Data-Driven Decision Making: Principals' Strategies for Improving Students' Academic Achievement

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Abstract

This study explores how principals implement data-driven decision-making (DDDM) strategies to improve students' academic success. Quantitative data were collected from 45 Principals of western Dzongkhags (Thimphu, Paro, Wangdiphodrang and Punakha) and 4 Principals were purposely selected for a semi-structured interview. Both quantitative and qualitative data findings reveal that principals actively use diverse data sources, primarily standardized test scores and student feedback, to inform targeted interventions. While there is a strong belief in the positive impact of DDDM on overall academic performance, challenges persist, particularly in addressing achievement gaps and ensuring equity in data use. Some of the impediments to a successful implementation of DDDM include insufficient training in data literacy and logistical constraints like limited time and resources. Qualitative insights highlight innovative strategies, such as award ceremonies, to foster a positive school culture and enhance collaboration. However, challenges remain in establishing a consistent data-driven culture among staff, which is crucial for the sustainability of DDDM practices. Overall, this study underscores the importance of comprehensive data use while addressing cultural and training barriers to optimize student outcomes.

Key words: Data driven decision making, strategies, academic achievement

Introduction

Data-driven decision-making (DDDM) involves utilizing data to guide actions related to policies or procedures (James, 2010). As noted by Marsh et al. (2006), in the educational context, DDDM encompasses the systematic collection and analysis of diverse data types- such as input, process, outcome, and satisfaction metrics- by teachers, principals, and administrators. This approach aims to inform various decisions that ultimately enhance student and school success. In the education of the 21st century, data-driven instruction is essential to build a culture of continuous

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improvement. Consequently, data-driven decision-making has emerged as the central focus of education policy (Mandinach et al., 2005). This methodology promotes a culture of growth and a willingness to learn, careful planning and the evaluation of the effects of change. It furthermore helps to enhance a growth mindset and openness to learning that helps students to succeed (Dowling, 2023). Levin and Datnow (2012) further emphasize that effective school administration relies heavily on the implementation of DDDM. In summary, DDDM entails leveraging student data- such as test scores, attendance, and behavioural information- to pinpoint areas of difficulty for students and to devise targeted interventions to address these challenges (Billen, 2009).

According to empirical research, educational institutions that use data-driven decision-making procedures typically have students who achieve at higher levels academically. This is due to the fact that data-driven decision-making enables school leaders to pinpoint problem areas for children and create individualized interventions and instructional plans to address these issues (Hallinger, 2010).

The literature suggests that dramatic increases in student achievement occur in schools that use student data consistently and effectively (Terrill, 2018). A study by Carlson et al. (2011) thus found that schools using data-driven practices showed substantial gains in student achievements and school improvement initiatives. Similarly, Lai and Schildkamp (2012) claimed that data-driven decision-making can enhance teaching practices, curriculum development, and overall school improvement initiatives. Further, Ikemoto and Marsh (2007) found that schools that effectively used data to guide instructional decision-making saw marked improvements in student performance. Similarly, Hamilton et al. (2009) highlighted that data-driven approaches lead to more focused and effective teaching strategies, as educators are better equipped to address the diverse needs of their students. Moreover, data-informed decision-making has been identified as a primary practice of successful school leaders in enhancing student retention and engagement (Shen et al., 2015).

Despite the recognized importance of data-driven decision-making, there are challenges that principals encounter in effectively utilizing data for school improvement. These challenges include limited access to timely and relevant data, a lack of data literacy skills, and insufficient

professional development opportunities for principals to enhance their data-driven decision-making practices (Supovitz, 2016; Marsh, 2017). Principals must navigate various obstacles, including data literacy among staff, technological infrastructure, time constraints, and the need for a cultural shift towards data-driven practices (Datnow & Hubbard, 2016). Lack of training often leads to schools that operate at a surface level of understanding the data they collect (Billen, 2009). DDDM continues to face challenges as it has not been a systematic approach till date. Murray (2014) further emphasizes that Principals and teachers generally lack the knowledge, skills, and time to sort through, organize, and make sense of volumes of data. As a result, it leads to ineffective processes, leading to failure in realizing the potential use of data available.

In the Bhutan context, the Competency Framework for Principals, as per RCSC (2023), refers to the competencies that consistently embrace data-driven approaches. This in itself is a paradigm shift away from conventional educational leadership practices and toward data-driven decision-making. Leaders and educators are better equipped to make decisions about instruction and interventions that will improve overall learning outcomes (Jurgens, 2023). Nonetheless, there are still unresolved problems with education, including student learning gaps, educational access, equity, quality, and system efficiency at all educational levels (MoE, 2020). These unresolved problems of access, equity, quality, and system efficiency can only be achieved through principals' leadership and decision-making based on data.

Over the past few decades, Bhutan has transitioned from a largely monastic education system to a modern, secular one. This transition has brought about significant changes in educational management practices. The Ministry of Education, established in 1961, has been at the forefront of shaping educational policies and practices in the country (REC, 2012). Recent reforms have emphasized decentralization and school-based management, giving principals more autonomy and responsibility in decision-making processes (Thinley, 2016). This shift has created both opportunities and challenges for school leaders in Bhutan.

As the country strives to improve the quality of education and student learning outcomes, there has been a growing recognition of the importance of evidence-based practices in school management (Gyamtso & Maxwell, 2012). While the importance of DDDM is recognized, its

implementation in Bhutanese schools is still in its early stages. A study by Dorji (2018) found that while many principals in Bhutan acknowledge the value of data in decision-making, they often lack the skills and resources. Moreover, there remains a significant gap in understanding how Bhutanese principals can effectively implement DDDM strategies to improve student achievement. This study aims to address this gap by examining the current practices, challenges, and opportunities for DDDM in Bhutanese schools, with a particular focus on principals' strategies for leveraging data to enhance student learning outcomes.

The study seeks to identify the types of data used by Principals, their impact on decision making and the challenges faced by the Principals in implementing data-driven decision-making in their leadership practices, which contributes to the growing body of knowledge on educational management in Bhutan. It also has the scope to provide practical insights that can inform policy and practice in the unique cultural and educational context of the country.

Methods used

The study adopted two instruments namely a survey questionnaire and a semi-structured interview. A total of 45 Principals from western Dzongkhag were purposively selected in the survey questionnaire and 4 principals of Thimphu Dzongkhag were for the semi-structured interview. The participants for the survey questionnaire and semi-structured interview were selected since these schools have been performing better academically.

The survey questionnaire contains 26 questions, arranged on a Likert scale. Respondents were expected to provide their answers on a 4-point scale of Strongly Agree, Agree, Disagree, and Strongly Disagree, which was coded as 1, 2, 3, and 4 respectively. The reliability of the instrument was established through a split-half test using 15 respondents and a coefficient of 0.76 was obtained. Every item on the Likert scale was analyzed using mean, SD and ranking.

The semi-structured interview was employed to obtain qualitative insights from principals' beliefs, experiences, and strategies regarding data-driven decision-making. A total of four principals (2 Higher Secondary Schools and 2 Middle Secondary Schools) from Thimphu Dzongkhag were interviewed. The principals of the four Schools were chosen based on the progressive overall academic performance of the school. In addition to the academic

performance, the availability and willingness of the principals to participate, and the proximity of the principals were taken into consideration. Selection of the participants was done using purposeful sampling and the participants willingly accepted to participate in the study. The interview involved semi-structured and open-ended questions. The interviews were recorded and transcribed. The participants shared their lived experiences as Principals and the interpretations of their data-driven decision-making. (Creswell, 2009). Each of the interviewees is given pseudonyms HSP 1, HSP 2, MSP 1 and MSP 2.

Result

Table 1: Current practice employed by principals in utilizing data-driven decision-making.

S/N	Current practices employed by principals in utilizing data-driven decision making	Mean	SD	Rank
1	Use data to monitor progress towards the school improvement goals	3.56	0.49	3rd
2	Address achievement disparities by using data	3.52	0.5	5th
3	Involve teachers in data collection process	3.46	0.63	6th
4	Ensure that the data collected are accurate	3.33	0.56	8th
5	Help instructors learn data literacy	3.39	0.62	7th
6	Identify trends in making informed decisions about instructional strategies	3.54	0.5	4th
7	Systematically organize/store data for easy access/retrieval	3.61	0.49	2nd
8	Use of various types of data (e.g., student performance, attendance, behaviour) to inform decision making	3.64	0.55	1st
9	Analyse data to develop instructional strategy	3.61	0.49	2nd

Table 1 presents the mean rating, standard deviation (SD) and ranking for different current practices employed by principals in utilizing data-driven decision-making for school improvement and student learning outcomes. The use of various types of data (e.g., student performance, attendance, behaviour) to inform decision-making received the highest mean rating of 3.64 while ensuring that the data collected are accurate has the lowest mean rating of 3.33.

Table 2: Perceived impact of data-driven decision-making on school improvement and student learning outcomes.

S/N	Perceived impact of data-driven decision making on school improvement and student learning outcomes	Mean	SD	Rank
1	Improve overall academic performance of students in the school	3.67	0.49	1st
2	Contributed to a more personalized and targeted approach to student support and interventions	3.61	0.49	2nd
3	Improved teacher collaboration and shared accountability in the school	3.55	0.47	3rd
4	Led to improved student achievement in specific subject areas (e.g., math, reading)	3.54	0.57	4th
5	Enhanced the efficiency and effectiveness of school improvement initiatives	3.61	0.49	2nd
6	Improved the decision-making process for allocating resources in the school	3.43	0.56	6th
7	Influenced the overall school culture and climate.	3.43	0.62	6th
8	Address achievement gaps among different student groups (e.g., gender, ethnicity, socioeconomic status)	3.29	0.59	7th
9	Identify effective instructional strategies and interventions	3.46	0.57	5th

Table 2 presents the perceived impact of data-driven decision-making on school improvement and student learning outcomes. The highest mean rating was 3.67 for the statement, "Improve overall academic performance of students in the school" while the “perception of addressing achievement gaps among different student groups” received the lowest mean rating of 3.29. There is not much variation in mean among the items.

Table 3: Challenges faced by principals in implementing data-driven decision-making in their leadership practices

S/N	Challenges faced by principals in implementing data-driven decision making in their leadership practices	Mean	SD	Rank
1	Integrating data-driven decision making into existing systems and practices	2.96	0.68	4th
2	Limited capacity to use data to identify and address specific student needs and interventions.	2.89	0.67	5th
3	Concerns regarding student privacy and ethical use of data	3.14	0.64	3rd
4	Resistance to change	2.82	0.6	6th
5	Limited access to high-quality/relevant data	2.96	0.57	4th
6	Difficulty in aligning data-driven decision making with the overall vision and goals of the school	2.89	0.67	5th
7	Insufficient training and professional development opportunities for principals to develop data literacy skills	3.61	0.49	1st
8	Lack of time/resources to collect, analyze, and interpret data	3.36	0.67	2nd

Table 3 presents the challenges faced by principals in implementing data-driven decision-making. The "insufficient training and professional development opportunities" has the highest mean rating of 3.61. The item "resistance to change" has a mean rating of 2.82 which ranks lowest among the challenges.

Theme I: Data-driven leadership and the challenges

Interview findings relay that principals had different beliefs about Data-driven leadership prior to the reforms of the Ministry of Education and Skills Development (MoESD) focusing on instructional leadership. Participants perceive data-driven as time-consuming, requiring expertise and difficulty in managing data due to a large number of students. Mr. HSP 1, a senior Principal expressed that "while data collection is important, we require the right kind of training". According to HSP 2, data management takes a considerable amount of time and impedes other important programs. As per HSP 1, if any data-driven decisions lack timely support and

interventions, the entire process of DDDM loses authenticity. HSP 2 expressed that they become helpless when the relevant agencies ask for too much data at the last minute leading to ineffective data submission. According to this respondent, they seek support from ICT teachers for any data collection or compilation that results in compromising on the quality of teaching.

MSP1 also shared that handling a wide variety of data is cumbersome and it is difficult to reach out to the needy students, thus wasting the time spent on compiling. As per MSP 1, "While we maintain data in many areas of development of students, we face difficulty in updating the information on a timely basis owing to other works". On the contrary, due to the multi-tasking job, it is cumbersome to do the follow-up programs after the identification of needs (HSP1, HSP 2, MSP 2). HSP 2 and HSP 1 pointed out, "Due to many planned and ad-hoc programs, time constraint is a hindrance to effectively conduct follow-up programs". According to MSP 2, "Due to the lack of data-driven culture among staff, it is difficult to engage all in data-driven decision-making processes".

All the participants agreed to the lack of expertise to validate and authenticate the available data compiled. All the participants had the common understanding that when teachers are provided with the task of data analysis, it hinders their effectiveness in classroom teaching thus compromising the student learning which they consider as a priority and when these teachers have to work overtime, it slowly leads to professional burnout.

Theme II: Data Used by Principals

The participants of the interview also shared that quality data-driven decision-making should be emphasised in all schools. According to HSP 1, HSP 2 and MSP 1, "using standardised test scores as the main source of data to improve academic performance is one they have used so far exclusively." MSP 1 said, "Quite often, the school collects feedback from students on the teacher's teaching and considers this way to be effective in improving the academic performance of students." On the other hand, MSP 2 said that student demography, attendance and behaviour data play a significant role in planning for the interventions to improve the academic performance of students.

MSP 1 and HSP 2 have been using teacher's competency data, capacity-building data and feedback from the community are the major data for any planning and decision-making purposes to date. HSP 3 highlighted on having multiple data compilations in his school but only result analysis data is considered a priority. As per HSP 2 "As a head of the institution, the most important and the first data we always have in hand readily available is the resource mapping, capacity building and attendance of students".

Theme III: Strategies used for implementing data-driven decision-making

All the participants said that strategies based on the data analysis are used for identifying the gaps and needs of the students for the validation of academic performance. The data analysis, according to them, is required for studying the target group for developing interventions and other plans and programs. According to MSP 2, "This year, the school has used the data for comparing the school's academic performance with the past years to bring about better performance".

As per HSP 2, the best strategy used till date is the use of result analysis data through which he was able to conduct award ceremonies for the performing students. He also emphasized data collection from parents and the community on the school's performance which helped the school to come up with standardized tests. "The collection of feedback from the parents helped to develop the interventions to study student's background stories and provide support accordingly," says HSP 2 and MSP 1. Another strategy developed by HSP 2 is, "Extended learning time for students in the morning, three times a week which is one good practice that adds to the steady academic performance".

All participants in the interviews expressed a shared perspective that data-driven interventions facilitate the acquisition of support from various stakeholders. Additionally, such an approach simplifies the identification of students' needs, allowing for timely and appropriate interventions. Furthermore, when interventions are informed by data, the resulting impacts are significantly enhanced, thereby motivating both teachers and students.

Discussion

The analysis of both quantitative and qualitative data in this study provides a comprehensive view of the current practices, perceived impacts, and challenges faced by principals in implementing data-driven decision-making (DDDM) for school improvement and student learning outcomes.

Findings from the survey and the interview reveal that principals believe in the perceived impacts of DDDM in improving academic performance, which supports earlier findings by Denny (2020) that effective data use can significantly elevate student achievement, which is evident from the overall positive mean ratings and the responses from the interview and survey.

While principals demonstrate effective practices in leveraging data for the enhancement of school performance, there remain opportunities to improve teacher involvement, data literacy, and data accuracy. The results further reveal that principals possess a strong conviction regarding the substantial influence of data-driven decision-making on multiple aspects of school improvement and student achievement. The indicator “analyze data to develop an instructional strategy” ranks second among the current practices employed by principals in utilizing data-driven decision-making, suggesting that the use of DDDM is closely associated with planning in schools. Similarly, various types of data such as student academic performance, attendance and behaviour records are already in use in the leadership practices of the principals for decision-making and developing instructional strategies.

However, there are areas like addressing achievement gaps and improving resource allocation and paradigm shift from traditional leadership to instructional leadership that hinder further enhancement of leadership practices. Although Principals recognize the value of data-driven decision-making, they face significant challenges, particularly in terms of training and professional development, time, resources, and privacy concerns. The indicator “insufficient training and professional development opportunities for principals to develop data literacy” under challenges faced by principals in implementing DDDM in their leadership practices ranked highest in the survey. Similarly, all the principals during the interview stated lack of time, large number of students and lack of expertise in managing data is a hindrance to effective DDDM.

Addressing these challenges through targeted professional development, improved access to data, and supportive policies could enhance the effective implementation of data-driven leadership practices in schools.

Conclusion

This research indicates that school principals acknowledge the considerable advantages of data-driven decision-making (DDDM) in enhancing academic outcomes. Furthermore, the findings suggest that while schools are actively employing DDDM, they encounter significant obstacles, especially in areas such as training, resource distribution, and cultivating a culture that prioritizes data utilization. The combination of quantitative and qualitative data in this investigation highlights the complex nature of executing data-driven decision-making within educational institutions. By tackling these challenges, schools can more effectively utilize data to boost academic performance and promote equitable learning conditions.

For effective data-driven decision-making (DDDM) in educational institutions, the Ministry of Education and Skills Development needs to organize capacity-building workshops specifically for school principals. A robust data management system, complemented by the integration of digital technologies and overseen by a dedicated data manager, is necessary. At present, the responsibilities associated with data management are primarily handled by ICT teachers, which proves insufficient for comprehensive outreach due to their teaching obligations. Furthermore, the Ministry should consider allocating and securing additional funding to encourage schools to prioritize the implementation of digitalized data management systems.

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