Adequacy of instructional resources provided by principals and students' academic performance in Machakos County, Kenya

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ABSTRACT: Globally, regionally and nationally, studies keepdocumenting insufficient provision of instructional resources by principals' to teaching and learning process. Despite the continued efforts by the Kenvan government to institute policies to mitigate this problem, students' performance in Machakos remain low over the last five years. The purpose of this study was therefore to investigate the relationship between adequacy of instructional resources and students' performance in public secondary schools in Machakos County. Descriptive survey design was adopted, simple random sampling and stratified sampling were used to select target population of 8 sub county QASOs, 47 principals and 395 teachers of public secondary schools within Machakos County, Kenya. Both descriptive (mean and standard deviation) and inferential statistics (independent t-test) wasused in the analysis of quantitative data. Qualitative data was analysed thematically. Questionnaires and interview guides were employed in data collection process. The study established that, principals did not provide sufficient instructional resources to teaching and learning. Further, there was limited improvisation and innovation of the available teaching materials to compliment the few provided by the principals. Eventually the paper concluded that, provision and improvisation of instructional resourcesinfluences learners' performance. The study recommends that the government should put more resources in schools and capacity built principals on improvisation and use of the locally available teaching and learning resources to make them sufficient for teaching and learning process.

KEY WORDS: Instructional resources, principals, Academic performance.

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I. INTRODUCTION

According to Amadioha (2018), instructional materials refers to those alternative channels of communication which the classroom teacher uses to concretize a concept during teaching and learning process. It therefore implies that, for an effective teaching to be realized, teaching has go beyond talk- chalk approach to a comprehensive learning approach which has various teaching aids. Studies conducted by Dhakal (2017) and Gogoi (2015) in India revealed that there is limited use of printed teaching resources like magazines and wall charts in secondary schools. Additionally, though some schools have audio visual resources like televisions, computers and internet services, they are rarely used. This raised the pertinent question as to whether teachers instruct in the effective manner with limited use of these materials because such learning materials makes learning environment joyful for learners, stimulates learning and makes the teachers spent less energy while explaining the content to learners (Gogoi, 2015). Limited provision of these teaching and learning resources may therefore lead to low student achievement. It is on this ground that a need arose to conduct a study on a Kenyan context and examine the adequacy of these teaching materials and establish as to whether they affected learners' outcome.

According to a study on teaching and learning resource availability and teachers' effective classroom management and content delivery in secondary schools in Rwanda, Bizimana and Orodho (2013) established that, laboratory apparatus and consumables, audio visual resources like projectors, screens and radios were not available. This meant that science subjects like physics, biology and chemistry practicals could not be taught effectively because such material enable learners to understand difficult concepts through laboratory demonstrations. This could have led to low students' classwork achievement because practicals for science subjects makes their teaching interactive thus stimulating learning (Gogoi, 2015). To add on, it was also evident that teachers were not improvising some of these resources because they relied on purchased ones. A situation where instructional resources like projectors, radios and televisions were limited in the instruction process meant that there was no continuity of thought in lesson presentations, learners lacked interest in teaching and lastly teaching was not meant real and meaningful to them (Amadioha, 2017). A need therefore arose to conduct a study in Machakos within Kenya to investigate the types of teaching resources provided by principals in

Machakos County. Further, the study also examined whether teachers are fully guided by the instructional supervisors on how to be innovative in order to improvise on the use of locally available instructional resources like teaching aids and also Information Communication and Technology (ICT) integration with the aim of enhancing learners' classroom achievement.

A study by Muthoka (2014) in Masinga within Kenya which adopted ex-post facto researchdesign established that many instructional supervisors are unable to sufficiently supply instructional materials to teachers. Instructional resources include text books, science laboratories, teaching aids models and access to computers which have internet. Limited provision of these teaching resources means that learners may not comprehend the content easily. This discourages effective teaching and learning among students because as revealed by Busljeta (2013), teaching resources like internet enrich teaching process by way of making it more modern and effective. Insufficient provision of internet then may have led to dismal performance in Machakos county schools because there is statistically significant difference in performance between leaners taught using instructional resources as opposed to those learners taught without the use of the same instructional resources (Ajoke, 2017). It was necessary then, to conduct a descriptive survey study which helped to accurately describe the state provision of these teaching resources as it exists (Kombo and Tromp, 2006) thus providing valid findings.

Although according to Republic of Kenya, basic education act (2013), it is the responsibility of the government to provide infrastructure including school teaching and learning equipment and sufficient financial resources, many schools have complained of late disbursement of free secondary education funds, in some cases suppliers stopping deliveries (Mwangangi, 2017). Therefore this imposes a great challenge on the part of instructional supervisor who has to provide such instructional resources. An instructional supervisor without funds to purchase resources like chalk, revision books, wall charts, projectors and laboratory consumables for practicals will be limited in his/her provision of these resources to teachers. It is on this ground that this study established from principals whether they are able to provide sufficient instructional resources and whether they enhance students' academic performance.

In his study on effectiveness of instructional supervision and its impact on primary school pupils' academic performance in Masinga Division in Machakos County, Muthoka (2014) established that, head teachers at primary school level were unable to provide sufficient instructional resources to teachers. Learning resources include text books, teaching aids, well equipped science laboratories, sufficient teaching staff/ personnel, educational field trips and conducive environment for learning among others. Insufficient teaching resources hinders effective teaching because learners are not likely to understand abstract concept as these resources play such roles. This is based on the findings a study by Bizimana and Orodho (2013) that, there is direct significant and positive relationship between teaching and learning resources availability and teacher effective class management and content delivery. This study hence established the types of instructional resources provided by principals at secondary school level to teaching and learning process with reference to learners' performance.

In a study on school based factors influencing students' academic performance in KCSE in public secondary schools in Kathiani Sub County, Musyoka (2018) who adopted educational production theory to explore her study established that there was inadequate teachers as human instructional resource. This study employed management theory by Fredrick Taylor (1911) to explore whether principals enhanced innovation and improvisation of teaching resources in order to complement those few available. Further, Musyoka (2018) used descriptive statistics (mean, standard deviation) frequencies and percentages to analyze data. This study used descriptive statistics (mean and standard deviation), percentages, and also inferential statistics (independent t-test) to analyze quantitative data. This is because it will make it to be more representative and generalizable to the target population (Mugenda and Mugenda, 2003).

Past related review of studies conducted within Machakos County have dealt majorly on the adequacy of teachers as a human resource with relation to students' performance. It therefore emerges that instructional materials like text books, ICT resources, various teaching aids were not examined hence the need for this study. Eventually, this study acknowledges that there could be many factors which influence students' performance at public secondary schools in Machakos County. These factors will be held constant in order to establish whether adequacy of instructional resources influence learners' classroom performance.

II. STATEMENT TO THE PROBLEM

Instructional resources enhance learners' classroom achievement. The Kenyan government has continuously instituted policies and increased funds in schools to enhance adequate provision of instructional resources. Despite the above stated efforts, studies continue to revealinsufficient provision of instructional resources by principals locally, nationally, regionally and globally. According to County Director of Education in Machakos, the average performance in KCSE has been 3.324 for the last five years out of the possible 12 points. This is extremely way below average performance. Continued underperformance of KCSE in Machakos

County has been a great concern for many people. If the issue of academic performance in this county will not be addressed, academic opportunities for learners in their careers may be fore closed. The purpose of this paper was therefore to assess the effect of adequacy of instructional resources and learners' performance in public secondary schools within Machakos County.

Objective of the study

The objective of this study was to:

(i)Investigate the adequacy of instructional resources provided by principals and students' performance in public secondary schools in Machakos County.

Hypothesis of the study

 H_{01} : There is no statistically significant relationship between adequacy of instructional resources and students' performance.

Theoretical framework

This study was guided by classical theory of management by Fredrick Taylor (1911). One of the principles of this theory states that, for any organisation (public secondary schools in the study locale) to realize efficiency (students' academic performance), managers who in this context are the principals should not be stuck in the old way of doing things. Creativity and innovation of instructional resources should then be enhanced to compliment the few teaching and learning materials to ensure that they are sufficient. This study sought to establish whether in the event of limited instructional resources in schools, principals embraced creativity and improvisation of locally available resources to compliment the few provided by government. Limited improvisation and innovation of the said instructional materials would be attributed to low student performance experienced in Machakos County for the last five years as guided by this theory.

III. RESEARCH METHODOLOGY

The study employed descriptive survey design. The design was appropriate because it helped to describe the adequacy and types of instructional resources provided by school heads as they are (Kombo and Tromp, 2006) in this study locale. Data collection instruments involved both questionnaires and interview guides. Questionnaires ensured the researcher could collect a lot of information within limited time and also it was economical (Mugenda and Mugenda, 2003).Interview guide enabled the researcher to probe more questions from QASOs in order to answer accurately research questions (Kothari, 2003).Use of the two methods ensured that each could complement each other's inadequacies thus promoting reliability of study findings (Adami, 2005).

The target population comprised of 8 Sub county Quality and standards officers who were automatically included in the study(census sampling). The researcher preferred this sampling procedure because each sub county is unique in the manner in which principals provide instructional resources thus enhancing generalizability of study findings (Oso and Onen, 2005). Secondly, there were 366 public secondary schools which were stratified as 139 mixed day and boarding, 160 mixed day and 67 boys'/ girl schools.Stratified sampling was preferred because it enabled representation of the minor groups in the population (Kombo and Trump, 2006). Using a target population of 366 principals and 5,524 teachers, the researcher categorised it into two independent groups. Thirdly, stratified sampling was employed to select schools for the study. In line with this, the researcher stratified the three categories of schools into three groups, namely: mixed day, mixed day and boarding and single gender schools. This ensured that sub groups of the school were proportionately represented (Oso and Onen, 2005) hence enhancing generalizability of the study findings. According to the County director of education office in Machakos, this particular County has 369 public secondary schools. The schools comprise of 139 mixed day, 160 mixed day/ boarding and 67 single gender schools (boys' and girls' boarding). This implies that the schools are diverse in nature thus they could give information regarding principals' effectiveness of provision of teaching resources. This is based on Kombo and Tromp (2006) findings who observed that, capturing variability of population allows more reliability to the study. As Mugenda and Mugenda (2003) observed, for a target population of less than 10,000 informants like in this study, the following formula was used to select the sample. NF= $\frac{n}{1+n/N}$ where NF was the required sample size, n is the sample size if

target population was over 10,000 and N is the size of the target population. Using this formula, the sample size was computed and it resulted to 362 teachers and 45 principals. The names of various three categories of schools were written on a paper, folded and put into three bowls as per the strata. Each of the strata was proportionately represented in the sampling frame. All the principals in the sampled schools were included in the study plus the 8 QASOs from each of the eight sub counties within Machakos County. Additionally, each school which were sampled for the study had eight teachers selected for the study through simple random sampling to enhance

generalized findings of the data (Kothari, 2004). The sample size therefore resulted to 407 informants as indicated in the table 1.

	Sample size	
School category Mixed day and boarding		
Mixed day and boarding	Principals Teachers Totals	
Single gender	17 (38%) 138 (38%) 155	
Single gender	20 (44%) 158 (43%) 178	
	08 (18%) 66 (19%)74	
Total	45 (100%) 362 (100%) 407	

Table 3.1: Sampling frame for the study

Quantitative data was analysed using both descriptive (mean, frequency and percentages) and inferential statistics (Independent t-test). The independent t-test was used to test whether there was significant differences between the means of respondents (teachers and principals) based on a 5 point likert scale. The scale was on the level of respondents; agreement as: 5-Strongly Agree, 4-Agree, 3-Neutral, 2Dissagree and 1-Strngly Disagree. The use of this inferential statistics reduced the chances of making type one error in testing the study hypothesis (Kothari, 2004).Qualitative data was analysed thematically to enrich quantitative data.

IV. PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION

As indicated earlier, the purpose of this paper was to explore the adequacy and improvisation of instructional resources with regard to students' academic performance in public secondary schools within Machakos County. On the return rate, a total of 415 informants were targeted for the study (including 45 principals, 362 teachers and 8 sub county QASOs). Out of those, 394 informants responded including 38 principals, 349 teachers and 7 sub county QASOs. Seven principals were not present in schools during data collection period while 13 teachers failed to report to the questionnaire and returned them blank. One of the sub county QASO was unwell at hospital hence he could not be interviewed. This resulted to a response rate of 94.9%. Mugenda and Mugenda (2003) recommends that 60% to be a good response rate hence the researcher took it that it had met the threshold thus enhancing generalizability of the study findings. This is because the findings were considered to be free from participation bias and non-response error.

Demographic Information of the Respondents

Principals and teachers were asked to indicate their gender on the research instruments. The responses were given in the table 2

Gender	QASOs	Princij	pals	Teachers		
	F %	F	%	F	%	
Male	6 8	6 22	58	206	59	
Female	1 14	16	42	143	41	
T-4-1	7 100	20	100	240	100	
Total	/ 100		100	349	100	

Basing on the table 2, the study suggests that more than half of the principals 22 (58%) are males while more than a third 16 (42%) are females. This means principals in Machakos County are dominated by males. Despite this, the study reveals that, one third requirement for either gender to be in administrative post within public secondary schools has been achieved in Machakos County. This finding agrees with a study by Mutuku (2018) which was conducted in Machakos County and established that more than half of the principals were males. Interestingly, more than three quarters 7 (86%) of the QASOs were all males. This meant that this post is also dominated by males as opposed to females who were represented by 1 respondent. More than half 206 (59%) of the teachers were males whereas only 143 (41%) represented female teachers.

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Respondents	PhD		Masters		Bachelors		Diplomas	
	F	%	F	%	F	%	F	%
D: : 1	0	0	11	20	27	71	00	0
Principals	0	0	11	29	27	/1	00	0
Teachers	0	0	29	8	234	67	86	25
QASOs	0	0	04	57	03	43	00	0
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Total	0	0	44	100	264	100	86	100

Table 3.3: Distribution of Respondents' Highest Academic Qualification

The study suggested that all the principals had attained either bachelor of education degree or master's degree. Indeed majority of teachers, 234 (67%) had attained undergraduate degree in education. Only a quarter of the teachers 86 (25%) had diploma in teacher education. Surprisingly, more than half of the QASOs 4 (57%) had master of education degree. In that regard, QASOs were relatively more qualified than principals and teachers in Machakos County. It may therefore be taken that majority of respondents (QASOs, principals and teachers) had minimum qualification which is diploma (Wanjiru, 2019), hence they had knowledge on principals' provision of instructional resources and could provide reliable data with regard to this study objective. Unexpectedly, none of the respondents who were sampled for the study had attained a doctorate of philosophy degree.

Distribution of Respondents by Duration of Service in Schools

The informants were requested to indicate their length of stay in the teaching profession. The table 4.3 demonstrates that both teachers and principals' length of stay in their instruction profession.

Duration	Principals	Teachers		
	F %	F %		
0-2 years	0 0	41 12		
3 - 10 years	0 0	231 67		
11 years and above	38 100	73 21		
Total	38 100	345 100		

Table 3.4: Respondents' length of stay in their teaching school

The study suggests that all the principals had teaching experience of more than ten years. This may be explained by the fact that for any teacher to become a principal, one had to have taught several years in order to gain supervision experience hence more years in the teaching service. More than three quarter of the teachers 304 (88%) had teaching experience of more than three years and above. This implies that they had therefore stayed in their work station through four years in which a student enters the school in form one, is influenced by principals' provision of instructional resources and graduates in form four. Informants therefore had adequate time to observe and make correct judgment on various teaching and learning materials provided by head teachers with regard to students' performance.

Nature of Instructional Resources Provided by Principals and Students' Performance

On the third research question, the respondents were asked to indicate their level of agreement on the nature of instructional resources provided by principals in relation to students' performance. A five point likert scale was used to indicate their agreement level as follows: Strongly Agree (SA)= 5, Agree (A)= 4, Neutral (N)=3, Disagree (D)= 2 and Strongly Disagree (SD)= 1.

	Instructional resources provided by principals		Respondents		Computed t- test value
No	The principal:		Teachers (n=349)	Principals (n=38)	
1	Supports teachers in ICT integration by	Σ	813	151	
	providing computers	М	2.33	3.96	4.371*
		S.D	0.819	1.074	
	Provides sufficient text books both course	Σ	1368	160	
2	books and revision books	М	3.92	4.21	0.742
		S.D	1.172	0.799	
	Enhances innovation on the use of the	Σ	722	147	
3	available resources as teaching aids	М	2.07	3.87	3.921*
		S.D	1.32	0.95	
	Provides sufficient apparatus for science	Σ	676	86	

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4	subjects	М	1.936	2.271	1.241
		S.D	1.63	1.341	
Table 5. Desmandants' views on types of recourses provided by principals with reference to students'					

Table5: Respondents' views on types of resources provided by principals with reference to students' performance

Table 5, * indicates that there is significant difference at α =0.05, 386 as degree of freedom and a critical value of 1.645.

On the first item of table 5, informants were requested to indicate their agreement level that principals support teachers on ICT integration by providing computers. Surprisingly, teachers (M=2.33, S.D=0.819) disagreed to this fact while the principals (M=3.96, S.D=1.074) agreed. The calculated t-test value at α =0.05 with 386 as degrees of freedom and p value < 0.05 was 4.371. It was therefore more than critical value of 1.645 meaning there was significant difference on their agreement levels. A teacher coded as 0297 whose school had an average mean score of 3.104 from 2019 to 2015 revealed that, his principal emphasizes on chalk and chalkboard as the teaching resources and no projectors, computers are availed to enhance teaching and learning. The finding suggests that principals felt that they enhanced teaching and learning by providing computers which disagrees with findings by Bizimana and Orodho (2014) which revealed that head teachers did not provide radios, projectors and computers for learning. This may be attributed to the fact that Bizimana and Orodho (2014) study was conducted in Rwanda which may have different policy on provision of teaching and learning materials while this study was carried out in Machakos County, Kenya. Additionally, there is a possibility that limited provision of technology in learning may be caused by fear associated with technology especially where in-service training programs on how to utilize technology in teaching are few as revealed by Muthoka (2014). There is also a probability that limited use of radios and television sets in teaching may also be explained by limited time allocated for the lesson especially in schools where teachers are given timelines on when to finish syllabus for specific subjects.

Basing on the second item of table 5, respondents were required to reveal their agreement levels on whether principals provide sufficient text books (course books and text books). Teachers (M=3.92, S.D=1.172) and principals (M=4.21, S.D=0.799) strongly agreed to this statement. The calculated t-test value at α =0.05 with 386 as degrees of freedom and p value >0.05 was 0.742. It was less than critical value hence there was no significant difference on their agreement levels. The fact that public secondary schools have enough text books in this Machakos County may be attributed to the program by the government of Kenya which has been supplying sufficient text books from various publishers under MOEST sine 2017 January. This finding disagrees with findings by Muthoka (2014) study conducted in Masinga District in Machakos which revealed that, head teachers were unable to provide sufficient text books. This may be explained by the fact that Muthoka (2014) conducted the study five years earlier compared to this current study. It is therefore possible that much could have changed within the five years with respect to how head teachers provide teaching materials.

On item 3 of table 5 informants were required to indicate their agreement level as to whether principals enhance innovation on the use of available resources as teaching aids. Surprisingly, teachers (M=2.07, S.D=1.32) disagreed with it while principals (M=3.87, S.D=0.95) strongly agreed with it. The calculated t-test value at α =0.05, with 386 as degrees of freedom and p value <0.05 was 3.921. It was greater than critical value meaning that there was significant difference on their agreement levels. Interestingly, some principals organize to draw some educational content on the walls of their classrooms for science subjects which may be taken as a level of innovation in resource provision. This was demonstrated by a figure 1 of periodic table for chemistry as a science subject.

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Figure 1: A classroom wall drawing

Management theory by Taylor (1911) which guided this study stipulates that, for efficiency (students' performance) to be achieved, the managers (principals) should not be stuck in the old way of doing things, rather they should be innovative and creative like drawing teaching content as the one shown on figure 1. It is therefore evident that the finding of this objective demonstrates a certain level of innovation and improvisation of teaching materials hence supporting the management theory by Taylor (1911).

The level of innovation among the principals as demonstrated may probably be explained by their many years in teaching service which makes them capable of utilizing what they have at disposal to enrich teaching and learning. This finding does not agree with finding by Musyoka (2018) that principals in secondary schools do not highly enhance innovation of teaching resources. This may be explained by the fact that the study by Musyoka (2018) used only descriptive statistics to analyze data while this study adopted both descriptive and inferential (independent t-test) statistics. Inferential statistics enables the researcher to generalize data from sample to the study population (Oso and Onen, 2005).

Teachers and principals were also required to indicate their agreement level on whether principals provide sufficient apparatus for science subjects. Accordingly, teachers (M=1.936, S.D=1.63) and principals (M=2.271, S.D=1.341) disagreed. The calculated t-test value at α =0.05 with 386 as degrees of freedom and p value >0.05 was 1.241 which was less than critical value. This implied that there was no significant difference on the agreement level of the two groups. A teacher coded as 0163 indicated in the questionnaire:

In our school, many students interact with laboratory apparatus and chemicals while in form four. This is because is the only time principals became serious with students as they near their national examination. Lessons made to be conducted in the laboratory have been limited in classrooms just like a normal theory subjects like Religious education.

Indeed it is clearly evident that there is insufficient provision of apparatus for conducting science subjects. Limited provision of apparatus for science subjects may be attributed to the late disbursement of subsidized secondary education funds which makes budgeting by principals quite hard as revealed by Mwangangi (2017). This finding resonates quite well with finding by Musyoka (2018) and Samoei (2014) that heads teachers did not sufficiently provide laboratory apparatus and consumables in secondary schools.

The study further sought the opinion of teachers, principals and QASOs as to whether instructional resources influences students' performance. Table 4.9 demonstrates these findings.

Respondents	Yes	No	Undecided	Totals
QASOs	07 (100%)	0 (0%)	0 (0%)	07 (100%)
Principals	38 (100%)	0 (0%)	0 (0%)	38 (100%)
Teachers	331 (95%)	3 (1%)	15 (4%)	349 (100%)
Totals	376 (95%)	3 (1%)	15 (4%)	394 (100%)

Table 4.9: opinion of respondents as to whether instructional resources influence students' performance.

The finding of the study reveals that, all the QASOs 7 (100%) and principals 38 (100%) agreed that provision of instructional resources influences classroom achievement of the learner. In line with this, majority of the teachers 331 (95%) agreed to the same statement. Only 3(1%) teachers disagreed to the statement. Indeed this confirms that the manner in which principals avail teaching materials affects classroom achievement of

lesson objectives. This finding may be attributed to the fact that teaching and learning resources makes teaching more effective and modern (Busljeta, 2013) which makes learners to be interested and be involved in the process which eventually may be related in their performance. This finding also supported conceptual framework that provision of teaching and learning resources by principals influences students' academic performance.

This findings is consistent with Bizimana and Orodho (2013)) and Samoei (2014) studies' conclusion that, there is statistically significant and positive correlation between provision of instructional resources and teachers' role effectives which impacts on students' academic performance.

V. CONCLUSION AND RECOMMENDATIONS

The study sought to investigate the adequacy of teaching and learning resources and their influence on students' academic performance in Machakos County. Basing on the findings of this paper, it is evidentthat there is insufficient provision of teaching resources like laboratory apparatus for science subjects, teaching aids, internet services and computers by the principals. Additionally there is limited improvisation and innovation of available teaching resources. Overall, the study has clearly demonstrated thatadequacy of instructional resources and improvisation/ innovation of the available teaching materials influences students' performance. These findings will be very significant for they may guide policy makers like Ministry of education, science and technology (MOEST) and Teachers Service Commission (TSC) on the types of instructional resources and innovation strategies to be taught during in-service programmes for teachers. It should however be noted that the findings of this paper can only be generalised within Machakos county and not to the entire Country. This is because the manner in which provision of instructional resources by principals in other parts of the country may be different. Based on the study findings, the study recommends the government of Kenya to increase more funding to schools to enable the principals to provide sufficient laboratory apparatus and consumables for science subjects practicals. Secondly, the Teachers Service Commission (TSC) should regularly provide inservice programmes for teachers on how to improvise and use locally available instructional resources. Eventually, further research is recommended on the relationship between adequacy of instructional resources and students' performance in the entire country in order to give more insights on how principals have been providing teaching resources.

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