newsday.co.tt/2018/08/13/garcia-1486-tt-students-got-zero-csec-passes>
- Glynn, S., & Muth, K. (1994). Reading and writing to learn science: Achieving scientific literacy. *Journal of Research in Science Teaching*, 31(9), 1057-1073.
- Glynn, S., Brickman, P., & Taasobshirazi, G. (2011). Science motivation questionnaire II: Validation with science majors

*The Impact of Literacy Strategies*

and nonscience majors. *Journal of Research in Science Teaching*, 48, 1159-1176.

Irvin, J., Meltzer, J., Dean, N. & Mickler, M. (2010). *Taking the lead on adolescent literacy. Action steps for schoolwide success.* Thousand Oaks, CA: Corwin Press.

Lewis, M., & Wray, D. (2000). *Literacy in the secondary school.* London: David Fulton.

Manoli, P., & Papadopoulou, M. (2012). Graphic organizers as a reading strategy: Research findings and issues. *Creative Education*, 3, 348-356.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4), 370–396.

McLeod, S. (2018). Maslow's hierarchy of needs. *Simply Psychology*. Retrieved from <https://simplypsychology.org/simplypsychology.org-Maslows-Hierarchy-of-Needs.pdf>

Mertler, C. A. (2014). *Action research: Improving schools and Empowering educators* . Thousand Oaks: Sage.

Mills, G. E. (2007). *Action research: A guide for the teacher researcher.* Columbus: Pearson.

Monahan, K. T. (2012). *Read, retrieve, connect and use: An intervention strategy for science and scientific literacy.* Doctoral Program in Educational Leadership: Lynn University, College of Education, Florida.

Ogle, D. (1986). K-W-L: A teaching model that develops active reading of expository text. *The Reading Teacher*, 39, 564-570.

Owuor, N. A. (2018). Class size and student achievement: A parametric paired t-test. *UKH Journal of Social Sciences*, 2(1), 19-24.

*Ambika Sandhya Persad and Rawatee Maharaj-Sharma*

- Schleicher, A. (2019). PISA 2018 Insights and interpretations. *OECD*, 1-64. Retrieved from <https://www.oecd.org/pisa/PISA%202018%20Insights%20and%20Interpretations%20FINAL%20PDF.pdf>
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 207-231.
- Seddon, M. (2017). Strategies for integrating literacy into a science classroom. Graduate Research Papers: University of Northern Iowa UNI Scholarworks.
- Seifert, T. (2010). Understanding student motivation. *Journal of Educational Research*, 46(2), 137-149.
- TTUTA. (2018, August 21). Reflecting on CSEC results. Trinidad and Tobago: Trinidad and Tobago Newsday.
- Turiman, P., Omar, J., Daud, A. M., & Osman, K. (2012). Fostering the 21st century skills through scientific literacy and science process skills. *Social and Behavioral Science*, 59, 110-116.
- Visone, J.D. (2009) The validity of standardized testing in science, *American Secondary Education*, 38(1), 46-61.
- Wanakacha, C. K., Aloba, P. J. O., & Nyaswa, P. (2018). Gender differences in motivation and teacher performance in core functions in Kenyan secondary schools. *Academic Journal of Interdisciplinary Studies*, 7(1), 89-95.
- Wijsman, L. A., Warrens, M. J., Saab, N., Van Driel, J. H., & Westernberg, P. M. (2016). Declining trends in student performance in lower secondary education. *European Journal of Psychology Education*, 31, 595-612.
- Wise, B. (2009). Adolescent Literacy: The cornerstone of student success. *Journal of Adolescent and Adult Literacy*, 52(5), 369-375.

**Freddy James** is a lecturer of Educational Leadership at the School of Education, The University of the West Indies, St. Augustine. She is a University of Warwick Postgraduate Research Fellowship Scholar. Her current areas of research focus on innovation and entrepreneurship, building leadership capacity, teacher education, action research and educational change and improvement. She has published widely on these areas in a range of journals internationally, regionally and locally. These journals include, Education Action Research Journal, School Leadership and Management Journal, Caribbean Curriculum and School Effectiveness and School Improvement. Dr. James has presented her research at many international and local conferences, and is also involved in a number of international, regional and local education projects, focused on embedding innovation into the teaching and learning process. In this regard she brought a team from Finland to conduct a training workshop on innovative pedagogy for selected staff at the University of the West Indies, St. Augustine. She is Vice-Chairman of the CARICOM team responsible for developing and implementing standards for school leaders and teachers. She is the President and Founder of Caribbean Visionary Educators Foundation.

**Alicia Massiah** is a secondary school teacher in the educational district of Victoria in Trinidad and Tobago. She has been teaching for 11 years. She is a graduate of the University of the West Indies Post Graduate Diploma (Educational Administration) in Education Programme. As a recent graduate, her research interests include teacher development, student achievement and educational leadership.

**Vimala Kamalodeen** is a lecturer in Education (Mathematics/ Information Technology) at the University of the West Indies at St. Augustine. She completed her Doctor of Education at the University of Sheffield, UK in 2013. She has conducted an extensive number of workshops on behalf of the Ministry of Education and The University of the West Indies over the years in areas related to content and pedagogy and technology. Currently, she is the chair of the Mixed Methods International Conference in the Caribbean 2017. Her special interests are in multi-modal game-based learning, collaborative research, mixed methods research and integration of technology in the classroom.

**Michele Taylor** is a part-time assistant lecturer at the University of the West Indies St. Augustine. She is an experienced IT and Computer Science, and Chemistry Teacher for more than 20 years. She has been involved in and conducted a number of professional development workshops for teachers and schools. She is the co-author of the Hodder Education, 'Log on to IT', 'Log on to IT for CSEC' and 'Interact with IT' series. She has also co-authored an IT textbook specifically for Ghana entitled 'ICT for Senior High Schools: Students' Book'. She is one of the founders of ITTPN-Global as well as one of the Directors.

**Désirée S. Augustin** received her academic education at The University of The West Indies, St Augustine: Bachelor of Arts (Honours), 1981; Diploma in Education, specializing in the teaching of English, 1988; Master of Arts in Education, 1998. She is currently a doctoral student.

She has been a lecturer at the School of Education, The University of the West Indies, St Augustine, Trinidad, since 2009. Areas of educational research which pique her interest are varied and include: middle management/leadership in secondary schools; teachers, teaching and teacher

education; action research and qualitative research; curriculum leadership and, policy and change; literature in the curriculum.

**Jozette Roberts** is a Mathematics teacher. She has taught at the college level for the past 11 years. She works with students from Form 1 to Form 6. Her interests are building students mathematical confidence, reducing mathematics anxieties and rejuvenating interest in the study of Mathematics

**Sasha Phipps** is a Mathematics teacher and has been in the teaching service for the past 8 years. Her interests include fostering a love and appreciation for mathematics in students, and working with remedial students.

**Diandra Subeeksingh** is a Mathematics teacher. She has been in the teaching service for 5 years. She is currently in charge of students under the STARS (Student transition and remediation support) program at her school; an initiative from the Ministry of Education. She is working with an adapted curriculum and suggested resources, including the use of manipulatives for struggling learners in mathematics.

**Sharon J. Jaggernaut** is a lecturer in the teaching of Mathematics at The University of the West Indies, School of Education, St. Augustine. She works primarily with teachers in the Bachelor of Education and Postgraduate In-service Diploma in Education programmes, and research students in postgraduate programmes pursuing Masters and Doctoral studies. Her research interests include mathematics and mathematics teacher education, problem-solving and blended learning.

**Nalini Ramsawak-Jodha** is a lecturer in the teaching of Mathematics at The University of the West Indies, School of Education, St. Augustine. She works with Bachelor of Education and Postgraduate In-service Diploma in Education and Master of Education students pursuing pedagogical courses related to the teaching of mathematics and research supervision. She is interested in mathematics education.

**Zhanna Dedovets** is a lecturer in the Teaching of Mathematics at The University of the West Indies, School of Education, St. Augustine with responsibilities in the B.Ed., Dip.Ed, MPhil and PhD programmes. Her research interests include the teaching of school mathematics, theoretical and practical aspects of using logic problems, and search activity during mathematical problems solving.

**Aileen Rampersad** is a secondary school teacher of Geography who engaged in action research during the 2014-15 Post Graduate Diploma in Education Programme, at the School of Education, The University of the West Indies, St Augustine, Trinidad and Tobago.

**Shahiba Ali** is a former Teacher Educator/Lecturer (Geography/Social Sciences) at the School of Education, The University of the West Indies St Augustine, Trinidad and Tobago.

**Nafeesa Ali** is a secondary school teacher with an interest in addressing literacy in the teaching of Geography.

**Ambika Sandhya Persad** is a secondary school teacher of Physics and Integrated Science at a secondary school in the North Eastern Educational District of Trinidad and Tobago. She holds a Bachelor of Science degree in Physics (honours), and a Post Graduate Diploma in Education specialization in Science (with distinction), from The University of the West Indies, St. Augustine Trinidad and Tobago. Her research interests include: science education at the secondary level, STEM education and integration of technology in the classroom.

**Rawatee Maharaj-Sharma** is a senior lecturer in Science Education (Physics) at the School of Education, The University of the West Indies, St. Augustine Trinidad & Tobago. Dr. Sharma is also the current Deputy Dean of Planning & Programming at the Faculty of Humanities and Education. She has been the Coordinator of the Bachelor of Education Programme for the past nine years. She previously lectured at York University, Canada (5 years), in Physics and Astronomy. Her research interests include novel approaches in science education, science students' voices and students' conceptions and misconceptions in science.

**List of Reviewers for Caribbean Curriculum Action Research Special Issue 2020**

**Edited by: Freddy James**

<b>Name</b>	<b>Position and Institution</b>
1. Dr. Iris Hewitt Bradshaw	Lecturer the University of Trinidad and Tobago (UTT)
2. Dr. Patricia Briscoe	Assistant Professor in Education, Niagara University Ontario Canada
3. Dr. Joycelyn Rampersad	Former President of CREDI and Lecturer in Science Education at The School of Education, The UWI, St. Augustine
4. Dr. Rachel Ann Charles	Course Director and Lecturer, Birmingham School of Media Researcher, Birmingham Centre for Media and Cultural Research, Birmingham City University
5. Dr. Sabeerah Abdul-Majied	Coordinator of the ECCE Programme, The School of Education, The UWI, St. Augustine
6. Dr. Laila Boisselle	Former Lecturer in Science Education at The School of Education, The UWI, St. Augustine Lecturer and Programme Coordinator (Science Education), The Higher Colleges of Technology, UAE
7. Dr Susan Herbert	Senior Lecturer in Science Education at The School of Education, The UWI, St. Augustine Chair, sub-committee for Graduate Studies and Research, School of Education, UWI, St. Augustine Deputy Dean, Graduate Studies and Research, Faculty of Humanities and Education, The UWI, St. Augustine