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Effect of self-instructional materials (SIM) during the COVID-19 pandemic: An impact study

Ugyen Penjor[1]✉, Sonam Jamtsho[2]

[1] ugyenpen2016@education.gov.bt
Dagpela Middle Secondary School (Bhutan)
[2] sonamjamtsho@education.gov.bt
Dagapela Middle Secondary School (Bhutan)
✉ Corresponding author

ABSTRACT: *The research was conducted to study the effects of Self-Instructional Materials (SIM) Volume I and II on student learning at Dagapela Middle Secondary School in line with the mandates of the Ministry of Education amidst the COVID-19 pandemic. Students ranging from pre-primary to class 10 participated in the study, and data was collected using survey questionnaires and interviews (N=53, with items rated at σ=0.7). The study followed a mixed method approach (Parallel Convergent Mixed Method) combining quantitative and qualitative data. The findings were integrated from both data analyses. The results indicate that secondary grade students were comfortable using SIM for their learning, while lower primary grade students experienced more challenges than opportunities due to the lack of guidance from teachers and support from parents. The study concludes that independent learning materials should be developed for secondary and upper-primary students, aligned with their learning abilities and resource materials. However, similar materials for lower primary students may be ineffective.*

KEYWORDS: COVID-19, Effects, Self-Instructional Materials.

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1. Introduction

Following the first confirmed case of COVID-19 in the country, all the educational institutions were closed as a precautionary measure (Bhutan Broadcasting Service, 2020). The Ministry of Education (MoE) in collaboration with other stakeholders such as the Royal Education Council, Bhutan Council for School Examination and Assessment, Bhutan Telecom, Bhutan Broadcasting Service, Department of Information Technology and Bhutan Telecom and Volunteer Teachers of Bhutan strategized education responses as part of continuing education (MoE, 2020). Due to the highly contagious nature of the pandemic, face-to-face teaching was restricted. In response to these demanding times, the Ministry of Education introduced the *Adapted Curriculum as an Education in Emergency Plan* (MoE, 2021, p. 5). This introduced the concept of remote learning for students with recorded lessons through multimedia platforms. However, for students who could not access online platforms, the teaching strategy known as "Reaching the Unreached" was adopted (MoE, 2021, p. 6). One of the elements of this initiative was the development of Self-Instructional Materials (SIM). The SIM played a key role in enhancing academic instruction and learning platforms during the pandemic. The *Guidelines for Curriculum Implementation Plan for Education in Emergency (EiE)* enabled online and offline learning opportunities. The Ministry of Education (2020) states that this initiative was to build educational resilience and enhance education continuity for all children in Bhutan. This was part of the strategy to adapt to the pandemic. However, these plans were impeded by geographical, networking and family economic barriers. According to the Organization for Economic Co-operation and Development (OECD) Europe, it states that social and cultural inhibitions have restricted support from parents. It was noted that while the Education in Emergency took time during its formative stages, it became an access line for continued education. In Bhutan, learning supports were accessed through radio and television broadcast service channels, digital platforms such as Google Classroom[s], and Social Media channels. The SIM directly enhanced access to information and instructions for students, who were not favourably supported by online digital services.

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), the pandemic has imposed huge challenges to the masses, however, in the best interest of the students, educational coverage strategies had to be developed, implemented and enforced to ensure that there were minimal effects on education and learning processes. As one part of the strategy, print material support through designed academic print materials helped to reach students in far-flung areas. However, DeWitt (2020) found that the students who were in remote parts of the country had challenges submitting work and assignments. This was no exception to the Bhutanese learning ecosystem. Research established that students, who were assisting their parents during these times, were heavily assisted by the adaptive curricula. These were eased through assessment waivers and non-mandatory student participation during the studies. Despite its immense coverage, the SIM failed to actively engage the students and involve participatory learning. In view of these, the study aims to evaluate and assess the effects of SIM education strategies and its ability to engage children in learning. The Study aims to provide study views, and research recommendations to enhance SIM education strategies so that it serves as an effective tool of student engagement and academic information. The research seeks to answer the following research questions:

1. What are the effects of the SIM on students' learning?

2. What are the opportunities and challenges faced by the students while learning from the SIM?

2. Literature Review

2.1. Self-Instructional Materials (SIM)

The SIM is printed learning materials designed by the Ministry of education for students who did not have access to instruction delivery media such as the radio, television, digital, and online information services, including smartphones and internet connectivity, during the COVID-19 school closure period. The SIM was developed in key stages: Key Stage I covered grades PP to 3, Key Stage II covered grades 4 to 6, Key stage III covered grades 7 to 8, Key Stage IV covered grades 9 and 10, and Key Stage V covered grade 11 and 12-grade students. The SIM lesson layout included the Topic, Statement(s) of Learning Objectives, Introduction (concept) of the topic, Learning Activities, and Self-check for learning (assessment). The introduction and learning activities were supported by pictures and illustrations, more evident in the SIM for Key Stage 1. Minnick (1989) claimed that while designing SIM, "…it will be necessary to create nonverbal visuals and verbal communication. They will be valuable tools to assist learning."

Further, Kinley et al. (2022) reflect that the COVID-19 pandemic helped to introduce a transformative teaching practice in Bhutan. The *Bhutan Education Blueprint (2014-2024)* states that these strategies helped to integrate the long-term educational strategy and goals to acquire values and skills such as critical thinking, creativity, and collaboration. This event also helped to develop key digital technology skills and shift from the passive mode[s] of learning-teaching.

The case Studies undertaken by Phuntsho (2022) explain the experiences of Education in Emergency during the COVID-19 pandemic. The research through the sequential multi-method paradigm through in-depth semi-structured interviews, observations, and detailed field notes examining the relationship between a conducive learning environment, teachers' pedagogical knowledge and skills, and medium of effective instruction explains that teachers had an awareness of the adaptive curriculum through the process of *Professional Learning Community Programs.* Triangulating the information suggested that well-designed online material and activities reduce the students' negative perceptions. Self-Instructional Materials (SIM) are technically designed to ensure uninterrupted education for unreached students. The unreached students were those who were underprivileged to receive e-lessons. The Ministry of Education designed all possible strategies to continue learning during COVID-19 (MoE, 2021). The International Bureau of Education, UNESCO provides comprehensive information on

education in emergencies. According to the report made by the Ministry of Education (2021), 72.7% of schools reported that the syllabus coverage was adequate, 84.2% of the respondents found the initiative user-friendly, and 80.1% expressed that the SIM was effective for learning-teaching. The report added that the SIM was more useful for students living in remote parts of the country.

2.2. SIM and learning

Few pieces of research have been undertaken across various contexts on the effects of SIM materials on students learning during COVID-19. Peldon (2021) suggests that most students and parents preferred the SIM instructions since it was user-friendly, flexible, and self-paced. Ali & Elsayed (2021, p. 378) found that the students were "higher competent" in their experiential learning through SIM. Tadesse & Muluye (2020) revealed that learning was personally meaningful, interesting, and enjoyable, with control and personal autonomy. Furthermore, Bilda & Fadillah (2020) gathered satisfactory research data results on learning independence from the SIM.

Similarly, Dai & Xia (2020) claimed an effective improvement in the student's achievement by learning from such materials. On the other hand, Xie (2020) stated that students' scores decreased significantly compared to their pre-pandemic test scores. The study further adds that "autonomous learning materials" can positively impact learners. This study shows that SIM as an instructional guide has better-performing opportunities to assist students' learning. It enhances a positive outlook and enriches the scientific methods of engagement in students.

2.3. Opportunities and Challenges

Although it is evident that SIM could positively affect students' learning and education enhancement capacities, the use of SIM by parents and guardians to assist learners can be challenging. Fairly the instruction and academic contents of the SIM are standardized, which impedes its use by parents and guardians with median literacy and skills. Geographical and literacy barriers have hindered the effective use of SIM. Research shows that SIM can foster a good learning opportunity by strategically streamlining flexibility, collaboration, and independent learning opportunities. However, to enable assisted learning SIM helps to collaborate interchangeably with other dominions of support. Simui et al. (2017) claimed that no matter how effectively the self-instructional material is designed to reach the unreached, without interaction and communication between the learner and the teacher, it is still difficult to grasp everything on their own. Students live in different learning environments, and measuring the learning outcomes is difficult (Simui et al. 2017). The curriculum design is adaptive, basically a theme-based learning activity. As stated in the Education in Emergency, since the learning by the students alone is limited and teachers and family members are tasked to be responsible for acquainting the students with necessary guidance. It is also claimed by Ryan & Deci (2009) that play and active learning are intrinsically motivated because they are engaged and inherently interesting and motivating. However, students learn best when they are together with two or more.

The literature also claims that SIM's success depends on the learners' level. As a result, its success among younger rural children is low. Further, there is a monitoring and assessment challenge, and consequently, if the SIM is distributed without adhering to basic outcomes, with lesser learner motivations, it cannot replace classroom learning.

3. Methodology

This research employed a mixed-method research design to study the effect of SIM. By combining quantitative and qualitative approaches, the study can be more comprehensive and enhance its strengths. Creswell (2014) argues that the weaknesses of an individual approach are reduced by exploiting the strengths of mixed methods. The mixed methods help to integrate the statistics essentials of the two methods so that it best represents the virtues and advantages of these methods.

Population and Sample

Dagapela Middle Secondary School is a semi-urban day school. In 2020, the school had 804 students. To distribute the SIM, the school conducted a pre-survey through class teachers to determine the number of students receiving the SIM. The survey showed that 66 students out of 804 did not have news broadcast channel services, including radio, television, and digital gadgets, nor Internet service connections. Thus, 66 students received SIM from the school.

Meanwhile, four students were living far away, and four students' parents could not read or write in the national language (Dzongkha) or English. Of 66 students, 37 were from grades 7 to 10, and 29 were from pre-primary to grade 6. Accordingly, 37 students were the sample, and the population for the study was from 4 to 10. Similarly, 29 parents who represented the students from pre-primary to grade 6 were the intended population and sample for the study. However, only 16 parents turned up for the interview making the sample 16 for the interview.

Ethical consideration

Ethical clearance was sought from the parents of the population students to administer the survey questionnaire. The parents of the primary students were contacted through telephone calls, and their permission was sought before the study. Ethical clearance for the study was sought from the District Education Office to ensure that the study imbibes the principles of dignity, respect, and academic prudence.

Development of Data collection tools and validity

The quantitative data collection tool of the survey questionnaire was designed to consider the effects of SIM on students' learning. Eight items were framed with the Likert scale of 1 to 4. (1 strongly disagree, two disagree, three agree, and four strongly agree). The questionnaires were piloted with ten students who had smartphones to test their validity. The pilot study rated the items at $\sigma = 0.7$. The interview questions were written considering the opportunities and challenges that SIM would have on the pre-primary to grade 6 students.

Data collection

Quantitative data were collected from 37 students from grades 7 to 10 through a survey questionnaire. The researchers handed the questionnaires to the individual student respondents through personal visits. The students were given enough time to fill up the questionnaire.

The parent respondents were contacted through telephone calls, and the interviews were carried out with prior information and consent. With movement restrictions at the height of the pandemic, parents who could not be met in person were contacted by telephone. Each interview took around 10 minutes. The parents were chosen to symbolize children's representations for primary classes. However, only 16 parents could be interviewed for the study. The rest of the parents (N = 13) could not be interviewed due to connectivity and consent issues.

Result Analysis

The quantitative data collected in the printed papers were first entered into an excel sheet under the items included in the questionnaire. Next, the excel data was imported to SPSS Version 23, followed by descriptive analysis data analyses. The quantitative data generated the mean scores under each item with corresponding standard deviation values. The mean scores were highlighted and interpreted in the result analysis to indicate the effects of SIM on students' learning. Meanwhile, the qualitative data were scrutinized and studied thoroughly based on six steps suggested by Creswell. The six steps, according to Creswell (2014), include raw data (transcripts of telephonic interviews for this research), organizing and preparing data for analysis, reading through all data, coding the data in themes or description (hand in this research), interrelating themes or descriptions and interpreting the meaning of themes or description. The qualitative data were analyzed to identify opportunities and challenges emerging from the SIM.

4. Results and discussions

Effects of SIM on students' learning

The student participants from grades 7 to 10 were surveyed through a hard copy questionnaire

to elicit the effects of SIM on their learning. The data portrays that the students of grades 7 to 10 agreed that the SIM provided enough learning information on a particular topic with the mean score of M = 3.0; SD = 0.5. The mean score of M = 2.9; SD = 0.7 interprets that the students could understand the language used in the SIM. However, it is inconclusive to interpret that the participants could fully understand the language in the SIM as the mean score is between 2 (disagree) and 3 (agree). Similarly, the participants have an inconclusive expression on how far the SIM provided enough learning activities with the mean score of M = 2.8; SD = 0.7. It is illustrated that the students with the mean score M = 3.1; SD = 0.7 got enough time to learn from the SIM. Enough time to learn from SIM could have been possible due to the lengthy closure of schools and lockdown during the COVID-19 pandemic. The students agreed with the mean score of M = 3.0; SD = 0.7 that the pictures and illustrations in the material helped them understand the ideas and concepts. Similarly, the mean score of M = 3.0; SD = 0.6 displays that the students felt that the instructions in the SIM were clear. The mean score of M = 2.7; SD = 0.5 interprets that the students could do the activities given in the SIM easily. However, the score is not evident enough to conclude that the students could complete the activities without difficulties. The mean score of M = 3.1; SD = 1.0 also confirmed that the SIM was distributed to those students who did not have broadcasting services, either radio or television, smartphone, and internet connection.

Given the mean scores of not less than 2.5 for every item, it may be interpreted that the students of secondary grades (7 to 10) had positive effects of SIM. Positive effects could include motivation, self-regulated learning, increased competency, and independent learning. According to Peldon (2021), the majority of students and parents preferred SIM to online learning materials during the pandemic, which is associated with motivation factor. A study by Ali & Elsayed (2021) in their experimental design also found that the participants are "highly competent" through self-directed materials rather than actual classroom learning. Similarly, the result of this study corresponds with the findings of Tadesse & Muluye (2020) that the learning activities designed and distributed through various mediums during COVID-19 were meaningful, interesting, and enjoyable, giving a sense of self-control and autonomy. This study finds that the students were somehow able to complete the tasks given the SIM independently, matching with the finding of Xia (2020) that the students in their study through autonomous learning material developed the abilities of self-regulated and independent learning compared to the students in the control group.

Opportunities and Challenges

The parents of students from pre-primary to grade were interviewed to analyze the opportunities and challenges with SIM. The learning from SIM is deprived of direct intervention from the teachers. Further, the illiteracy of parents and the remoteness of residence of the students aggravated the challenge. The interview result shows that the material remained idle without a guide for the students to learn from the SIM. As R7 said, *"*no one to clarify in the village as parents are illiterate." Furthermore, R8 had a similar opinion, "cannot grasp complete information by parents as they have limited education." Simplistically, the following statements are interesting.

R5- *"With the help of [her] sister, she can read."*

R6 -*"Difficult for school beginners."*

R11 - *"Face problem in reading big words."*

R13 -*"Cannot read [by] herself."*

R14 - "*Facing problem in pronunciation.*"

R16 -*"Cannot read big words."*

Most respondents claimed they had no one to clarify their doubts and that their parents were illiterate. Some respondents shared that they could not comprehend the information. Others shared that the challenges to learning from SIM were hard felt by the lower primary students and their parents. The parents shared that they could not provide any guidance due to their illiteracy and low literacy level. For instance, most students in grades pre-primary and 1 faced the biggest challenge. They shared that: R4 [had] difficulty learning without guidance as we cannot read and write.

Parents expressed that both the parents and their children could not read English letters and Dzongkha letters, so they could not use the SIM. The respondents stated that it was difficult for beginners and children to face problems using and pronouncing words. The above finding corroborates with the report made by the Ministry of Education (2021) that students in lower primary found it more challenging to use SIM without guidance. Further, Xie (2020) claims that low performance through autonomous learning materials (similar to SIM) is due to the inability to independent learning among primary-level students, more so with students from far-flung who cannot complete the learning task without the contact guidance of the teachers. Additionally, Simui et al. (2017) argue that without interaction and communication between the learners and teachers, even effective SIM cannot adequately help students to learn independently. In addition, the respondents revealed that their students lacked seriousness and focus on studying for being at home longer. The interview data did not indicate any opportunity originating from SIM for parents and students, particularly for primary-level students.

Considering the challenges experienced by the parents and students of the primary level, the interview respondents recommended a few reforms that could be adopted in the future. The responses have derived three sub-themes: guidance, language, and illustrations. They state that learning with a guide will be effective besides simplifying big words and additional illustrations. The respondents shared concerns about the lack of guidance as a hindrance to effectively implementing SIM. They find that big words need to be simplified and illustrations added. The parents of pre-primary classes and beginner students suggest teachers' presence and contact support.

5. Conclusions and recommendations

The effectiveness of the SIM in generating insightful, independent, and creative learning has been observed to be more pronounced in higher grades. However, students face challenges in reading big words, pronunciation, and comprehending questions and diagrams. To achieve more effective implementation of the SIM, guidance from a teacher is deemed to be the most important factor, as parents' inadequate literacy levels prevent them from providing sufficient guidance. A study has shown that unsupervised study results in a barrier to children's learning of the content in the SIM, as parents are unable to provide the necessary explanations. Parents have played a crucial role in furnishing correct information to draw the conclusion that implementing SIM without guidance is not possible. The findings suggest that teacher visits and guidance are essential for the effectiveness of learning through SIM, particularly for students in lower grades. To ensure that a larger group of students at all levels can benefit from learning through SIM, printed copies should be made available for meaningful engagement. Additionally, further studies are required to assess the process of evaluating children who are learning through SIM.

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