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Data-based decision-making practices in secondary schools of North Gondar, Ethiopia

Asrat Dagnew*, Department of Teacher Education and Curriculum Studies College of Education and Behavioral Science, Bahir Dar University, Post Box No: 79, Bahir Dar, Ethiopia https://orcid.org/0000-0002-2804-1715
Aster Asrat, Gondar University, Ethiopia
Gebremedhin Fitsumbirhan, Central Zone of Tigray, Ethiopia

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Abstract

The main purpose of this study was to examine data-based decision-making practices in secondary schools of North Gondar. Descriptive design was employed in the study. Data were collected from 14 principals, 28 vice principals and 78 department heads through a questionnaire which contained closed and open-ended items and from document analysis. Regarding the sampling of participants, systematic sampling was used for selecting the sample districts; principals and vice principals were selected using comprehensive sampling and purposive sampling were used to select the department heads. The result of the analysis shows that the secondary schools under study had varieties of decision areas and data available for their decisions but they did not use such data available properly to address the decision areas specified. From this, it was possible to conclude that the data-based decision-making in secondary schools was not practiced as expected and it was highly affected by a host of factors like poor scientific methods of data collection, lack of data analysis practices using different techniques and poor data storage and retrieval systems in secondary schools. It is, therefore, recommended that training in skill and awareness development on data-based decision-making should be provided to school teachers in the area.

Keywords: Data-based, decision-making, practice and secondary school.

* ADDRESS FOR CORRESPONDENCE: **Asrat Dagnew,** Department of Teacher Education and Curriculum Studies College of Education and Behavioral Science, Bahir Dar University, Post Box No: 79, Bahir Dar, Ethiopia.
E-mail address: asratboza@yahoo.com/ Tel.: +1-905-721-8668

1. Introduction

Regardless of the type of decisions and the degree of involvement, we all spend our lives by making decisions wherein some are good while others may be bad decisions, depending on the way we understand and handle the decisional issues and the environmental context and its pressure. According to Marsh, Pane and Hamilton (2014), what matters in making data-based decisions is what kind of data is collected for decision, how to organise and analyse the collected data, how to set goals and objectives of the data, how to change the data into actionable knowledge and how to make data-based decisions in a systematic way. The success of school improvement efforts as Bernhardt (1998) stated, decision depends on the extent to which principals make or lead decisions based on relevant data. Data-based decision-making has opened a new world of opportunities for schools and districts to provide professional educators, students and parents access to large amount of information. According to Messelt (2015), today, schools can enable key decision-makers with data and information to facilitate more informed decision-making; and thereby boost the overall school performance and improve students' achievement. Thus, it can be said that it is based on the appropriate data and the data-based decision that a student's achievement and school performances can be improved.

Data-based decision-making refers to an educator's on going process of collecting and analysing data. The purpose of data-based decision-making is to help teachers, schools, districts and states to use information they have to actionable knowledge to improve learning outcomes. Data-based decision-making is used to explain complexity of education support, collaboration and creating new designs of teaching. Teachers practically use the data-based decision-making process in the implementation of formative and summative evaluation. The application of criterion and norm referenced assessment technique requires classroom teacher's fair judgement.

Research shows that the associated benefits of data-based decision-making have been unrealised in most high schools. In most high schools of developing countries, data-based decision-making faces several problems in terms of implementation (Messelt, 2015). For leaders who are committed to supporting data-based decision-making in their schools, there are a variety of technical challenges to overcome many of them involving availability and reliability of data. It includes (1) shortage of skilled staff and resources, (2) difficulties cleaning up data from multiple sources, (3) various entry and accuracy errors that once analysed can lead to incorrect conclusion and (4) the need for large quantities of information. Lachat (2012) suggests that motivating staff to use data is an essential task. However, it not only motivates but also strengthens the concept that practices of finding quality data and transforming the data into knowledge used to improve schools clearly take planning, expertise and commitment from principals (Mills, 2013). There are many uses for data in educational settings, ranging from compliance and accountability of data to inform instructional practice, mostly at the diagnostic level. The push to use data has been emerging for several years as educators and policy-makers recognise the need to rely on objective evidence rather than on anecdotes (Love, 2011). At the same time, teachers and administrators are constantly being bombarded with increasing amounts of disparate data. Because many forces including pressure at the national level to increase rigor in the field of education, data use and data-based decision-making have risen to a level of national and international awareness.

As clearly mentioned by different authors, data-based decision-making in terms of data collection, data analysis and data usage is the overall decisive factor for development of the education sector. Therefore, assessing the practice of data-based decision-making in secondary schools and suggesting some possible recommendations for the problems through research seemed to be timely and valuable. Thus, based on the above background and facts raised, it is important to adopt a conceptual framework that would serve as a lens to examine the practices of data-based decision-making process in schools. The following framework may guide the way the study precedes.

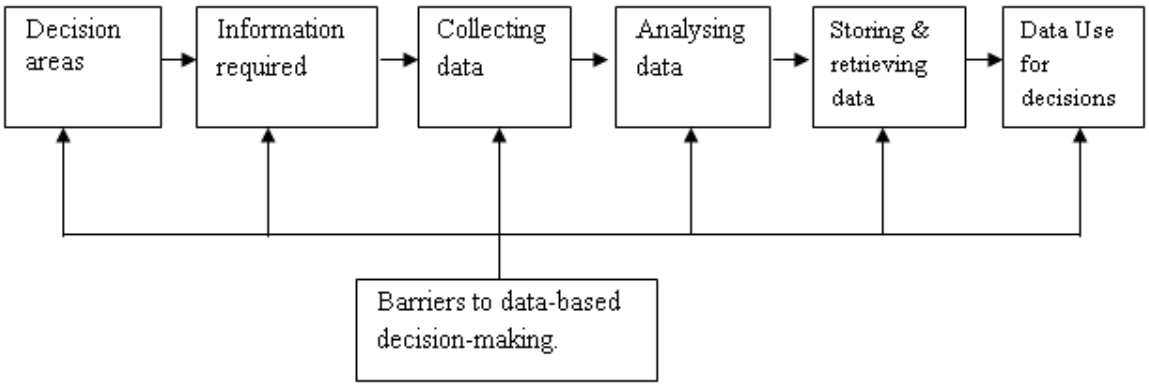

Figure1. Conceptual framework of data-based decision-making (adapted)

The framework focuses on the way school teachers identify their areas of decisions and data available, how they collect, analyse, store and use data for decisions because if these components of the data-based decision-making process are effectively used they can have a great impact on the curriculum, teacher and school improvement. According to Bernhardt (2010), educators who appropriately collect, analyse and utilise information are able to understand their students' learning needs as well as make informed decisions to change instructional practices that meet the students' learning needs. Trustworthiness of decision-making can be determined by the extent it makes based on data. Thus, data need to be appropriately collected and then the collected data need scientific and technical analysis to yield information; these data need proper mechanisms of storage so that theycan have future uses and be easily retrieved; finally data not only have to be collected and analysed but must also be used for decision-making that in turn results in changes of curriculum and instruction in order to improve student learning. It is also expected that each step of the process faces different barriers, as indicated in Figure 1, and these barriers are also made to be part of the framework that can lead the study.

Studies on data use in schools are predominantly Western-based and remain scarce in the context of developing countries like Ethiopia. That means, although data-based decision-making is getting high value in the Western countries and consequently there have been several Western-based research studies on educational data-based decision-making, the researcher, to the knowledge of him, found no related study that focused specifically on how secondary schools of North Gondar use data to inform their decisions. There were no researches carried out in examining the existing practice of data-based decision-making in secondary schools of North Gondar in terms of identifying information needs for decisions, data collecting and analysing techniques used in schools, how schools use the data, how schools store information and the hindering factors for data processing within the schools.

1.1. Data use for school decision-making in the Ethiopian context

According to Abebe (2012), it is only in recent years that the Ethiopian Government has paid attention to the importance of school management and school-level decision-making. Research in the area of school management is almost non-existent in Ethiopia. According to Ministry of Education (2003), teachers are expected to assess students appropriately and fairly using various alternative assessment methods rather than tests and examinations in that those teachers may gather useful information for learning improvements. Recently, in Ethiopia, efforts have been made to increase school-level independence through the provision of direct financial support to schools in the form of school grants and by promoting community participation.

Modern managers know that the ability to obtain, store, process, retrieve and display the right information to the right decision is vital. The process of educational planning, policy formulation, decision-making, resource allocation and other processes require coordinating and systematic organisation of information (American Association of School Administrators (AASA), 2009). Even though the definitions and concepts of data-based decision-making stated earlier are initiating to use data and there are more of Western-based literatures, scholars like Shen and Cooley (2008) cited in Dutcher (2011) contend that 'the promise of data usage has not been realised' to the extent that it should be a tool for not only looking at student achievement, but also for making school improvements. Kowalski and Lasley (2009) indicated that the often heated debate connected to scientifically based practice is not really about whether evidence should be used in decision-making, but rather how evidence (data) is collected, analysed and then subsequently used to guide practice.

Maximising students' learning outcomes in educational systems with limited resources is one of the greatest educational challenges which requires a constant monitoring and evaluation of the learning system by collecting and examining data and information used in the process of educational decision-making. But, despite the leverage that can be gained by using data effectively, many schools still struggle with data-based decision-making (Ingram, Louis & Schroeder, 2004; Mason, 2009). Many school leaders have made decisions about instructional leadership with 'intuition'. In relation to this, Simpson (2011) concluded that the barriers for effective data-based decision-making are lack of training, lack of perception or understanding what to do with data, lack of clear goals on what data to collect and complicated data report. The researcher also enforced the assessment of the above-mentioned and other related barriers for data-based decision-making in the secondary schools under study.

Hence, the researcher found the issue examining data-based decision-making practices in secondary schools worth researching to find scientific conclusions, to recommend for their improvements and to suggest the changes needed in collecting, analysing and using of school data to improve data-based decision-making practices.

To this end, the study attempts to answer the following basic questions:

1. What information needs do schools have at school wide and classroom levels?
2. How do schools collect data to address the information needs at school wide and classroom levels?
3. How do schools analyse the data collected at school wide and classroom levels?
4. How do schools store data for future use?
5. How do schools use the data collected and analysed at school wide and classroom level?
6. What are the barriers of schools in the data-based decision-making process?

Specifically, this study aims to investigate the components of the framework prepared and has the following specific objectives:

- To identify the kinds of data available for decisions at the classroom and school level.
- To determine how secondary schools collect data for school and classroom level data-based decisions of the study area.
- To examine the data analysis techniques employed at the school and classroom level of secondary schools.
- To examine the data storage and retrieving practices for future use at the school and classroom level in the secondary schools.
- To assess the use of data for decisions and actions at the classroom and school level in secondary schools of North Gondar.
- To identify the challenges that schools face in the process of data-based decision-making in secondary schools.

2. Materials and methods

The research design of this study was descriptive survey research. This research design is appropriate to deal with the perceptions of principals, teachers and students about quality of education.

2.1. Sources of data

For this study, primary sources of data were employed. The primary sources were principals, vice principals and department heads in North Gondar secondary schools. The sample for this study included secondary school principals (14), vice principals (28) and department heads (78). The researcher used comprehensive sampling method to select secondary schools in North Gondar. School principals and vice principals of the sampled district were selected using comprehensive sampling technique because the researcher believed that by virtue of their respective position they can provide the required information to the study. Purposive sampling allows researchers to select people or events that have good ground to answer the research questions. Purposive sampling techniques are used in qualitative research by selection of units from individuals and institutions based on particular purposes that are associated with answering basic research questions. Accordingly, the researcher believed that department heads having better years of experience in schools could be knowledgeable and informative about the practices of data processing in schools; based on this sense,78 (86.6%) department heads whohad2years and above in any leading department of the sampled schools were included in the study using purposive sampling method. Because these department heads may provide the required information, for that they have more experience in leading and teaching.

The combination method of sampling approach leads to a greater depth of information when careful selection of problems from a small number of units is achieved. A combination of probability and non-probability methods of selecting sample principals, vice principals and department heads for equating was compared for accuracy. Stratified and purposive sampling methods were representative samples employed in the study and matching samples on the school population. Therefore, the combination of sampling methods can be explained as cost-effective.

2.2. Data gathering instruments

According to McKay (2006), '… survey research can use both statistical and qualitative analysis.' Since this research was a survey research type, qualitative and quantitative data gathering instruments were used. Therefore, a questionnaire containing closed and open-ended items and document review was the major instrument used in the study.

2.3. Questionnaire

A set of close-ended with few open-ended items for the questionnaire was prepared. This is because the questionnaire is not only better to secure factual information about opinions and views but also serves as an appropriate instrument to obtain a variety of opinions within a relatively short period of time. In this regard, Kaul (1996) suggested that a questionnaire is widely used in educational research to obtain information about certain conditions and practices and to inquire into opinions and attitudes of individuals or group. The questionnaire was focused on the decision areas of schools, information needs at schools, data collection instruments used in schools, data analysis techniques, mechanisms of data storage and retrieval, use of data in schools and challenges that affect data-based decision-making in schools.

2.4. Data collection procedure

The following procedures of data collection were used in examining the practice and problems of data-based decision-making in the secondary schools under study. First, a questionnaire with five-point scales ranging from 1(Never) to 5 (usually) was prepared in English. After the preparation of the questionnaire, for its validity, it was evaluated by two experts who graduated with a master degree from Addis Ababa University, including the support of the colleagues. Based on this, necessary corrections were made to all suggestions and comments; for instance, comments related to inappropriateness, such as instead of listing many alternatives of school decision areas and information needed for decisions to be rated by respondents it was corrected to be an open-ended item so that participants can list themselves; in addition, some items were changed from the ranking style to the Likert scale method of presenting due to their availability in relation to the research questions.

It is important to standardise the tools before administering the instruments of data collection, as it gives the chance to comment on and check its clarity. Accordingly, the instruments prepared for principals, vice principals and department heads were pilot tested to address their reliability in one randomly selected high school which was not included in the sample study and which had one principal, two vice principals and four department heads that gratify the criteria of sampling of participants of the research. The pilot test was conducted to test the reliability of the instruments by employing Cronbach's alpha method. Thus, the result of the reliability was 0.956 for the instruments. This shows that the instruments were reliable since numbers (reliability test results) near to one are generally considered more reliable. Finally, the questionnaires were distributed to the final sample participants of the study, by giving them an orientation to make clear the contents of the questionnaire and objectives of the study. Finally, the responses of the questionnaires were collected by the researcher himself to secure the information. Necessary documents related to the study which solicited additional information were surveyed by the researcher.

2.5. Data analysis techniques

In order to manage and acquire detailed information easily, the data collected through the questionnaire were organised and presented in tables and analysed using descriptive analysis methods. Since the items were many in number, they were analysed and discussed following the presentation of each research questions; for instance, in the open-ended items, the varieties of decisions frequently made in schools and the kind of information needed for school decisions all described by the groups of participants were presented, analysed and discussed by putting them into four thematic categories: student-related, teacher-related, instructional-related and administration-related. School level and classroom level instruments of data collection were presented and analysed together and accordingly discussed. The analysis, presentation and discussion of results continued based on the research questions.

The percentage was used to analyse the characteristics of respondents, such as age, sex, educational qualification and experience. Word narration was qualitatively used to analyse the qualitative data obtained from open-ended questions of the first part of the basic questions that is to analyse what decision areas and information needs do schools have at school and classroom levels.

Mean, standard deviations and One sample *t*-test calculated with the help of Statistical Package for Social Sciences were used to analyse the quantitative data obtained from research questions concerning the instruments of data collection used in schools, the data analysis methods, techniques, data storage and retrieval mechanisms, uses of data and the barriers that affect the data-based decision-making processes in secondary schools. Data obtained from the document consultation were analysed in order to complement the result of the data collected through the questionnaire. This enabled the researcher to reach some relevant conclusion and recommendations.

3. Discussion and results of the study

3.1. Characteristics of participants

The purpose of this section is to provide some basic background information pertaining to sample population with the assumption that it might have some sort of relationship with 'practices of data-based decision-making'. For this reason, the characteristics of participants were examined in terms of sex, age, educational qualification, leading experience, additional work load and training condition about data-based decision-making. Hence, the summary of this part is presented in Table 1.

Table 1. Characteristics of participants by their sex, age and educational status

No	Characteristic	Participants					
		Principals		Vice-principals		Department heads	
		No	%	No	%	No	%
1	Sex	14	100	22	78.6	57	73.1
	Male						
	Female	0	0	6	21.4	21	26.9
2	Age interval	2	14.3	5	17.9	21	26.9
	<30 years						
	31–40 years	8	57.1	17	60.7	39	50
	41–50years	4	28.6	6	21.4	18	23.1
	>51 years	–	–	–	–	–	–
3	Educational status	–	–	–	–	–	–
	Diploma						
	First degree	12	85.7	27	96.4	78	100
	Second degree	2	14.3	1	3.6	-	-
4	Experience	–		–	–	–	–
	<5 years						
	6–10years	2	14.3	6	21.4	34	43.6
	11–15years	7	50	13	46.4	26	33.3
	16–20years	2	14.3	7	25	13	16.7
	21and above years	3	21.4	2	7.2	5	6.4
	Total	14	100	28	100	78	100

As it can be seen in Table 1, all the 14 principals, the majority (78.6%) of vice principals and the majority (73.1%) of department head leaders were male. This shows that schools were most of the time led by males.

With regard to age, 8 (57.1%) principals, 17 (60.7%) vice principals and 39 (50%) department heads were aged between 31 and–40 years. This means the majority, 64 (53%), of the participants were in this range. And among the participants, 4 (28.6%) principals, 6 (21.4%) vice principals and 18 (23%) department heads were aged between 41 and 50 years; this means that about 28 (23%) of the total participants of the study were in this age range. The analysis of age intervals indicated that the majority of participants of the research were above adult age and their responses could give sufficient information.

With respect to participants' educational level, 12 (85.7%) principals, 27 (96.4%) vice principals and all department heads were first degree holders. This indicates that principals of the secondary schools of the sampled area were well qualified. This finding is in agreement with the requirements set by the Ministry of Education. Based on this, it is possible to see that their qualification may help them to have the skills and understanding in data-driven decision-making.

Regarding participants' experience shown in the Table, 1 (14.3%) principal, 6 (21.4%) vice principals and 34 (43.6%) department heads had 6–10 years of experience. Similarly, 7 (50%) principals, 13 (46.4%) vice principals and 26 (33.3%) department heads had an experience ranging from 11 to 15 years. There were also a total of about 32 participants (26%) with more than16 years of experience. This indicated that about 78 (65%) of the total participants were over 10 years in service. This shows that principals develop their decision-making abilities as their work experience increases. Thus, their experience enables them to understand and practice different data gathering and data analysis techniques and this in turn has been thought to have an opportunity for providing sufficient information for the study.

Table 2. Kinds of information needed for classroom level decisions

Student-related information	Teacher-related information	Instructional-related information
Benchmark of students' results	Content covered	Best practices obtained from staff meetings
Background of students in their academy	Observing student–teacher interactions	Lesson plan and annual plans
Application of students	Educational annual calendar	Examination results
Attendances	Minutes at departments	Data on tutorials
Drop-out rates		
Students enrolled		
Exam results		
Parent's suggestions about student		
Reports from monitors		

Table 2 reveals that there are also varieties of information needed for classroom level decisions as described by the groups of participants. From the above presentation, one can see that some information needed at school wide is also needed at classroom level; for instance, minutes, reports, attendances, drop-out rates, content covered and benchmark of students. But, the overall results of the participants further indicated that most of the information needed for school level and class room level are different. Schildkamp and Kuiper (2010) argue that schools have different data available. In line with the argument of these authors, it may be clear from the above presentation and analysis that our secondary schools at both school and classroom levels have varieties of decision areas and many types of information needed for decisions for that they own high amount of school population (students, teachers and administration staffs) and they own large budgets from government and the community for their school improvements which requires different day-to-day monitoring and evaluation activities and decisions.

Table 3. Uses of data gathering formats for school level and classroom level decisions

Level of study	Instrument	*n*	Test value = 3					Sig.
			Mean	Mean difference	Std. deviation	*t*	*df*	(2-tailed)
School level	Data gathering format	120	3.917[a]	−0.91667	−0.87528	11.472	119	0.000
Classroom level	Data gathering formats	120	2.325	−0.37500	−0.74543	−1.511	119	0.000

N = total participants; $p < 0.05$ scale; 1 = never; 2 = rarely; 3 = sometimes; 4 = many times; 5 = usual.

At the school level, the calculated results in Table 3 using one sampled *t*-test shows that the calculated mean value (3.917) is greater than the expected mean value (3), the observed *t*-value (11.472) is again significantly greater than the critical *t*-value (1.980), at $p < 0.05$, $df = 119$ and sig. two-tailed; these results shows that the respondents rated the item above average and hence indicates that the data gathering formats were used most of the time as school wide data collection

instruments for decisions. The standard deviation calculated (0.875) which is below one also indicates that there is no difference in responses of the respondents.

Concerning the use of data gathering formats for decisions at the classroom level, the calculated One sample *t*-test shows that the calculated mean value (2.325) is less than the expected mean value (3), the observed absolute *t*-value (1.511), at $p < 0.05$, $df = 119$, sig. two-tailed, is again greater than the critical *t*-value which is 1.980. These results shows that the respondents rated the item below average hence indicates that data gathering formats were used rarely as classroom level data collection instruments.

3.2. Data analysis methods and techniques employed in schools

Table 4. Results of One-sample *t*-test on data analysis methods

	Instrument	*n*	Test value = 3					
			Mean	Mean difference	Std. deviation	*t*	*df*	Sig. (2-tailed)
School wide	Using computer for data analysis	120	3.441	0.442	1.02732	4.710	119	0.000
	Using manually for data analysis	120	2.917	−0.083	1.10449	−0.827	119	0.410
Classroom level	Using computer for data analysis	120	2.517	0.483	1.07675	−0.917	119	0.000
	Using manually for data analysis	120	3.325	0.325	1.04650	3.402	119	0.001

*N = total participants, $p < 0.05$ scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = many times, 5 = usually.

For using computer to analyse school level data, the obtained value of *t* (4.71) at $p < 0.05$,$df = 119$ is observed to be significantly greater than the *t*-critical value(1.98), indicating that the calculated mean value (3.44) of using computer is significantly higher than the expected mean value(3). But the result for using manual methods to analyse school level data depicts that the absolute *t*-obtained value (0.827) at $p < 0.05$ was less significant than the *t*-critical value which shows the calculated mean value (2.917) was lesser but nearer to the expected mean value (3) indicating that manual methods of data analysis were moderately used at school level.

For using computer to analyse classroom level data, the calculated mean value (2.51) is greater than the expected mean (3); and the absolute obtained value of *t* (4.91) at $p < 0.05$, $df = 119$ is observed to be significantly greater than the *t*-critical value (1.98) indicating that there is a significant difference between the calculated mean value and the expected mean value. Thus, the item that scored below average indicated that the computers were used rarely to analyse data at classroom level. But the result for using manual methods to analyse classroom level data depicts that the *t*-obtained value (3.40) at $p < 0.05$ was significantly greater than the *t*-critical value. The calculated mean value (3.32) was greater than the expected mean value (3), indicating that the manual methods were many times used to analyse data at the classroom level.

3.3. Mechanisms of data storage and retrieval in schools

Table 5. Mechanisms of data storage and retrieval at school and classroom level

	Instrument	*n*	Test value = 3					
			Mean	Mean difference	Std. Deviation	t	df	Sig. (2-tailed)
School	Using computer for data	120	3.100	0.100	0.999	1.096	119	0.000

wide	storage							
	Using paper-based mechanisms for storage	120	3.916	0.916	0.7947	12.64	119	0.000
	Retrieving data manually	120	4.067	1.06667	0.80683	14.48	119	0.000
Class	Using computer for data	120	1.700	−1.300	0.7735	−18.4	119	0.000
room	storage					1		
level	Using paper-based mechanisms for storage	120	4.233	1.233	0.7417	18.22	119	0.000
	Retrieving data manually	120	4.558	1.55833	0.69567	24.54	119	0.000

*N = total participants; $p < 0.05$ scale: 1 = never; 2 = rarely; 3 = sometimes; 4 = many times; 5 = usually.

Regarding the school wide and classroom level data storage mechanisms, the data calculated and presented in Table 5 shows that the school wide calculated mean value for using computer storage (mean = 3.100, $t = 1.09$ at $p < 0.05$) did not have a significant difference with the expected mean value (3). This result indicates that schools use computer-based mechanisms to some extent for school wide data storage. For instance, the document analysis observed in the sampled schools showed that vice principals stored different kinds of information, such as annual plans, different reports and time tables (period allotments of teachers), on in their computers.

The calculated mean value for paper-based mechanisms of data storage at school level (3.916) at ($t = 12.64$, $p < 0.05$, $df = 119$, sig. two-tailed) was significantly higher than the expected mean value (3). Thus, it indicates that schools most of the time use paper-based mechanisms of data storage for school level decisions.

Similarly, the calculated mean value for classroom level computer-based data storage (1.70) is significantly lower than the expected mean value (3) because the absolute obtained *t*-value (18.41) at $p < 0.05$ which is greater than the *t*-critical value (1.98) indicates that there is a statistically significant difference between the two means; and this result indicates that computer-based mechanisms of data storage at classroom level were used rarely. The calculated mean value for classroom level paper-based mechanisms of data storage (4.23) at ($t = 18.22$, $p < 0.05$, $df = 119$, sig. two-tailed) is significantly higher than the expected mean value (3); and this shows that paper-based mechanisms of data storage were most of the time used for classroom level decisions.

Regarding data retrieval methods of schools, the analysis of the responses using One sample *t*-test revealed that the calculated mean values (4.067) for manual-based data retrieval with *t*-obtained was 14.48 (at $p < 0.05$, $df = 119$, sig. two-tailed) at school wide level and was greater than the expected mean (3). The obtained mean for manual-based data retrieval (4.56) with *t*-obtained was 24.54 (at $p < 0.05$, $df = 119$, sig. two tailed) at classroom level, which was significantly greater than the expected mean value. This indicates that schools use most of the time manual-based methods of data retrieving at their school wide and classroom level.

Lafee (2012) confirmed that non-systematic and incompatible data storing and organising is an important reason why the evolution of data-based decision-making and the paradigm shift is painful; in line with this fact, it could not found latest samples of decisions for analysis in the sample schools thus indicating lack of poor storing mechanism of the schools. From the above findings, it can be discussed that schools did not give due emphasis for technology-based information storages, which means that schools are using manual-based (paper-based) instruments for data storage at school level and classroom level. Even though papers have their own advantages, the modern world is in need of technologies and in contrast to this the secondary schools under study were using paper-based mechanisms. A research conducted in an educational institution of Nigeria by Samuel & Ede as cited in (Tefera, 2011) showed that schools record only in files that were pushed away, which later accumulated dust and were eaten up by rodents and cockroaches; thus, it was impossible to find information. In agreement with the concept of the scholars, our secondary schools, as the analysis

indicated, were frequently using paper-based files to store their information. In relation to this, the findings of the data analysed indicated that schools retrieve information using manual methods that may consume time to look into the archives, which affects quick decision-making. All these existed problems may affect the overall data-based decision-making process in schools.

3.4. Challenges that affect data-driven decision-making in secondary schools

Table 6. Results on challenges that affect school level DDDM practices

Instruments	*n*	Test value = 3					
		Mean	Mean difference	Std. Deviation	*T*	*df*	Sig. (2-tailed)
Lack of skilled and knowledgeable personnel in data analysis and interpretation	120	4.517[a]	1.51667	0.73317	22.661	119	0.000
Untimely data collection requirements	120	4.333[a]	1.33333	0.61266	23.840	119	0.000
Lack of understanding what to do with data	120	2.9000	−0.10000	0.77134	−1.420	119	0.158
Lack of commitment of school leaders	120	2.6750	−0.32500	0.81129	−4.388	119	0.000
Computer systems are inadequate for data processing	120	4.750[a]	1.75000	0.43483	44.087	119	0.000
Lack of data/information management policy	120	3.867[a]	0.86667	0.93425	10.162	119	0.000
Lack of clear goals on what to collect	120	2.767	−0.23333	0.94142	−2.715	119	0.008
The perception that data analysis is not a school priority	120	3.742[a]	0.74167	1.0330	7.865	119	0.000
Lack of standard instruments of data collection	120	2.6333	0.3667	0.84747	−2.462	119	0.391
Inconsistent data requirements from the top officials	120	4.483[a]	1.48333	0.63489	25.594	119	0.000

N=total participants, $p<0.05$ scale: 1=never; 2=rarely; 3=sometimes; 4=many times; 5=usually.

Different kinds of challenges were presented to participants to determine their degree of influence and their results obtained from the one sample *t*-test as tabulated in Table 6. The results obtained reveal that the major challenges which scored significantly higher *t*-critical values than the expected *t*-value (1.98), at $p < 0.05$, $df = 119$, sig. two-tailed, and challenges with significantly greater mean values than the expected mean (3) were the following: lack of skilled and knowledgeable school personnel for data analysis (mean = 4.517,$t = 22.66$), lack of untimely data collection requirements (mean = 4.33, $t = 23.84$), lack of computers (mean=4.75,t=44.08), lack of data management policy in schools (mean = 3.87, $t = 10.16$), the perception that data analysis is not a school priority (mean = 3.74, $t = 7.86$) and inconsistent data requirements from top officials (mean=4.483,t=25.59). Their calculated *t*-values, which are higher than the *t*-table value (1.98), imply that there is a significant difference between the calculated mean and the expected mean (3) of each of the challenges. Thus, the results indicated that these challenges were highly affecting the school wide data-driven decision-making process in secondary schools. The result indicates that there is significant deviation in responses of the participants about the 'perception that data analysis is not a school priority'. The obtained *t*-value of the challenge 'lack of understanding what to do with data' was absolute (1.42), which was lesser than the expected value (1.98) which suggests that the mean of the challenge (2.9) has an insignificant

difference with its expected value (3) and this indicates that the lack of understanding what to do with data was a moderate challenge of schools in data-driven decision-making process.

3.5. Findings of the study

- Secondary schools have a variety of decision areas during their annual works.
- Regarding the data collection tools employed in schools, the study revealed that the frequently used data gathering tools were at school and classroom level.
- Regarding the data analysis techniques employed in secondary schools, the study indicated that computers were used many times for the analysis of data at school level and rarely used for analysing data at classroom level.
- The document analysis indicated that latest samples of decisions for analysis were not available, indicating lack of poor data storing mechanisms.
- The analysis of the research depicts that schools used data for many purposes.
- With regard to the challenges of data-based decision-making, the study revealed that lack of technically trained staff and lack of skilled and knowledgeable school personnel for data analysis were the major challenges highly affecting the school level and classroom level data-driven decision-making process in secondary schools of the study area.

3.6. Implication

- It contributes to increasing the knowledge of school leaders, administrators and teachers in data-based decision-making.
- It helps to improve data-based decisions and actions in schools. That is, this study may provide additional insights to current and future school reform movements. Hopefully, the insights from this study along with other studies on data-based decision-making can be used to form a database for future comparison purposes as well as theory building.
- It adds knowledge for how to collect, how to analyse and interpret information for effective decision-making and how to store information for future use by exploring the existing practices.
- It provides solutions for the challenges that school teachers face in the process of data-based decision-making.
- It may serve as a springboard for other researchers to take in-depth study for further investigation in the field especially in developing countries.

4. Conclusion

Based on the findings of this study, it can be said that even though there were a variety of decision areas and many types of information needed for decisions at school and classroom levels, the schools used such accesses less than expected. Hence, it is possible to conclude that the data-based decision-making in secondary schools is not practiced as expected and it is highly affected by a host of factors, like poor scientific methods of data collection, lack of technology based data analysis methods, lack of varieties of scientific data analysis techniques, such as mode, *t*-tests, correlation, standard deviation and so on, lack of poor data storage systems and poor information retrieval systems. The data-based decision-making practise in secondary schools of the sampled area was critically challenged by different barriers such as lack of skilled and knowledgeable school personnel for data analysis, untimely data collection requirements, lack of computers, lack of data management policy in schools and inconsistent data requirements from top officials.

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5. Recommendations

- Although there are many types of information needed for decisions, the schools did not use them properly. Schools should not only have data available, but they should also do something with the data.

- One of the factors affecting data-based decision-making is poor storage mechanism of data in schools. Thus, teaching staffs need to use technology-based mechanisms to store their data properly so that the data can be safe and retrieved easily for future use.
- Teachers of secondary schools of the study area need to use inferential and descriptive techniques to analyse and interpret school and classroom level results so that the techniques help them understand deficiencies.
- Schools need to develop a clear policy on how to collect, analyse, use and store their data.
- Inconsistent and untimely data requirements by top officials may lead schools to inform or to report false decisions. Therefore, there should be consistent and scheduled requirements of information from top officials.

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