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Teaching and learning of physical sciences grade 11 in rural schools through rural blended learning strategy

Tebogo Edwin Nkanyani [1*], Awelani V. Mudau [1], Lettah Sikhosana [1]

[1] Department of Science and Technology Education, College of Education, University of South Africa, Pretoria, SOUTH AFRICA

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Abstract

The aim of this paper was to explore how teaching and learning of physical sciences using rural blended learning strategy (RBLS) in rural schools occurred. A qualitative case study design was used to collect data from a from a rural school. Hence, it was a purposeful sampling strategy with one physical science teacher and his 45 learners. Data was collected through classroom observation, semi-structured, and focus group interviews. The study found that issues such as digital divide, poor training of teacher, incorrect teaching approaches, workloads, poor parental involvement remain challenges in rural areas, even though the teacher experienced effective institutional support and exposure to e-learning. As such, we noted his ability to create Google Classroom (GC) and WhatsApp platforms and their effective use, even though the same could not be said about the use of video conferencing (VC) platforms. Issues like workload were cited as the barriers to the implementation of RBLS. The teacher also carried on with teacher centered methods, which were not effective not only for the learning of science but also for the implementation of blended learning. Therefore, the teacher failed to flip the classroom. Learners on the other hand found RBLS to be inducing their self-directed learning and motivation. We recommend that more prolonged training on the use of RBLS should be provided, not only to teacher but also to the learners. Department of basic education should engage network providers on the provision of zero-rated data for educational applications such as GC and VC platforms while school governing bodies provide institutional support to both learners and teacher.

Keywords: blended learning implementation, rural blended learning strategy, self-directed learning, flipped classroom, Google Classroom

INTRODUCTION

The emergence of the Fourth Industrial Revolution (4IR) expected us to rethink how we teach science (Aslam et al., 2023). While the emergency of the COVID-19 pandemic opened our eyes much wider, to understand that one approach of teaching science cannot be enough (Will, 2020), as during the pandemic, teachers together with all stakeholders had to find other alternative ways to facilitate teaching and learning to their learners. As the face-to-face approach was minimal during the pandemic, due to lockdown restrictions, alternative methods such as the online platforms of teaching were used.

However, since both the online and to some extent a face-to-face approach was used, teachers applied blended learning modes during their teaching (Armellini & Rodriguez, 2021). They were amalgamating those two platforms. Blended learning approaches carry a lot of advantages to teaching and learning. For example, due to its learner-centeredness, blended learning improves learners' communication and collaborative skills, self-directed learning (SDL), and interactions (du Plessis, 2020). In addition, learners become architects and utilizers of their knowledge and

With the exception of the introduction, the content of this manuscript were derived from a PhD thesis, titled, designing and implementing a strategy for blended teaching and learning for physical science teachers in rural schools.

✉ 44616732@mylife.unisa.ac.za **(*Correspondence)** ✉ mudauav@unisa.ac.za ✉ esikhol@unisa.ac.za

Contribution to the literature

- This study diagnosed the teaching and learning of physical sciences in a rural school with rural blended learning strategy (RBLS).
- RBLS enhance physical science learner`s SDL while increasing their motivation for learning.
- Improved institutional support and pro-longed training to teacher on RBLS may have positive implications for the teaching and learning of physical sciences.

not just passive spectators in their learning (Javadi et al., 2021). Furthermore, learners' social interactions are enhanced. It therefore is not surprising that learners highly recommend blended learning based on their preferences, the depth of technology employed, and the gains thereof (Li et al., 2020).

In addition to that, one should not be much concerned about high costs when implementing blended learning in their class. That advantage borders well for rural schools, that are ranked according to the depreciation index, which focuses on the percentage of households earning between R1 and R1 600 (Businesstech, 2016). However, rural schools do experience other challenges in the implementation of blended learning. For example, Tachie (2019) indicated how teacher' poor access to computers lead to learners' poor computer skills, which is a downside to the learning process as learners' use of computers is directly proportional to their academic success (Simões et al., 2022). Nevertheless, is not just the access to technology, but the teacher' poor technology skills that have a negative impact on the learning process (Msiza et al., 2019). It is therefore prudent that both teacher and learners be trained before the implementation of e-learning (Kalogiannidis et al., 2023), which in the context of this study included the use of learning management systems (LMSs), social media (SM), and video conferencing (VC) platforms to teach physical sciences.

There are plenty of blended learning models that were implemented in the science classrooms. To name few, we have the station rotation blended learning model, which allows learners to rotate between different learning contexts or groups; the lab-rotation blended learning model, wherein learners switch locations by moving from one class, where they do a certain activity and continue to the next stage of the activity in other learning setting like a laboratory or a computer laboratory (Staker & Horn, 2012). There is also the individual rotation model in which each learner is given a predetermined schedule, wherein they switch between different learning platforms, whether online or face-to-face (Staker & Horn, 2012). However, the school lacked sufficient resources to allow for the use of rotation models to suffice. Nevertheless, the flipped classroom model, wherein exercises in normal face-to-face classroom are carried over home as homework while home exercises are converted into classroom exercises (Northrup et al., 2015), seemed to be fit for purpose.

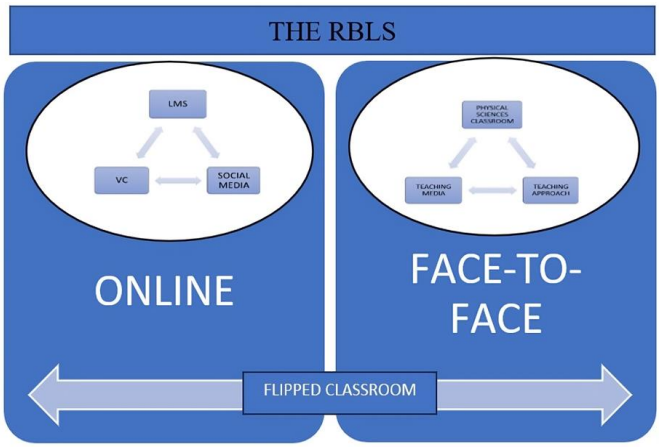

Figure 1. RBLS (Nkanyani, 2023)

The current paper implemented the blended learning strategy in a physical science class of a rural school to examine how it shaped the learning process. RBLS by Nkanyani (2023), influenced by the flipped classroom model and shown in **Figure 1**, was the chosen strategy. Thus, this paper was guided by the following questions:

1. How does RBLS shape the teaching and learning of physical science in rural schools?
2. How did RBLS shape physical science learners' SDL?

Initiation of the Strategy

The implementation of RBLS was initiated with some activities. This included engaging the school principal (C2P) in allowing learners to bring along cell phones to school for the duration of the implementation. The principal acceded to the request but needed to consult with school governing body (SGB). This was a great boost as physical science teacher (C2T) was able to use the cell phones to add some of physical science learners (C2L) to Google Classroom (GC) platform. Likewise, the C2P was engaged in the provision of electricity power backup, which never materialized. The teacher C2T was also trained on the use of RBLS to teach physical science. The focus was the themes that are indicated **Figure 1**. The classroom observations involved observing the face-to-face and online context for at least three lessons.

METHODS

A qualitative approach was used in this study (McMillan & Schumacher, 2010). Data was collected from a physical science teacher and learners.

Table 1. DAS of RBLS

Face-to-face			Online	
Themes	Indicators		Themes	Indicators
Connection to prior knowledge, giving instructions, & outlining lesson objectives	Does teacher: Link lesson to prior knowledge? Give instructions in lesson (is it verbal or written)? Does teacher outline lesson objectives?		Use of LMS	LMS creation, adding participants, announcing & discussing, assessment, resources upload, & simulation of experiments
Link to online sessions/platform	Is there a link between face-to-face & online platforms?		Use of SM	SM group/s creation, discussions & announcements, upload of resources, scheduling of classes, & assessments
Teaching methods/ approaches	What teaching method/s does teacher employ? Are method learner-centered or teacher centered?	Flipped classroom	Use of VC	Existence of platforms, scheduling of online classes, live/synchronized &/or recorded asynchronous sessions, use of keys/tabs during teaching, length of sessions, & use of videos for experiments/demonstrations
Experiments	Does teacher facilitate practical work, or does he show concepts with experiments?			
Assessment & feedback	What assessment method do teacher use? Does teacher give feedback/how does teacher give feedback? Is any reference to online platform?			

The teacher was required to teach at least three lessons with RBLS. The intention was to observe how RBLS, when introduced shapes teaching and learning in physical science classroom, hence answering the research question. The video recorder was employed to record all the occurrences in class while the field notes were employed for jotting down occurrences noted that were crucial in answering the research question. After the classroom observations, the teacher and three learners were interviewed through a 22 minute-long semi-structured interview and a 12 minute-long focus groups interviews, respectively, which were audio recorded, to understand their experience with the designed RBLS.

Sampling Strategy

The purposeful sampling strategy was used (Xie & Li, 2023) to choose participants who hold specific characteristics of our target click or tap here to enter text.and that could assist us to answer the research question. Therefore, it was a criterion sampling strategy (Yanuarto et al., 2023) with the criteria that the population must be from a school in a rural area. The sample consisted of a one physical sciences teacher and a class of 45 learners. The teacher had to be teaching physical science in Sekgosese Area, which belonged to Mopani East District of Limpopo.

Data Analysis

The data that was collected through semi-structured interview, focus group interviews, and classroom observation was transcribed before been analyzed. The analysis was made on both the online and face-to-face aspects of the lesson. Detailed analysis system (DAS) in **Table 1** together with RBLS were key in outlining aspects that should be focused on during data analysis. DAS was designed with context of blended learning in mind in that it should contain both the face-to-face and online parts of learning. The design was inspired by the flipped classroom model. For the face-to-face part, DAS focused on the instructional aspects, testing prior knowledge, how lesson objectives are outlined, how the teacher links the online platform to what learners are currently learning in the face-to-face context, the teaching approach, experiment/practical demonstration, and assessment together with its feedback. The online platform was analyzed on whether the teacher was able to use GC LMS, SM platform, and VC platforms to teach physical sciences. What was also the focus was whether the teacher was able to link what is currently learnt in online platform, to what was learnt in the face-to-face platform.

RESULTS

Face-to-Face Platform

Prior knowledge, giving instructions, & lesson objectives

C2T started the first lesson, which was the relationship between force and acceleration experiment as presented in **Figure 2**, by taking learners through what is expected from them in the experiment.

Figure 2. C2Ls doing experiment on behalf of whole class (Nkanyani, 2023)

Figure 3. C2L solving an electricity problem on board (Nkanyani, 2023)

However, he never linked the experiment to any prior knowledge or theory that pertains to the experiment they were going to perform. He then redeemed himself in the second lesson, where he taught about circuit diagrams. He started the lesson by visiting prior knowledge from grade 10 work of series and parallel circuits. C2T also visited prior knowledge to a lesser extent when he was teaching the topic–Power. He asked learners "what is energy?" to which learners responded by saying, "energy is the ability to do work." He then told them that what they stated was learnt in grade 7.

Link to online sessions/platform

Likewise, he failed to mention the online platforms or refer to them in the first two lessons. He referred learners to GC platform after the third lesson, when he had already concluded the lesson. He failed to connect the online platform with the face-to-face platform, hence there was no blended learning of physical science. What was exciting to observe in one lesson is that C2T clarified a learner's misconception about GC. The learner thought GC consumes a lot of data and felt WhatsApp was better for which C2T corrected by indicating that GC consumes less data similar or less compared to WhatsApp. However, it was established in the focus group interviews that some C2Ls used WhatsApp ticket data and not the data meant for general use.

Teaching methods/approaches

C2T used teacher-centered methods for most of the lessons. For example, in both lesson 2 and lesson 3, he spent a lot of time writing on the board and speaking simultaneously while learners were busy writing down notes. Also, in the first lesson, which was the experiment, he picked four learners to come and do the experiment while the rest of the class were taking down reading as presented in **Figure 2**. Science is a doing subject as per the requirement of physical science curriculum (Department of Basic Education [DBE], 2011). Likewise, teacher-centered methods did not yield active learning in class, which is one of the expectations of physical science curriculum (DBE, 2011)

C2T consequently deprived C2Ls of an opportunity to be engaged hands-on with the content. He indicated time as an issue that led to his choice:

> "The reason why I did that was because of time again because learners were still busy writing their common tests. So, of which I could not take much time with them. I wanted them to also prepare for the common tests, which they were busy writing. So, I opted to call for learners to demonstrate to the rest just to save time"–C2T.

Likewise, in the dominant part of his lessons, he kept on writing on the board while C2Ls were reciting answers either in small numbers or as a whole class. He continued by doing the calculations for C2Ls for the most part of the lessons, except at one instant as presented in **Figure 3**. C2T indicated that he wanted to check if his C2Ls understood what he taught:

> "There is one learner whom I called to come and solve one of the problems. Yeah, I gave to them. Yeah. Yeah, so wanting to check if they really understood"–C2T.

However, he was inconsistent as that approach was not evident in the other lessons. He indicated time as a factor and that he tried to address that by giving learners work in the WhatsApp and GC platform.

Regarding the teaching media, the teacher deprived C2Ls of an opportunity to learn with objects they see. Rather than naming electric components, the teacher could have brought some if not all, of the electric components to class for the purpose of showing learners during his teaching of electric circuits. Even though he tried to use the wall plug socket as an example of a resistor, he could have brought some resistors to class.

Experiments/practical demonstrations

Except for the first lesson, which was an experiment, C2T never did any practical demonstration in the second

and third lessons. That may have created an impediment to active learning, which is one of the aims of the physical science curriculum (DBE, 2011).

C2T only assessed the learners in lesson 1, which was an experiment, where learners were subsequently required to write a practical report. He never assessed learners in lesson 2 and lesson 3. He said he realized that the content for lesson 2 did not carry much weight, which could be assessed and then decided to assess both the content for lesson 2 and lesson 3 at once:

> "What has transpired is, the electric circuit. So, for the second lesson, it was not having some of the things, whereby the problems, which I normally share with them you know caters both lessons. The reason why I did not give them a problem during the first lesson was that I wanted to also introduce the other part so that when I give them the problem it will be catering for second and third lessons"–C2T.

But that did not occur in class. This was a downside of his approach as according to Wilson (2018), classroom assessment positively impacts learning process.

Online Platform

Use of learning management systems

C2T created GC platform before implementing RBLS. He consequently managed to add the C2Ls through the class code and through the email invitations, which learners created by themselves under his guidance. During the first observation, he managed to add 13 out of 43 learners and ended up with 32 learners by the conclusion of my observations. However, about 11 learners had not joined GC platform. C2T indicated the issue of parental resistance, as a factor:

> "What I've discovered is that some of learners' parents are resistant. They do not want to buy them cell phones. They are saying they are very playful when they are with their cell phones. The ones, which I could not manage to add was because of not having a cell phone"–C2T.

C2Ls themselves indicated to have experienced a lot of challenges when joining GC platform. For example, one C2L indicated that the challenges are mostly due to the fact that the platform is alien to them:

> "It's a new thing to us, connecting to it was pretty, it was pretty difficult in terms of the steps we followed to get connected"–C2L.

C2T consequently managed to communicate with his C2Ls through GC platform when he wanted those who were already added, to send a message to those who were yet to be added as presented in **Figure 4**. That

Figure 4. GC/stream cell phone version screenshot (Nkanyani, 2023)

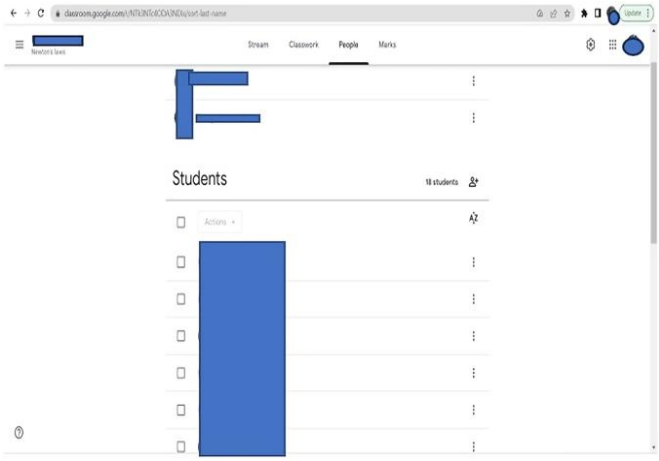

Figure 5. GC desktop version participant screenshot 1 (Nkanyani, 2023)

communication was fruitful as the number of C2Ls increased to 18 by the day I made my first classroom observations as presented in **Figure 5**.

Additionally, he used GC LMS to engage C2Ls on a subject-related matter or even to refer to the face-to-face content as presented in **Figure 6**. For example, just after the third lesson, he uploaded an assessment that required learners on the stream of GC and indicated to them to send the work back after writing as presented in **Figure 7**. At the same time, he assigned 30 learners of his class the same work on the Classwork tab of GC as presented in **Figure 8**. However, only one of C2Ls did submit their work on GC. When I asked C2Ls why they did not upload their written work on GC, one C2L

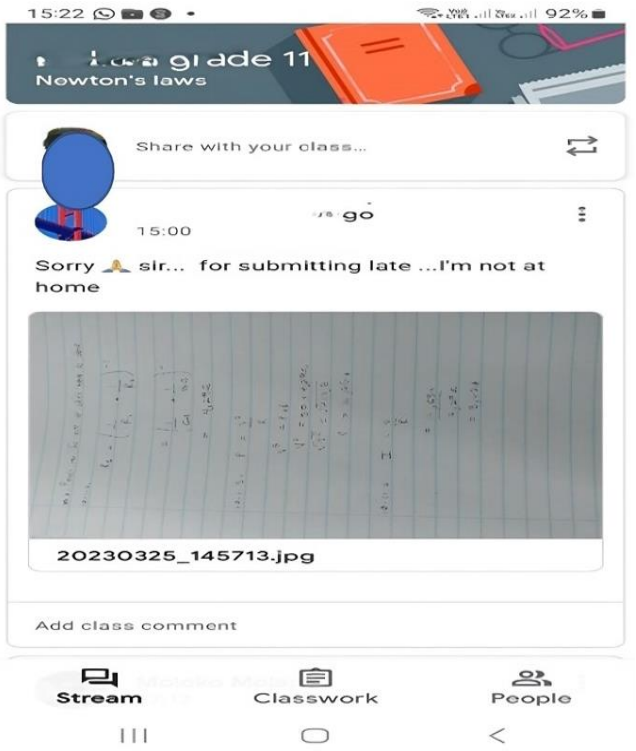

Figure 6. C2L uploaded work & communication in GC (Nkanyani, 2023)

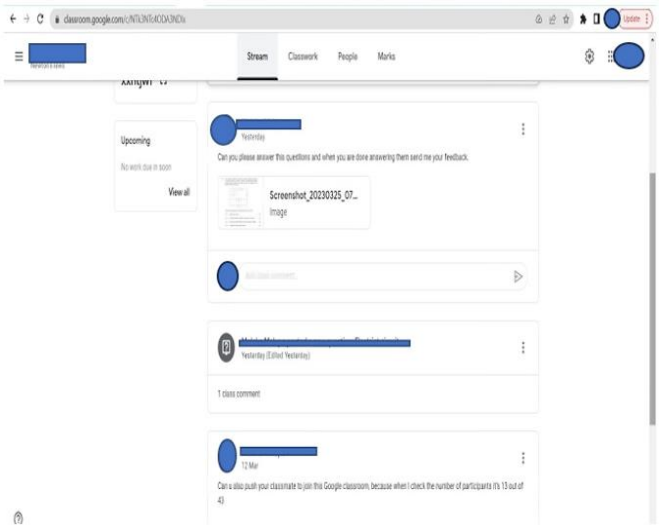

Figure 7. GC stream desktop version (Nkanyani, 2023)

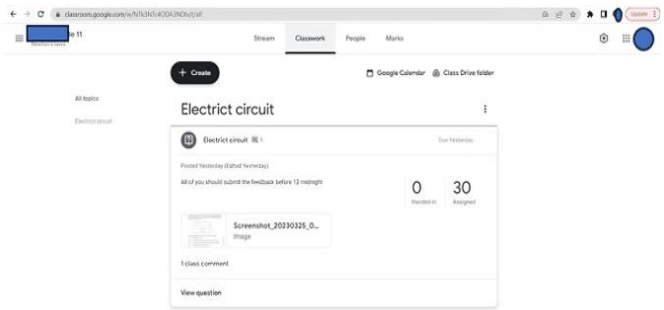

Figure 8. GC classwork tab (Nkanyani, 2023)

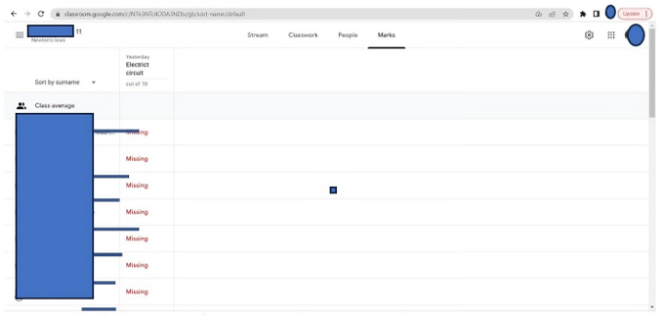

Figure 9. GC marks tab (Nkanyani, 2023)

explained that the challenge faced had to do with their inability to use the platform:

> "Yes, I experienced a few challenges … especially when we're supposed to give feedback on activities that we were given. I explained a challenge there because I did not know how to"–C1L.

Nonetheless, C2L consequently managed to use other methods to send work to C2T:

> "So instead, I just sent the e-mail directly to the teacher because I did not know how to send the feedback via the Google"–C2L.

Interestingly, one C2L found GC to be improving her SDL:

> "I like the fact that we can learn from our comfort zones. We can be at home. Some people like me do not like social interactions. So, learning through GC has given me a chance. From where I can learn freely without having to wonder what people are thinking, what people are doing. It is just to me and my work. I feel isolated and I feel like I do best when I'm isolated from other people"–C2L1.

On the same note, another C2L shared with me how GC platform had motivated him to be more engaged in his studies:

> "Now I know how to invest in my studies to improve my academics. So yeah, GC is giving me the opportunity"–C2L2.

Evenhouse et al. (2023) contended how blended learning platforms yield SDL, promote 21st century skills, and align with 4IR. In addition, they proposed that this may lead to development of social constructivism, and learner-centered active learning (Evenhouse et al., 2023). Likewise, C2T had not used the marks tab for GC as presented in **Figure 9**. He could have used it to give C2Ls a report back of their progress of their performance in a digital manner (Huber et al., 2024). He said he felt that since learners responded to the task on WhatsApp

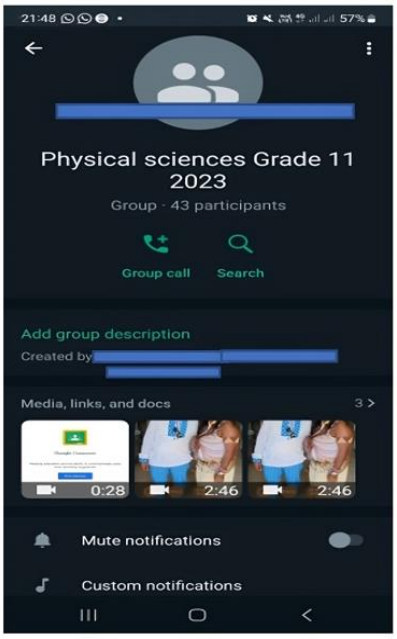

Figure 10. WhatsApp physical science group participants page (Nkanyani, 2023)

and not GC, he should use the WhatsApp platform to report back:

> "Uhmm! I could not give them their marks via GC, but I gave them via WhatsApp because they responded in WhatsApp"–C2T.

C2T had not uploaded any learning support material such as notes, videos, pictures, and previous question papers as per RBLS. He could have used the platform to share, for example, practical worksheet on GC platform prior to experiment's performance. He indicated workload as reason for not following that route:

> "No, I could not manage to share those via WhatsApp or GC due to the workload"–C2T.

Likewise, he had not referenced the face-to-face platform in GC platform. As a result, he could not flip the classroom. It was also refreshing to note that C2T used SM to aid his teaching of physical science. C2T had created a WhatsApp group that he used with his grade 11 physical science learners. By the time of the first observation, he had added 40 learners in total, with a total of three teacher, resulting in 43 members as presented in **Figure 10** and **Figure 11**. In the last face-to-face observation, number of learners had increased to 42.

The teacher uploaded a video on the platform explaining to the learners how to download, install and join GC platform as presented in **Figure 12**.

He even used a WhatsApp voice note to amplify his message. It can also be noted from **Figure 7** that after sending the voice note, he added two more learners to the WhatsApp group. One learner also had a challenge in joining GC platform. However, through the

Figure 11. A WhatsApp group chat page with uploaded video & voice (Nkanyani, 2023)

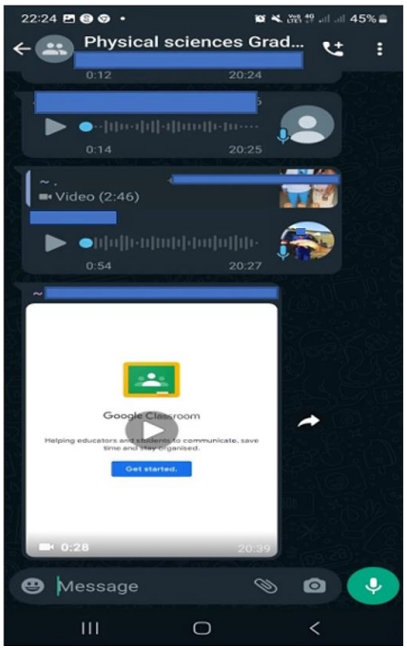

Figure 12. A screenshot of a video engagement between C2T & C2L (Nkanyani, 2023)

engagement with C2T, she sent a recorded video showing where she faced the challenge as presented in **Figure 12**.

The learner could use the online application to engage and raise their concern with the teacher. I asked C2T if he was able to assist that particular learner, and he responded by saying:

> "I managed because I ended up, you know, inviting her via the e-mail. So, I got the e-mail from that screenshot she sent to me. So, I ended up inviting her. And she was able to respond. So, it came to a success because I now have her on my GC"–C2T.

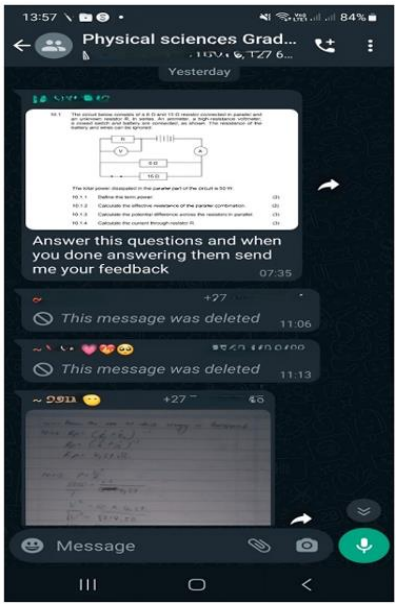

Figure 13. Assigned work in WhatsApp platform (Nkanyani, 2023)

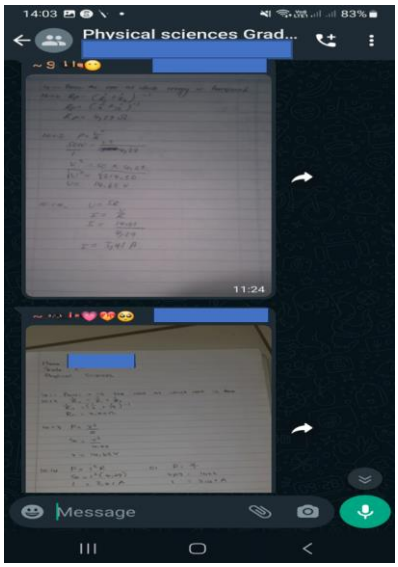

Figure 14. C2Ls submitted work on WhatsApp (Nkanyani, 2023)

The teacher also used the WhatsApp platform to assess learners as presented in **Figure 13**.

He sent the same assessment as the one he assigned in GC platform. He indicated that he did that to accommodate some learners who were failing to join GC platform. Nonetheless, he only did that in the third lesson, and not the first two lessons.

Use of social media platform/s

Interestingly, unlike other platforms, learners responded positively by submitting their tasks on the WhatsApp platform as presented in **Figure 14**. To be specific, 21 learners did submit the task.

I asked C2Ls why they chose WhatsApp over GC platform and they indicated that most of them are using

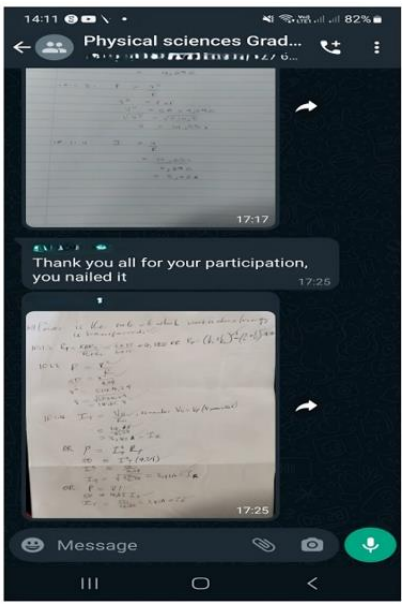

Figure 15. C2T feedback on WhatsApp (Nkanyani, 2023)

WhatsApp ticket that caters only to WhatsApp and no other applications:

> "There is a specific type of WhatsApp data and there's general data for all app. So, the one that she had was for WhatsApp only (WhatsApp ticket). Therefore, she could not log into GC"–C2L.

Ultimately, the teacher gave them feedback by sending them back the memorandum/marking guideline and briefly commenting on their performance as presented in **Figure 15**. The teacher did not mark the task and gave the following reason for that choice:

> "In fact, the feedback, which they gave to me, all of them answered the problems correctly. Then I had to also paste solutions, because I also added some of the methods, which they did not use. Other than that, there are other ways, which you can still use to solve these problems"–C2T.

This implied that C2T used WhatsApp platform to assess and give C2L feedback.

Use of video conferencing platform/s

Even though C2T had used videos to explain instructions to the learners on SM platform, he had not used any of VC platforms to do that. However, he utilized the screen recorder application in his smartphone to record GC joining demonstration as presented in **Figure 12**. He had not used MS Teams, Zoom, or Google Meet platforms. He indicated that he is doing that for a group of learners from different schools that he teaches after school for enrichment purposes and has never done that with the learners from his school of employment. He gave the following reasons for that:

> "No, it has never crossed my mind because you know at my workstation normally learners talk about the challenges, which they normally have. They always complain about not having data, you know, some complains about not having smartphones. Yeah, that's the reason why I was having challenges. But the ones, which I, normally see, during extra lessons, they do have smartphones and their parents also support them when it comes to, buying data for them, yeah"– C2T.

C2T deprived C2Ls of an opportunity to be taught through VC platforms, which would have allowed them to interact with their peers (Hopper, 2014), and promoting social presence in process (Oh et al., 2018).

DISCUSSION

C2T failed to form a link between the online and face-to-face platforms. He had not made mention of any online platforms in the face-to-face platforms and vice-versa. RBLS expected him to begin the face-to-face lesson as a continuation of the online lessons and/or complete the face-to-face lesson as a pre-requisite to the online lesson. Likewise, RBLS expected C2T to revisit prior knowledge and deal with misconceptions, which he dealt with in the last two lessons. Nonetheless, he failed to outline lesson objectives and give instructions. Contrary to what physical science curriculum expects (DBE, 2011), C2T chose to use teacher-centered method.

For example, in the performance of the experiment, C2T chose to use a few C2Ls to do the experiment while the rest of the class recorded the experiment seated. Science is a doing subject. However, C2T deprived the C2Ls of an opportunity to learn hands-on, through learner-centered methods, which are known to support blended learning (Javadi et al., 2021). Furthermore, the approach chosen by C2T did not give room for engagement between him and C2Ls and between C2Ls themselves. That provided a barrier to social constructivism in the classroom (Laux, 2018).

Consequently, learners had no room for cooperative learning (Marzouki et al., 2017) with the teacher failing to contextualize learning. For example, in electric circuit lesson, C2T could have brought electrical components such as resistors, batteries, and cells. In the same lesson, C2T was explaining the difference between a battery and a cell, which could have been easily explained with cells in C2T's hands. In addition, when solving problems, C2T chose to do the calculations on the board while C2Ls recited answers. He only allowed a C2L only once to come to the board and do it on behalf of others, and he was never consistent with that approach.

Again, the approach was teacher-centered, contrary to what blended learning is embedded in (Javadi et al., 2021). C2T cited time as an issue. Further, C2T did not assess the learning process during the face-to-face class, a choice, which Wilson (2018) indicated to have a negative impact on the learning process. Nevertheless, he only assessed learners through the homework on the online platform. However, it was interesting to note that C2T found using GC simple. For example, not only did he create the platform, but he also managed to add 30 of the 43 C2Ls. The same could not be said about some of the C2Ls, who did not find joining the platform easy, indicating issue of data vs data tickets as the challenge.

C2T highlighted the lack of parental involvement bordered on initiating GC platform. However, some C2Ls indicated how GC allowed them to learn at their own pace and motivated them to work independently, something that was indicated by Lubis et al. (2023). Consequently, GC influenced their SDL (Evenhouse et al., 2023). C2T also managed to use GC effectively to support his teaching of physical science by taking advantage of some of its tabs, like the classwork tab and the stream (Li, 2020). For example, he uploaded an assessment under the classwork tab in the third lesson and asked C2Ls to submit. He also duplicated the assignment under stream of GC as an announcement.

However, only one C2L responded. One of C2Ls who did not submit highlighted how she struggled to submit work on GC platform, as a result she ended up sending her work through an email. Likewise, C2T could not report back or give feedback to learners through the platform in a digital manner (Huber et al., 2024). Nonetheless, he indicated that he gave them a report on the WhatsApp platform. More so, C2T could not upload any learning support materials such as notes, pictures, videos, and links that could have helped C2Ls understand the content better.

C2T also used the WhatsApp platform to teach physical science effectively. For example, he uploaded work that C2Ls had to respond to, the same work he had uploaded in GC platform. However, in this platform, most learners responded and returned the written work. This was not surprising since Gon and Rawekar (2017) found WhatsApp to be an effective instrument for facilitating an activity for learning, while Roy and Das (2023) noted how through WhatsApp groups, students can collaborate, share ideas and discuss problems. Likewise, C2T gave them feedback by sharing the memorandum and indicated to them that all 'nailed it.' Nonetheless, C2T did not use the platform to give them instructions or send additional resources and videos. He minimally engaged them on subject-related matters.

It was also interesting to note that C2T had plenty of video creation skills. For example, when creating GC platform, he used a screen recorder application on his phone to show C2Ls how to join GC. He also assisted one C2L struggling to join using the screen recorder application. Likewise, during the interview, he indicated how he uses Microsoft Teams and Zoom meetings VC

platforms to create lessons for the learners he assists after school hours as a private tutor. Nonetheless, he never demonstrated those skills in his grade 11 classroom at his school of employment. He could have used the platforms to record asynchronized sessions or instructions, which are known to develop learners' critical thinking and problem-solving skills (Hew & Knapczyk, 2007), or to schedule live sessions, but did not. VC platforms are known to promote social presence in the process (Oh et al., 2018), and as such, C2T deprived C2L of that opportunity.

CONCLUSIONS

The study managed to diagnose the teaching of physical sciences using RBLS. The issue of digital divide, poor training of teacher, incorrect teaching approaches, workloads, poor parental involvement remains a challenge in rural areas. It is however interesting to note C2T's ability to create GC and WhatsApp platforms and their effective use, even though the same could not be said about the use of VC platforms. RBLS also assisted C2Ls to achieve their SDL and motivation in learning, adding to the findings of du Plessis (2020) and Evenhouse et al. (2023). We recommend that more prolonged training on the use of RBLS should be provided, not only to teacher but also their learners. Parents should also prioritize involving themselves more in their children's schoolwork. Subject advisors should in their support to physical science teacher, assist them in applying learner-centered approaches and hands-on activities that they use in their teaching. DBE should also engage network providers on the provision of zero-rated data for educational applications such as GC and VC platforms while the SGB should provide institutional support to both learners and teacher.

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