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The Effects of Reality Pedagogy on Motivation and Academic Performance to Learn Biology in Class IX

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Abstract

Teaching Biology in an innovative way has always posed challenges due to its complex terminology and abstract concepts. This study explored the effects of reality pedagogy as an alternative instructional strategy on learner motivation and academic performance in learning biology at the ninth-grade level. To achieve this, a quasi-experimental research design was employed, including a pre-test/post-test assessment, biology learning motivation questionnaires, semi-structured interviews, and classroom observations. Descriptive and inferential statistics were used to analyse the data. The findings of the study revealed that the implementation of reality pedagogy had a positive influence on learner motivation in learning biology. Additionally, a significant correlation was identified and observed between motivation levels and academic achievement in the subject. The implications of these findings, as well as recommendations, are also discussed in the study.

Keywords: *Reality pedagogy, motivation, academic performance, instructional strategy, biology learning, class IX*

Introduction

The education system in Bhutan has witnessed unprecedented change over the years, particularly since the 1960s, in terms of both quantity and quality. With the advent of modern education, there have been significant transformations in the science curriculum from borrowed curricula to much more socially and culturally relevant new science curricula from classes four to twelve. In Bhutan, science topics start in the primary grades through class eight in the form of integrated science.

Learners are introduced to all three branches of science, such as biology, chemistry, and physics, as part of the integrated science curriculum. Nevertheless, biology is taught separately beginning in class IX since Bhutan's national science curriculum divides science into three distinct areas: biology, chemistry, and physics (Ministry of Education, 2022).

In today's evolving world, education plays a crucial role in equipping learners with the knowledge and skills necessary to thrive in an increasingly complex society. Amongst the many subjects taught in schools, biology education holds significant importance as it gives learners a deeper understanding of life, the environment, and their place within the natural world. In addition, it is also crucial to prepare learners for their careers (Jeronen et al., 2016).

However, teaching seemingly abstract biological concepts is difficult in a classroom that consists of learners with diverse backgrounds leading to poor scientific literacy skills. This is evident from the low scientific literacy of 41.1% from the PISA-D report (Bhutan Council for School Examinations and Assessment, 2019a) and the low overall biology subject national mean mark of 52.88 (refer to Table 1) from the year 2018 to 2022 Bhutan Certificate of Secondary Education (BCSE) (BCSEA, 2018, 2019b, 2020, 2021, 2022). Therefore, it could be one of the reasons that learners continue to face challenges in comprehending abstract concepts and complex biological jargon, leading to decreased motivation and underperformance in academic assessments.

Table 1

BCSE Mean Marks for Biology in the Last Five Years

National Mean Mark (BCSE)						
Year	2018	2019	2020	2021	2022	Total
Mean Mark	45.7	53.2	53.3	50.4	61.8	52.88

In recent years, access to education has significantly increased with a paradigm shift from teacher-centred to learner-centred (Kasim, 2014). However, there is still a need for effective instructional strategies that build motivation and improve academic achievement in biology. This is because learners often exhibit a lack of motivation in learning biology despite its essential role in their career and understanding of the natural world (Papilaya & Matruty, 2019; Regmi & Devkota, 2022). It is possibly attributed to several factors such as assignments, use of learning materials, teacher's attitude, classroom setup including other passive pedagogical practices, the inability

to connect biological concepts with real-life experiences, and the limited opportunities for active learners' participation. Such a trend poses a risk of reduced engagement in learning processes, limited conceptual retention, developing negative attitudes towards learning, and poor academic performance. Consequently, the learners are supposedly not motivated for lifelong learning. Nevertheless, with a shift in the national school curriculum from traditional-based to 21st-century competency-based education (Ministry of Education, 2022), learners are expected to maintain a robust understanding of biological concepts with the highest scientific temper.

To address these challenges, this study investigated the potential impact of reality pedagogy as an alternative approach to biology learning in class IX. Reality pedagogy is an innovative teaching approach that seeks to connect learners' lived experiences and cultural backgrounds with the subject matter, making learning more relevant, meaningful, and engaging (Taher et al., 2017). Further, by incorporating real-world examples, cogenerative dialogue, and interactive discussions, reality pedagogy offers a promising framework that can enhance learners' motivation and improve their academic performance.

Although several studies have demonstrated the positive effects of implementing the five principles of reality pedagogy on student motivation and academic achievement, there is a notable lack of established research on this topic in the Bhutanese context. In fact, no study has been conducted thus far to confirm the impacts of using reality pedagogy in Bhutanese classroom settings. Therefore, in an effort to introduce innovative and creative approaches to teaching biology, this research aimed to assess the academic achievement and motivation of class nine learners. Additionally, this research endeavour allows researchers to reflect upon and articulate effective pedagogical strategies for teaching biology. Moreover, this study establishes baseline data for future investigations on the application of reality pedagogy in the unique Bhutanese educational context.

Aim of the Study

This study aimed to investigate the effects of reality pedagogy on the motivation to learn biology and academic performance in Class IX learners.

Research Question

This study intends to answer the following research questions:

Overarching Question: How does the implementation of Reality Pedagogy impact the motivation to learn biology and the academic performance of Class IX learners?

Sub-questions:

- How effectively does reality pedagogy motivate Class IX learners to learn biology?
- How do class IX learners perceive and respond to the implementation of Reality Pedagogy in their biology learning experience?
- Is there a significant difference between the pre-test and post-test scores of the learners?

Literature Review

Reality Pedagogy

Reality pedagogy, a relatively new and innovative approach to teaching, has gained increasing attention in recent years for its potential to improve learner engagement, motivation, and academic performance. According to Moskal (2019), reality pedagogy is teaching and learning from learners' perspectives. Emdin (200) who coined the phrase reality pedagogy, claims that it incorporates different strategies for efficient science teaching and learning into a more coherent and workable pedagogical strategy. Further, Emdin (2011) asserts that reality pedagogy is nested between critical and culturally relevant pedagogy, resulting in effective learning methods for learners.

The essential tenet of reality pedagogy is that learners are the content delivery experts while teachers are the subject matter experts. According to reality pedagogy, there must be a knowledge exchange between the teacher and learners for teaching and learning to occur (Emdin, 2010, 2011). In order to improve science teaching and learning, reality pedagogy achieves its objectives through a collection of five key principles. These five key principles are cogenerative dialogue (cogen), co-teaching, cosmopolitanism, content understanding, and context incorporation into instructions (5 Cs) (Emdin et al., 2021; Taher et al., 2017).

The first C (cogenerative dialogue, or cogen) is a structured strategy in which learners and teachers discuss and deconstruct the lessons within to reflect, critique, and overcome barriers to engagement for learning. Similarly in second C (co-teaching), learners take the role of teachers by being involved in lesson planning with the teacher and teaching small and whole classes to let them experience the role of teachers (Emdin, 2009). Likewise, the third C (cosmopolitanism) attempts to teach that everyone is a citizen of the world and is equal despite having differences in culture and race (Emdin et al., 2021). Further, the fourth C (context) incorporates the

learning of science context into real-world situations for better understanding. Finally, the fifth C (content understanding) involves the teacher's consistent development of expertise in the science content being taught to learners.

In summary, this modern teaching approach coined by Emdin, emphasizes learning from learners' viewpoints. It integrates strategies from critical and culturally relevant pedagogy, highlighting learners as content experts and teachers as subject matter experts. Key principles include cogenerative dialogue (cogen), co-teaching, cosmopolitanism, contextualization, and content mastery. Cogen fosters structured discussions to overcome learning barriers, while co-teaching involves learners in lesson planning and teaching. Cosmopolitanism promotes equality despite diversity in a classroom setting. Embedding learning in real-life contexts enhances understanding, with teachers mastering subject matter for effective instruction.

Academic Performance and Motivation Using Reality Pedagogy

Academic achievement and motivation are two critical components for learners to succeed. Self-driven learners are more likely to participate in class, own their learning, and persevere in the face of difficulties. On the other hand, a lack of motivation can result in apathy, disengagement, and subpar academic achievement (Vargas-Ramos et al., 2021). As such, educators are constantly searching for ways to improve these outcomes among their learners. It has been found that one promising contemporary approach is the use of reality pedagogy, which emphasises the importance of acknowledging and respecting learners' cultural experiences and perspectives (Ramirez, 2018). By creating a learning environment that values learners' identities and experiences, educators can foster intrinsic motivation, improve academic outcomes, and ultimately, support the success of all learners (Moskal, 2019).

Several studies have shown that when the principles of reality pedagogy are used in teaching and learning contexts, learners are motivated and subsequently improve their academic performance. For instance, a cross-national study by Sirrakos and Fraser (2017) in the Bronx, New York, Dresden, and Germany found that reality pedagogy is a practical approach to teaching and learning science. Similarly, there is multiple established empirical evidence claiming the effectiveness of all key principle characteristics of reality pedagogy in teaching and learning science (Borges, 2016; Singh et al., 2002; Sirrakos & Fraser, 2017a). In addition, the implementation of reality pedagogy has also proved to have changed the teacher-learner relationship in the science classroom from a negative to a positive (Borges, 2016; Sirrakos, 2012). Likewise, Emdin (2009) and Ramirez (2018) have

deduced that reality pedagogy motivates learners to engage in the context of science learning processes thereby improving their academic performance. For Bhutan, there is no empirical research on reality pedagogy. Therefore, there was a need to carry out this study to investigate its efficacy related to the Bhutanese classroom context.

In short, academic achievement and motivation are vital for student success, with self-driven learners more likely to excel. Educators strive to enhance these outcomes, and reality pedagogy offers a promising approach. By valuing learners' cultural experiences, this method fosters intrinsic motivation and improves academic performance. As indicated, numerous studies demonstrate the effectiveness of reality pedagogy, particularly in science education, with positive impacts on learner engagement. Despite its proven benefits, empirical research on reality pedagogy in Bhutanese classrooms is lacking, highlighting the need for further investigation in this context.

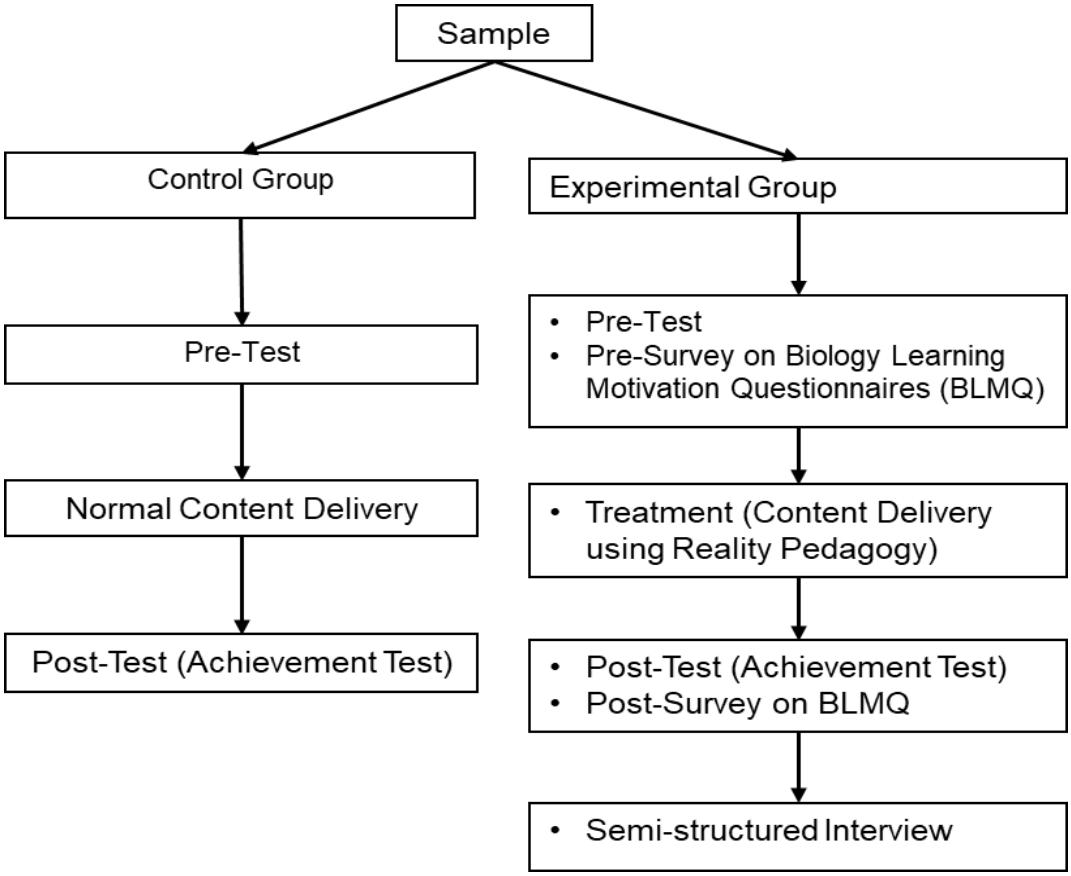
Methods

Research Design

Nested within the post-positivism paradigm, the ontological and epistemological aspects of this study were addressed through a quasi-experimental research design. This was appropriate as the intention of the study was to examine the effectiveness of reality pedagogy in learners' motivation and academic performance in biology. The pre-test and post-test were administered to both the control group [CG] and experimental group [EG] before and after the intervention as indicated in Figure 1. This was important as it allowed for a comprehensive and nuanced understanding of the implications of reality pedagogy.

Figure 1

Research Framework



Setting and Participants

This study was carried out in one of the Middle Secondary Schools during the course of the regular academic year 2023. A total of 55 (EG=27, CG=28) ninth graders participated in the study.

Experimental Design and Intervention

The convenience sampling method was used to select the sample from the target participants (N=84), considering their pretest scores. The section with the lowest mean score was designated as the experimental group [EG] (n=27), while the section with the second lowest score was assigned as the control group [CG] (n=28).

Two groups of class IX learners participated in this study: one group received

reality pedagogy and the other group received standard teaching approaches. Before implementing the reality pedagogy in the EG, the motivation and academic performance of CG and EG were both pre-tested. Both groups underwent a post-test after five weeks (15 periods of 40 minutes) to ascertain the impact of reality pedagogy on academic performance and motivation. Identical course materials were used to teach both groups. While reality pedagogy's five principles were applied to the EG, traditional teaching approaches such as cooperative learning, lectures, note-taking sessions, discussions, and presentations were used in traditional instruction.

Instrumentation and Reliability

Data was gathered via questionnaires, standardised tests, observations, and semi-structured interviews. Biology Lesson Motivation Questionnaires (BLMQ) (adapted from Regmi & Devkota, 2022) were used to collect information on learner motivation such as intrinsic motivation to learn biology, extrinsic motivation to learn biology, personal relevance of learning biology, self-determination, self-efficacy in learning biology, and anxiety about biology test and examinations before and after the introduction of reality pedagogy. The items adapted were developed and validated for both content and reliability. For content validity, Yusoff's (2019) content validity index (CVI) was used and achieved a satisfactory level of CVI with a score CVI average = 0.98, score-CVI Universal Agreement (UA) = 0.95, and score CVI average based on proportion relevance = 0.98.

Similarly, pre-and post-tests were administered to both the CG and EG to assess academic performance. The test items were vetted for content validity and accuracy by the authors. After drawing a consensus among authors, a pilot test was conducted with 30 participants who were not involved in the study. The result of the pilot test was then computed by Cronbach Alpha coefficient to check the reliability value. According to Tavakol and Dennick (2011), the acceptable alpha value ranges from 0.79 to 0.95. The alpha value of this study based on the pilot test was 0.85 which was a highly acceptable score. Thus, the instruments were reliable and valid for the current study. Furthermore, learner behaviour and engagement in class were observed to determine their level of participation, attentiveness, and interaction.

In addition, the semi-structured interviews were conducted (n=6) with the EG to elicit participants' beliefs, views, and assumptions about the reality of pedagogy in biology education. Likewise, class observation notes were maintained during the course of the intervention process.

Data Analysis Procedure

The data analysis process consisted of three phases. In the first phase, the mean and standard deviation of the Biology Learning Motivation Questionnaire (BLMQ) were calculated to assess the level of motivation in learning biology before and after the intervention. The pre-survey BLMQ was based on a five-pointed Likert-type scale ranging from 1= Strongly Disagree; 2=Disagree; 3=Neutral; 4= Agree; 5=Strongly Agree (refer to appendix). There was a total of 30 items that measured learners' different motivational factors such as intrinsic motivation in learning biology (5 items), extrinsic motivation in learning biology (5 items), personal relevance of learning biology (5 items), self-responsibility for learning biology (5 items), self-efficacy in learning biology (5 items), and anxiety about biology test and exams (5 items). The scores for each of the items under each theme have been computed to generate an overall mean and standard deviation.

In the second phase, the pre-test and post-test scores of the CG and EG were analysed using inferential statistics such as an independent sample t-test to determine the statistical significance of the mean scores.

Likewise in the third phase, the audio-taped responses from semi-structured interviews were transcribed, coded, and thematised identifying patterns for triangulation.

Finally, data collected through three instruments such as BLMQ, achievement test, and semi-structured interview achieved triangulation to deepen the result of the study.

Addressing the Ethical Issues

To minimise the possible risk that the research processes may cause to the participants, the research team complied with the core standards of ethical practices, confidentiality, and consent while collecting the data. The procedures and ethical requirements were taken into priority. The approval was taken from the school administration while the consent was taken from all the participants that their participation is voluntary and may withdraw from any part of the study at any time should there be incontinence.

Results

The result analysis was conducted in four phases. The first phase details the result of BLMQ while the second phase presents the findings of the achievement test.

Similarly in the third phase, findings of the semi-structured interviews are presented while the fourth phase presents the findings from the classroom observation notes.

1. Biology Learning Motivation Questionnaires (BLMQ)

The pre-survey BLMQ and post-survey BLMQ for EG were analysed using descriptive statistics. Means and standard deviations were computed to examine the level of motivation based on the six motivational factors such as intrinsic motivation in learning biology, extrinsic motivation in learning biology, personal relevance of learning biology, self-responsibility for learning biology, self-efficacy in learning biology, and anxiety about biology test and examinations. The overall mean score for BLMQ was slightly greater in the post-survey (M=3.69, SD= 0.44) than in the presurvey (M=3.48, SD=0.46) (refer to Table 2).

Table 2

The Overall Result of Pre-survey and Post-survey BMLQ from EG

Motivational Factor	Presurvey		Post-survey	
	Mean	Standard Dev.	Mean	Standard Dev.
Intrinsic Motivation	3.62	0.47	3.87	0.56
Extrinsic Motivation in Learning Biology	3.36	0.45	3.47	0.29
Personal Relevance of Learning Biology	3.42	0.47	3.67	0.38
Self-determination (responsibility) for Learning Biology	3.66	0.49	3.87	0.48
Self-efficacy (Confidence) in Learning Biology	3.39	0.40	3.52	0.36
Anxiety about Biology Assessment	3.44	0.49	3.74	0.56
Overall mean	3.48	0.46	3.69	0.44

To determine the statistical significance of BLMQ on the experimental group due to the intervention strategy of reality pedagogy, a paired samples t-test was computed. The results indicated that the BLMQ mean score for post-survey (M = 3.69, SD = 0.44) was significantly higher than the presurvey mean value (M = 3.48, SD = 0.46), with t (29) = -2.966, p = .006 (refer to Table 3). The mean difference was -0.21 with a 95% confidence interval ranging from -354 to -065. Cohen's d statistic was calculated to measure the effect size, resulting in a value of 0.466. This indicates a medium effect size according to commonly accepted benchmarks for Cohen's d (Cohen, 1988).

Table 3

Presurvey-Postsurvey Comparison of Mean

			Paired Differences					t	df	Sig. (2-tailed)
			Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
	Mean	Std. Deviation				Lower	Upper			
Pre-survey	3.48	0.46	-0.21	0.39	0.0707	-0.354	-0.065	-2.966	29	0.006
Post-survey	3.69	0.44								

Significance Level: p = 0.05

2. Achievement Test

Pre-test and post-test mean scores of CG and EG were computed to enable facilitation in evaluating the effects resulting from the intervention. The result of the pre-test mean score of CG (M=12.5, SD= 5.5) was better than EG (M=8.6, SD=4.6) informing that CG was comparatively better than EG before the intervention (refer to Table 4). On the contrary, there were differences in the mean post-test score for both CG and EG after the intervention. For EG, the post-test mean score (M=16.6, SD=2.1) was higher than the pre-test means scores (M=8.6, SD=2.1). However, there was very little difference in CG between the post-test mean scores (M=13.3, SD=2.1) and the pre-test mean scores (M=12.5, SD=2.1).

Table 4

Pre-test and Post-test Mean Scores of CG and EG

	Pre-Test Score			Post-Test Score	
Group	N	Mean	SD	Mean	SD
Control	28	12.5	5.5	13.3	2.1
Experimental	27	8.6	4.6	16.6	2.1

To evaluate the prevalence of statistically significant differences in post-test scores between CG and EG, the overall mean score was computed. The assumption

of normality was assessed and found tenable for CG and EG. The result of the computed mean was subjected to an independent sample t-test to compare the mean score of the pre-test and post-test of CG and EG.

For the pre-test, Levene's Test of Equality of Variances was tenable with p = 0.501. Owing to this tenability, the t-statistic assuming homogeneity of variance was computed between CG and EG. The result has shown that there is a statistically significant difference in the pre-test score of CG (M=12.5, SD=5.5) and EG (M=8.6, SD=4.6) with the level of significance at 0.05 with the condition; t (53) = 2.84, p=<0.006 (refer to Table 5). Therefore, it is deduced that the CG is comparatively better before the intervention.

Similarly, for the post-test, Levene's Test of Equality of Variances was tenable with p = 0.911. Owing to this tenability, the t-statistic assuming homogeneity of variance was computed between CG and EG. The result indicated that there is a significant difference in the post-test score of CG (M=13.3, SD=2.1) and EG (M=16.6, SD=2.1) with the level of significance at 0.05 with the condition; t (53) = -5.83, p=<0.000 (refer to Table 5). The p-value associated with the post-test result (p<0.000) compared to the pre-test result (p<0.006) indicating that the difference is statistically significant between the CG and EG.

Table 5

Pre-test and Post-test Comparison of EG and CG

Independent Samples Test						
	Levene's Test for Equality of Variances			t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Pre-test	Equal variances assumed	0.459	0.501	2.84	53	0.006
	Equal variances not assumed			2.85	52.101	0.006
Post-test	Equal variances assumed	0.013	0.911	-5.83	53	0.000
	Equal variances not assumed			-5.83	52.959	0.000

Significance level: p=0.05

3. Semi-Structured Interview

Responses for the semi-structured interview from the six respondents were transcribed and coded thematically. The result revealed two prominent themes as follows:

The Positive Impact of Cogenerative Dialogues within the Biology Class.

The majority of the respondents have indicated that they favour reality pedagogy's principles. This is well asserted in respondent 1's statement: "Cogen was helpful as it encourages communication, and clarification of doubts as we discuss ideas on how to learn the given topic with our friends". Similarly, respondent 2 reiterated a similar view:

The cogenerative dialogues I had with my friends and biology teacher have been incredibly helpful in my learning process. By engaging in cogenerative dialogues allowed me to gain a deeper understanding of the biological concepts and processes we were studying. During cogenerative dialogues, we often encountered challenging questions or problems related to biology. By engaging in cogenerative dialogues, we created a supportive and motivating learning environment as we could encourage and help each other, share study resources, and discuss strategies for better performance.

3. Favourable Classroom Learning Environment

The second theme highlighted the unique and positive learning environment that emerged as a result of incorporating the 5 Cs of reality pedagogy. Participants expressed that their classroom experiences were notably superior compared to other learning sessions. For instance, respondent 2 shared: "It's very understandable and was very interesting to learn through different activities and cooperating actively with each other asking doubts and clarifying each other's questions". In addition, the participants were of the view that principles of reality pedagogy are powerful tools for enhancing their learning. Respondent 4's statement bears the view:

Co-teaching must be done in all the subjects and its easier for me to communicate with the Co-Teachers without doubt and as a Co-Teacher I would recommend it as they are more interesting compared to regular classes in my school life and it was a memorable day to me and it was my first experience as a Co-teacher, first for the time, kind of interesting session.

On the same note, respondent 6 states: "The overall perception towards this reality pedagogy is that what if these principles of reality pedagogy were brought to all

of the subjects and taught to us. It will be more engaging and our knowledge on the subject will increase".

4. Classroom Observation Notes

The observation notes which were recorded in the form of photographs and video graphs were subjected to relational qualitative content analysis. The analysis of photographs and video graphs revealed the three notable outcomes

Firstly, there was a significant increase in learner participation, as individuals who had previously refrained from engaging in classroom discussions actively stepped forward and participated. This newfound engagement fostered a more inclusive learning environment.

Secondly, there was an equal distribution of responsibilities among the learners, particularly during class tasks and presentations. This balanced allocation of tasks ensured that everyone had an opportunity to contribute and take on leadership roles.

Lastly, as learners presented their assigned tasks, it became evident that they had developed a deeper understanding of each other's strengths and weaknesses. This awareness allowed them to effectively support and complement one another, creating a collaborative and cohesive learning community. Overall, these results highlight the positive impact of reality pedagogy.

Discussion

This study was aimed to investigate the effects of reality pedagogy on the motivation to learn biology and academic performance in Class IX learners. A total of 55 participants (CG=28 & EG=27) took part in this study. The research questions were tested by using both descriptive and inferential statistics for quantitative data while for qualitative data, thematic analysis was employed to triangulate the findings.

The result of the current study had shown some insights into the effectiveness and applicability of reality pedagogy. The findings of the study are discussed in relation to the sub-research questions that would answer the main question which states " How does the implementation of Reality Pedagogy impact the motivation to learn biology and the academic performance of Class IX learners?".

Research Question 1

How effectively does reality pedagogy motivate Class IX learners to learn biology?

The findings from the study confirmed the effectiveness of reality pedagogy in motivating learners to engage in biology. This was evident from the results of the BLMQ, which assessed six motivational factors such as intrinsic motivation, extrinsic motivation, personal relevance, self-determination, self-efficacy, and test anxiety (refer to Table 2). The mean score of the pre-survey and post-survey for the EG showed a significant difference, indicating that reality pedagogy effectively motivates learners. Additionally, interviews with the learners revealed their motivation to actively participate in learning experiences when reality pedagogy principles were implemented. Furthermore, classroom observations demonstrated a notable increase in learner participation, as learners who previously refrained from engaging in discussions actively came forward and participated. These findings are consistent with several studies which posit that reality pedagogy is effective for learning science at different levels as it enhances learners' motivation (Borges, 2016; Emdin, 2009; Ramirez, 2018; Sirrakos & Fraser, 2017a; Sirrakos, 2012). Therefore, based on the findings from BLMQ, EG post-survey findings, interview findings, and the findings from classroom observations, it is deduced that reality pedagogy motivates learners to learn biology in the classroom.

Research Question 2

How do class IX learners perceive and respond to the implementation of Reality Pedagogy in their biology learning experience?

The present study has unveiled that learners in Class IX exhibit favourable perceptions of reality pedagogy. This is evidenced by the high mean scores and low standard deviation across all six motivational factors (refer to Table 2), indicating that learners perceive reality pedagogy as an effective approach to facilitating learning. The finding is closely related to Emdin's (2011b) and Moskal (2019) claim that reality pedagogy is learning from the learner's perspective and efficient science teaching and learning instructional strategies. Further support for these findings is observed through the significantly higher test scores of the EG compared to the CG during the achievement test. Such a high mean score on the achievement test corresponds to several other studies that claim reality pedagogy enhances academic performance (Emdin et al., 2021; Ramirez, 2018; Sirrakos & Fraser, 2017b).

Intriguingly, the semi-structured interviews conducted with the participants yielded positive responses, as participants expressed a preference for reality pedagogy and recommended its implementation in other subjects. In addition, there was increased learner participation, balanced task distribution, and improved

collaboration when reality pedagogy was implemented in the class as evidenced by the classroom observations. This gives a grounding to postulate that learners are motivated to learn and participate actively while reality pedagogy is implemented resulting in higher academic performance. Such findings are parallel to the claims that reality pedagogy motivates learners in learning science Emdin, 2009 & Ramirez, 2018).

In addition, it was observed during the intervention that learning experiences were engaging, interactive, and enjoyable. Learners actively participated and felt a sense of involvement in their learning. This positive atmosphere was fostered by the implementation of principles of reality pedagogy such as cogenerative dialogues, co-teaching and cosmopolitanism which proved to be helpful for learners. The cogenerative dialogues promoted effective communication, allowing learners to exchange ideas and perspectives freely. Similarly, co-teaching played a significant role in promoting confidence, engagement, and active participation among learners. The principles of reality pedagogy enabled learners to tailor their learning experiences according to their needs and interests. In a nutshell, learners perceived reality pedagogy as understandable, interesting, and beneficial, expressing a desire for its implementation in all subjects to foster enhanced learning experiences and academic achievement.

Research Question 3

Is there a significant difference between the pre-test and post-test scores of the learners?

Inferential statistical analysis was used to assess the difference between the pre-test and post-test BLMQ and achievement test results. A paired sample t-test for the BLMQ before and after the intervention revealed a statistically significant difference in mean scores (see Table 3). Similarly, the independent sample t-test for achievement test scores demonstrated a significant difference between the CG and EG following the intervention (see Table 4). Although CG outperformed EG before the intervention, it was found that EG outperformed CG after the intervention with a substantial difference in academic achievement. The effectiveness of reality pedagogy in improving academic performance is linked to such a considerable difference. Moreover, these findings are parallel with prior studies that found reality pedagogy to be effective in improving academic achievement (Emdin, 2011, 2013; Emdin et al., 2021; Ramirez, 2018; Sirrakos, 2012). This gives a stance to claim that reality pedagogy is effective in motivating learners and thereby enhancing their academic performance.

Recommendations

This study revealed that there was a high overall learners' motivation level in learning biology with reality pedagogy in the post-intervention as compared to the baseline. This was indicated by the six motivational factors in BMLQ. The semi-structured interviews and classroom observations further supported it. The plausible reasons for this high level of motivation were due to the intervention strategy. Therefore, it is encouraged to use and implement reality pedagogy in all other subjects by all teachers.

Similarly, the findings of the study revealed a significant correlation between learners' motivation level and academic achievement in biology. Such a positive correlation can potentially help to understand the perceived notion of our learners that biology is difficult to understand given its abstract concepts. Therefore, biology teachers are recommended to try this culturally relevant reality pedagogy as an alternative instructional strategy. This will ensure an increase in the student's academic achievement and learning outcomes in biology.

Limitation

The study was conducted with class IX learners for biology subjects and therefore the findings do not have the scope to generalise to different classes with different subjects.

Conclusion

This study reveals that reality pedagogy effectively enhances learners' motivation and improves academic performance in the context of learning biology for Class IX learners. Firstly, the findings indicate that reality pedagogy effectively motivates learners as demonstrated by significant differences in the pre-and post-BLMQ scores for intrinsic motivation, extrinsic motivation, personal relevance, self-determination, self-efficacy, and test anxiety. Interviews with learners and classroom observations further supported these findings, indicating increased learner participation and active engagement when implementing reality pedagogy principles. Secondly, the study also revealed the positive impacts of reality pedagogy in enhancing academic performance. This is evidenced by the significantly higher test scores of the EG compared to the CG during the achievement test. The EG outperformed the CG after the intervention, indicating the effectiveness of reality pedagogy in improving academic performance.

In conclusion, this study provides valuable insights into the effectiveness of

reality pedagogy in motivating learners and improving their academic performance in the context of learning biology for Class IX. The study supports using reality pedagogy as an instructional approach that fosters learner engagement, active participation, and positive perceptions towards learning. The findings have important implications for educators and policymakers in promoting effective teaching strategies that enhance learner motivation and academic achievement. Further research and implementation of reality pedagogy in different educational settings and subjects are warranted to explore its potential benefits and impact fully.

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