Executive Summary:

An Implementation Study of the Discovery Education Science Techbook for Middle School in Sahuarita, Arizona

Prepared by McREL for Discovery Education

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- Research, data analysis, logic models, and program evaluations
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Overview

Discovery Education (DE) retained the services of McREL International to study the use and impact of DE's Middle School Science Techbook in Arizona's Sahuarita Unified School District (SUSD) during the 2022/23 school year.

The purpose of the current study was to answer two research questions:

1. What is the correlation between Techbook use and change in science aptitude?
2. What are the successes and challenges for teachers in using the Techbook?

Study Design and Method

To answer the first research question a single-group, within-subject approach was employed for two grade levels: 6 and 7. Three schools and nine teachers within SUSD containing these grade levels participated in the study.

To help answer the first question, a 30-item science aptitude assessment was administered in fall 2022 before teachers began using the Techbook (pre-assessment) and then again in spring 2023 after having used it for most of the year (post-assessment). Of the 460 students enrolled in grade 6, 423 completed the pre-assessment (91.9%). Of the 423 students who completed the pre-assessment, 363 completed the post-assessment for a study attrition of 14.2%. Of the 479 students enrolled in grade 7 at the beginning of the year, 447 (93.3%) completed the pre-assessment. Of those, 378 completed the post-assessment for an attrition rate of 15.5%.

The 30-item assessments were developed from released items from the National Assessment of Educational Progress (NAEP) and BSCS Science Learning Assessments and were selected based on their alignment with Arizona's science standards. Approximately 40% of the items were from NAEP for grade 6 and 60% were from NAEP for grade 7. A 1-Parameter Item Response Theory (IRT) model was used for each grade level to determine the students' assessment scores. The pre-assessment scores from the IRT models were included as a baseline academic performance predictor in the regression models, while the post-assessment scores were used as the dependent variable in the analyses.

Three Techbook treatment variables were examined in the study that were developed from raw usage data provided by DE: the number of unique days a student logged in to the Techbook; the total number of times a student viewed a unique piece of Techbook content, and the number of minutes a student spent logged into the Techbook throughout the year. Each treatment variable was modeled in separate regression models. Several control variables were also used in each regression model to account for pre-existing differences, including race, ethnicity, special education status, and socio-economic status derived from Census Bureau data.

To answer the second research question, semi-structured individual interviews were conducted with teachers in the fall and then again in the spring. Interviews were conducted both in-person and online. Participants were provided a set of guiding questions ahead of time to help them reflect on and be ready to answer the research questions. There was also ample opportunity for probing answers to delve more deeply into topics that emerged in the interviews. Interviews were recorded with participants' permission, and then transcribed and coded according to themes as they emerged.

Finally, an implementation survey was administered in February 2023 to gauge teacher perception related to the Techbook, the implementation, curricular alignment within the district, and estimates of product use across different products.

Findings

The quantitative analysis revealed the following:

- Relatively small but statistically significant correlation between the ***number of days a student used the Techbook*** and post-assessment scores, for both grades 6 and 7
- Relatively small but statistically significant correlation between the ***distinct content views*** and post-assessment scores, for both grades 6 and 7
- ***Number of minutes using the Techbook*** did not have a statistically significant correlation with post-assessment scores for either grade level.

The qualitative analysis revealed the following four themes:

- ***Routines,*** which are powerful enablers to organizing one's work but can impede adoption of new technology or approaches
- ***Accountability-driven choices*** relating to gradable materials that guide or drive a teacher's choice of whether or not to use specific resources from the Techbook
- ***Time scarcity,*** which impacts the extent to which teachers can invest in building out the Techbook to serve as their main "go-to" source for science resources
- ***Resource scarcity***, in particular the lack of 1-to-1 student computing resources, forces teachers into an unauthentic "feast-or-famine" approach to Techbook use

Highlights of the implementation survey revealed the following:

- Overall satisfaction with the ***quality of resources*** in the Techbook
- A slight degree of dissatisfaction specifically with the ***Techbook characteristic navigation***

Discussion and Implications

The quantitative results meet the Every Student Succeeds Act's (ESSA) Tier 3 level of evidence: Promising Evidence. Though the correlation between two usage variables and student performance were small, they were statistically significant. Moreover, the results from the quantitative analysis are echoed in the qualitative analysis and the implementation survey: those teachers who had a greater degree of exposure to the Techbook used it more, gauged its quality to be higher than alternatives, were able to use it more flexibly, and based on the quantitative results had associated slightly better student performance.

Although there are several limitations to the study, the results offer a promising path to improvement for both DE and SUSD. For DE, it is important to remember that structures and resources at teachers' disposal can matter a great deal on how the Techbook is received and implemented. Increased investment in teachers' capacity to use the Techbook to build out complete units of instruction could be a worthy goal and potential outcome for SUSD.