Remote high school learning implementation in Africa: Analysis of Siyavula's online learning platform during the Covid-19 pandemic

Introduction

The COVID-19 pandemic altered the world's routines, wreaking havoc on everything from workplace practices to supply chains to education. In education, it affected an estimated 1.6 billion students worldwide (The World Bank). In Africa, research done by Human Rights Watch between April and August 2020 found that school closures due to the COVID-19 pandemic compounded previously existing inequalities, leaving children who were already at risk of being excluded from quality education to be most affected (Human Rights Watch, 2020).

To reach students, many countries in Africa hastily employed some form of remote learning as an emergency response. These educational responses evolved as the pandemic did.

Data Collection

Siyavula

Siyavula is known as a pioneer developer of high-quality free digital and print math and science textbooks for South African schools. The work began in 2002 in response to personal interactions with determined kids from poor rural schools at a Science Fair seeking to overcome a lack of resources and science expertise in the schools, including a lack of science textbooks. Siyavula has developed expertise in digitally developing, editing, and improving math and science workbooks and teachers' guides and distributing them in multiple digital and mobile formats for free.

They have also developed an adaptive practice technology called Siyavula Practice that has a complete set of South African curriculum-aligned open textbooks to create an offering for High School Mathematics, Physics, and Chemistry. Behind Siyavula Practice is a machine learning engine algorithm that adapts each practice session to the needs of an individual learner by sequencing and determining the optimal difficulty level to promote the greatest learning gains. The practice service requires learners to sign up on the website, unlike textbooks, which can be read without registration.

The number of learners who register for the Practice service has grown rapidly in recent years, largely enabled by the ability to offer the service at no cost to learners in South Africa. During registration, learners associate themselves with a school from the DBE (Department of Basic Education) master list, which in turn associates the school with a particular District. The Siyavula platform has managed to reach the lowest economic segment (Quintile 1 schools) in South Africa. In fact, more than 50% of the learners using Siyavula Practice attend Quintile 1–3 schools, that is, no- and low-fee schools.

Data Description

Siyavula assisted GDE (Gauteng Department of Education) in 2022 with the creation of a baseline assessment instrument in the form of an assignment on the Siyavula platform. The baseline assessment consists of 50 Mathematics curriculum-aligned questions. This project is focused on analyzing the results of Grade 8 student's performance on the baseline assessment. This project aims to understand gaps in the syllabus and any behavioral patterns. An ideal outcome would be a Power BI dashboard from a 100GB database hosted on AWS containing the learner's information to outline learner performance pre- and post-Covid-19. This dashboard will be used by the GDE to make data-driven decisions about where and how to intervene to better address learning needs.

The Purpose and Problem

To prevent learning losses from accumulating once children are back in school, countries need to adopt learning recovery programs consisting of evidence-based strategies. In this study, we empirically evaluate the impact of online learning during the pandemic on students' performance by comparing it with that of pre- and post-pandemic cohorts. In this study, we aimed to investigate if:

- Online learning impacted students' performance during the COVID as compared with other analogous cohorts who received face-to-face learning.
- There is any progress relative to the previous years.

Findings should be made and a dashboard created with the objective of solving several questions possessed by the Deputy Director of Curriculum and the District Officials; enabling insight into the current state of learners, progress made, how each district and school compare, where intervention is needed, and if previous interventions have had an impact year-on-year.

Dashboard and Findings

We created a dashboard using Microsoft Power BI to get insight from the data.
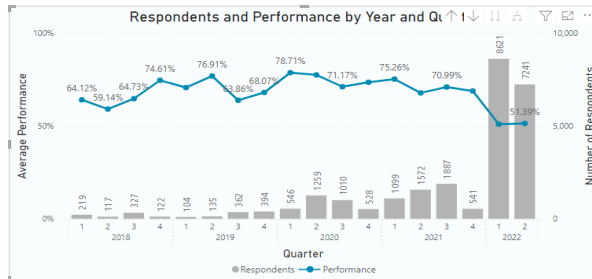

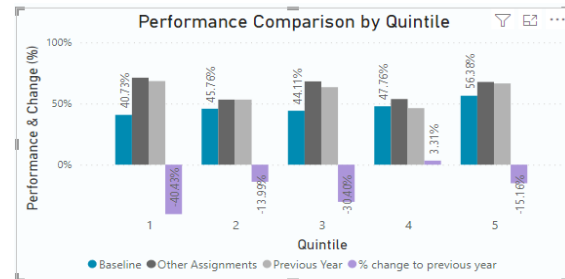Figure 1: Respondents and Performance by Year and Quarter

Figure 2: Performance Comparison by Quintile

Figure 1, shows that learners' average baseline performance hovers around 70 percent, with 2022 having the lowest performance. It can equally be seen that the number of respondents keeps increasing over the years, which indicates that more users keep interacting with the online learning platform.

Performance comparison by quintile, shown in Figure 2, confirms that the highest economic class, quintile 5, has the highest average performance in the baseline assessment, while quintile 1 has the lowest average performance in the baseline assessment. This is an expected divide/difference due to the ease of access to resources (such as teachers with good qualifications) by quintile 5 learners as compared to quintile 1.

Conclusion

The data shows a gap in performance between quantile groups, districts, and baseline items/chapters. The dashboard created will enable the department to make the necessary changes and adjustments in order to bridge this gap and give direction as to which areas they should focus on for the current and future 8th-grade cohorts.

With the dashboard we have created, the Deputy Director of Curriculum can identify key areas where the learners' performance is low, as shown in Figures 1 and 2, and equally identify the possible reasons for this low performance.

The dashboard we have created shows the distribution of learners and their performance across many variables, such as schools, districts, subject sections/topics, subject titles, quintiles, years, and so on. And with this, Siyavula can identify key areas that need improvement.