



Science Teachers' Career Change and Its Effects on Students' Performance: Evidence from Selected Public Secondary Schools in Dodoma City

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Abstract

The study explored factors influencing science teachers' career changes and their effect on overall students' academic performance in Dodoma. The study employed a cross-sectional research design, with 139 respondents being selected through probability and non-probability sampling techniques. Data were collected through interviews, documentary reviews and focus group discussions. Both descriptive and inferential techniques were used in data analysis. The findings show that social, administrative, and economic factors have a strong influence on science teachers' career change choices. The findings further revealed that there is a significant negative association between science teachers' career change and the overall academic performance of students. The study findings demonstrated some weaknesses in the implementation of the current education policy in Tanzania. Based on the findings, it is recommended that the policymakers and school administrators should improve learning and teaching environment, provide financial incentives, provide opportunities for science career development, and ensure science teachers are involved in the designing, implementation, monitoring and evaluation of various education policies.

Keywords

Career Change, Turnover, Science Students, Public Secondary Schools, Effects, Factors

1. Introduction

The history of career and career change or occupational cancelling dates back to

the reformist Frank Parsons (1864-1908) of the United States, who developed a framework to help individuals decide on a career choice. The decision to career change was described as a progressive social reform movement intended to eradicate poverty and substandard living conditions created by rapid industrialization, which resulted in the migration of people to major urban centers at the turn of the 20th century (Parker-Bell & Osborn, 2023). From 1909 after his death, different studies on career choices, practices of career change have been conducted in Europe and other continents (Parker-Bell & Osborn, 2023).

To overcome future global economic challenges, the European Union believes that Science, Technology, Engineering, and Mathematics (STEM) education should be given more weight (Joyce & Dzoga, 2011; Kennedy & Odel 2014). Heri and Mkulu (2022) show that recent key education policy documents and STEM-related organizations have highlighted a skills gap in these fields that, if not addressed, could have significant negative implications for the country's economic development. Similarly, a sound education system can drive economic development and influence the economic growth of a nation. Developed countries attribute their economic growth to a quality science education system (Hanushek & Woessmann, 2020).

In Africa, career change taken by a teacher is one of the most fundamental decisions in a teacher's life path (Kiongo, 2020). The lifestyle attitude and the way of thinking of a person could influence their career-change-decision (Kiongo, 2020). In Nigeria, Namibia, Cameroon, and the Kenyan context, teacher career change raises the shortage of teachers in the educational growth system (Orodho et al., 2013). Hence, there is an increased day-to-day responsibilities and complex work environments for science teachers (Moss & Urban, 2017). Not only is there a shortage of qualified teachers in schools, but also teachers changing their profession to take up non-teaching employment (Orodho, 2013). Teachers have their own individual interests, which are influenced by individual unique environments and their career development needs, depending on the contexts in which they live (Kiongo, 2020).

In Tanzania, career changes among different professionals are taking place, too. Although teaching is one of the most demanding professions, and it's certainly not for the faint-hearted, early-career teachers still have insufficient retention income rates, thus prompting them to seek career change on the way (Sixbert & Onyango, 2022). Teaching is tiring as it continues from school to home after the end of official school hours so as to prepare for the next day's activities (Gwambombo, 2013). While at home, the teacher prepares lesson notes, marks the student's assignment, and records examination scripts, apart from other teaching-related activities (Gwambombo, 2013). A stressful job can wear a person out very quickly (Heri & Mkulu, 2022). This makes teachers unable to effectively meet the teaching workload demands, and as a result, the student's academic performance continues to be unimproved (Sixbert & Onyango, 2022).

The trend in career change among science teachers in Dodoma City prompted

this assessment after realizing that both young and experienced teachers were on the look for better opportunities in science-based institutions. Junior science teachers, especially those employed in public secondary schools, enter the teaching profession to gain experience and develop their career aspirations and competencies with the intention of joining other professions perceived to be better in life (Sixbert & Onyango, 2022). The situation has greatly affected the quality of education and students' performance (Kiongo, 2020). Hence, this study assessed public secondary school science teachers' career change and its effects on the student's academic performance.

Scholars, including Heri and Mkulu (2022) argue that education is the key foundation to economic development. This implies that the country's economic development depends on education policies, especially in the developing world. Several kinds of literature have demonstrated the importance of science-related subjects in building countries' future economies (UNESCO 2017; Fischer et al., 2020; Chankseliani et al., 2021; Paschal & Mkulu, 2020; Heri & Mkulu 2022). Numerous literatures emphasize the need for an education policy that places more emphasis on science education and an improved education system that pays attention to science teachers (Sixbert & Onyango, 2022).

Heri and Mkulu (2022) assert that the main challenges that limit access to favorable student performance in science education are a shortage of teachers, inadequate teaching and learning materials, and school infrastructures. Teachers are overwhelmed with work by having more periods than they can afford and the improper class size ratio, making it impossible to achieve the goal set by the government in secondary education (Abayo, 2017). Not only that but the scarcity of scientific examination of the effects caused by public secondary school science teachers changing their careers (Heri & Mkulu, 2022). Teachers, particularly science teachers, constantly seek career change and recategorization, leaving their students, science laboratories, and newly built classrooms with fewer science teachers (Maro, 2016).

There is a notable increased number of transfer requests of public secondary schools' science teachers to different ministries and other public science-based institutions in pursuit of different jobs and careers in Dodoma. The turnover rate among science teachers in public secondary schools has been increasing year after year as shown in Table 1.

Table 1. Number of science teachers who change their career in Dodoma City.

Year	Number of teachers who change their career
2019	12
2020	26
2021	41
2022	58

Source: Dodoma City Statistics and Logistics Officer (2023).

The increasing number of science teachers changing their Careers necessitated this study as it became imperative to assess factors influencing science teachers' career change and their effects on students' academic performance in public secondary schools in the end, permitting this study to develop mitigation strategies that could be used to curb ongoing crisis which is threatening the delivery of science-based education in public secondary schools. The trend in Career change among science teachers in Dodoma city influenced this assessment after realizing that both young and experienced teachers were on the look for better opportunities in a science-based industry. Junior science teachers employed in public secondary schools enter into the teaching profession to gain experience and develop their career aspirations and competencies with the intention of joining other professions perceived to be better in life (Sixbert & Onyango, 2022). The situation has greatly affected the quality of education and students' performance (Kiongo, 2020).

At the national level public secondary schools have been performing very poorly in science and related subjects. Therefore, this study assumes that there could be some underlying factors that need a thorough study. The situation creates a perennial shortage of science teachers in public secondary schools, resulting in long-term negative implications for learners' academic performance. Thus, the findings of this study inform policymakers and relevant educational stakeholders to design an education policy that emphasizes the need to retain science teachers in public secondary schools. Furthermore, the findings are crucial for the Tanzania government and its respective administrative departments in partnership with key actors to develop an education policy that pays attention to the needs of students' competence-based knowledge as required by the global economy.

The expected relationship between variables illustrated in a conceptual diagram shows the correlation between the dependent variable and the independent variables. In this study, it is assumed that employee turnover is a result of many factors. Thus, science teachers changing their careers is influenced by several factors (Figure 1).

2. Study Area, Data and Methods

2.1. Location of the Study Area

The study was conducted in Dodoma City (Figure 2). The area is geographically located at Latitude 6°9'35" south, and at Longitude 35°47'53" east. The selection of the study area was motivated by the increase in the number of career change requests from the science teachers of various public secondary schools seeking job opportunities in different sectors, leaving schools and students with fewer science teachers (Angerous, 2019).

2.2. Data Collections

The study employed mixed techniques of data collection methods as recommended by Misra (2012), Armah (2017), Singh (2019) and Kapur (2019).

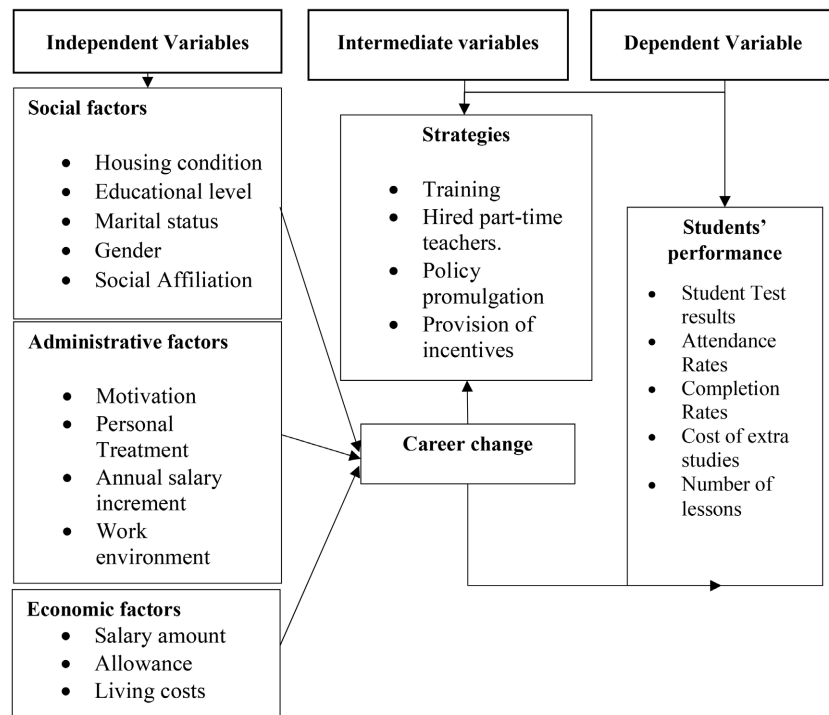


Figure 1. A conceptual framework. Source: Authors' construction.

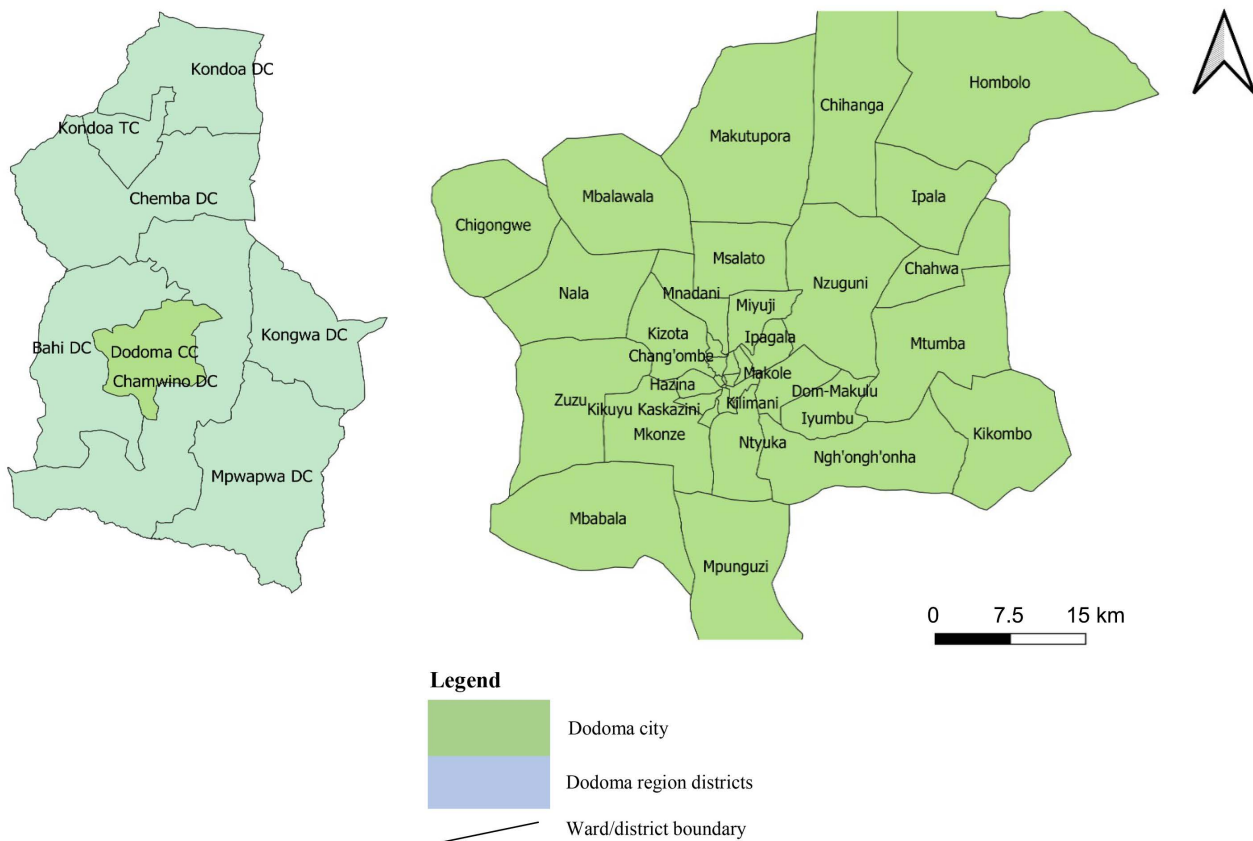


Figure 2. Location of Study (Study area). Source: Researcher's own source as generated from QGIS (Geographical Information System).

Primary data were collected from respondents who were former secondary schools' science teachers, the science teachers available at school, and the science students. Secondary data were obtained from both published and unpublished documents, which include journal articles and reports on the number of teachers who have changed their careers, and student's academic performance. The interview was done by using a questionnaire, which contained both open and closed-ended questions. The documentary review method was used to collect secondary data, where relevant documents were reviewed to get information related to the study topic.

2.3. Research Design and Sampling

The study used a cross-sectional research design, which allowed data from respondents to be collected at a point in time, as suggested by [Ahmed, et al. \(2017\)](#). The sampling unit was science teachers who were teaching in public secondary schools and who had changed their careers. The sample size was 138 respondents. Simple random sampling was used to get representatives from groups of science teachers and students. Purposive sampling was used to select key informants who were heads of secondary schools and educational officials.

2.4. Data Analysis

Both descriptive and inferential statistics were employed to analyze the data. Descriptive statistics were helpful in giving details of the results by using frequencies and percent and testing diagnostics to ensure if the distribution of the data enabled the researcher to retain parametric tests or otherwise. Correlation analysis was used to measure and establish relationships between variables, particularly the relationship between teachers who changed their careers and student performance, by comparing the average number of teachers who changed their careers with test one and test two results performance. The sign of the correlation coefficient indicates the direction of the correlation: a positive correlation indicates that as one variable increases, so does the other; a negative correlation indicates that as one variable increases, the other decreases ([Heumann et al., 2023](#)). A five-point Likert scale was used to measure the degree of response to each perceived factor and the strategy used to mitigate the career change among science teachers in public secondary schools.

3. Results

3.1. Demographic Characteristics of the Respondents

The findings in [Table 2](#) revealed that 57.6% of the respondents were male. This showed that 77% of the respondents were middle adult teachers, the majority lying between 31 to 40 years of age (28.1%). About 52.6% of the respondents were married teachers, and the sample predominantly was made up of those who possessed a Bachelor's degree (49.1%). This might indicate that career change is relatively observed in university graduates. The majority of respondents, specifi-

cally teachers, had a monthly income of 899,000 Tsh, which accounts for 33% of the total sample.

Table 2. Social-demographic characteristics of respondents (n = 139).

VARIABLE	CATEGORY	FREQUENCY	PERCENT (%)
Gender	Male	80	57.6
	Female	59	42.4
	Total	139	100
Age	11 - 20 (Students)	20	14.4
	21 - 30	12	8.6
	31 - 40	39	28.1
	41 - 50	35	25.2
	51 - 60	33	23.7
	Total	139	100
Marital status	Single	54	38.8
	Married	73	52.6
	Divorced	11	7.9
	Widow/Widower	1	0.7
	Total	139	100
Education Level	Forms 3 & 4 (Students)	20	14.4
	Diploma	21	15.1
	Degree	68	49.1
	Masters	28	20
	PhD	2	1.4
	Total	139	100
Monthly Income	0 - 99,000 (Students)	20	14.4
	100,000 - 499,000	6	4.3
	500,000 - 899,000	40	33
	900,000 - 1,299,000	27	19.4
	Above 1,299,000	46	28.9
	Total	139	100

3.2. Perceived Factors Influencing Science Teachers' CC in Public Secondary

3.2.1. Social Factors

Table 3 shows the respondent's views in relation to which social factors may influence the decision of public secondary schools' science teachers currently on

duty to consider changing their career. The findings show that 42.9% of the respondents indicated that housing condition highly contributed to public secondary schools' science teachers' decision to change career with 15% of respondents showing that it has a very high effect on their career change decision. These findings infer that public secondary school's science teachers are concerned with the status of their housing. Housing condition can influence public secondary school science teachers to seek opportunities in other sectors as more 50% of participants have agreed that it has some influence on their future career choices.

Table 3. Social factors.

Social Factors	VL		L		M		H		VH		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Housing condition	12	10.	15	12.6	23	19.	51	42.9	18	15.	119	100
Marital status	20	16.8	20	16.8	15	12.6	45	37.8	19	15.9	119	100
Gender	37	31.	30	25.	20	16.8	20	16.8	12	10.	119	100
Educational Level	3	2.5	3	2.5	13	10.9	67	56.	33	27.7	119	100

KEY: VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High, **Source:** Field data (2023).

In terms of marital factors, the findings in **Table 3** show that 37.8% of respondents agreed that marital factor highly influenced their career change decision, and 15.9% showed marital status has a much higher influence. This indicated that at least 53.7% of the respondents agreed that marital status has an influence on secondary schools; "science teachers" career change choices.

In relation to gender as a social factor influencing public secondary school science teachers' career change, the findings in **Table 3** show that 56% (31% + 25%) agreed that gender doesn't have much influence on public science teachers' career change decisions.

When examining responses based on education factors, the study findings in **Table 3** show that education level has a lead influence on science teachers' career changes. For example, about 56% and 27.7% of the respondents selected high and very high, respectively. A total of 83.7% (56% + 27.7%) show that education level does influence science teachers career change decision.

3.2.2. Administrative Factors

The findings in **Table 4** revealed that the majority of science teachers believe motivation is critical in retaining public secondary science teachers. The data show that 38.6% and 25.2% of respondents opted for high and very high influence, respectively. This finding concludes that when public schools administra-

tors introduce motivation incentives, there are higher chances that public secondary science teacher turnover can be addressed.

Table 4. Administrative factors.

Administrative factor	VL		L		M		H		VH		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Motivation	10	8.4	15	12.6	18	15.1	46	38.6	30	25.2	119	100
Personal treatment	6	5.	13	10.9	15	12.6	45	37.8	40	33.6	119	100
Annual Salary increment	7	5.8	5	4.2	6	5	35	29.4	66	55.4	119	100
Work environment	13	10.9	11	9.2	7	5.8	55	46.2	33	27.7	119	100
Personal attitude	14	11.7	10	8.4	11	9.2	49	41.1	35	29.4	119	100

KEY: VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High, **Source:** (Field data, 2023).

In relation to personal treatment as a factor influencing science teachers' career change, the findings presented in **Table 4** show that 37.8% and 33.6% of participants, respectively, agreed that personal treatment has a high and very high influence on public secondary school science teachers' career change decisions. This indicates that those in leadership positions should treat public secondary school science teachers with respect and dignity and apply leadership principles that are professionally acceptable.

In regard to the annual salary increments, the study findings, as illustrated in **Table 4**, show that 29.4% and 55.4% of respondents agreed that salary increment has a high and very high influence on their career choices, respectively. A strong record of higher and very high is a sign that the majority of public secondary school science teachers' career change decisions are influenced by annual salary increments, which indicates that improving or addressing salary increment challenges can help bring the number of science teachers' turnover down.

In relation to the work environment, the findings in **Table 4** show that 46.2% and 27.7% of respondents agreed that the work environment highly and very highly influences public secondary school science teachers' career change decisions, respectively. This implies that the work environment does influence public secondary school science teachers' career change decisions. Therefore, public secondary school administrators should create a favorable work environment for science teachers and students in order to retain science teachers and increase students and the school's overall performance. Fischer et al. (2018) argued that the teaching environment is supposed to promote mutual understanding and improve cooperation among teachers and students as well as among fellow students.

In regards to science teachers' personal attitude, the findings of the study in **Table 4** revealed that 41.1% and 29.4% of participants showed personal attitude has a high and very high influence, respectively, suggesting that public secondary schools' science teachers' personal attitude contribute to their desire to change their careers.

Moreover, participants commented on the issue of dishonest and poor treatment from leadership continues to influence science teachers to quit their teaching position and seek further opportunities somewhere else, as noted by respondents discussed below:

"As for me, I think my colleague who left the teaching position was looking for higher salaries, decreasing working pressure and harassment, desire for doing something worth and gaining new experience." - P8

"Educational inspectors should use good language to communicate with science teachers, improve the school environment (rehabilitation of building), employ laboratory technicians, to increase the salary of science teachers." - P5

The findings of this study support the works done by [Andriani et al., 2018](#); [Hartinah et al., 2020](#); [Heri and Mkulu, 2022](#) that have stressed the need to improve working relations between teachers, school leadership, and students.

3.2.3. Economic Factors

With regards to the economic factors, the findings in **Table 5** show that 34.4% and 46.2% agreed that salary amount has higher and very higher influence on science teachers career change decision respectively. This finding denotes that salary amount does have a strong influence on science teacher career change decision as the majority of participants 80.6% (34.4% + 46.2%) agreed with such notion. Therefore, increasing public secondary schools' science teacher's salary may address the challenges associated with science teacher's turnover.

Table 5. Economic factors.

Economic factors	VL		L		M		H		VH		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Salary amount	5	4	4	3.	14	11.7	41	34.4	55	46.2	119	100
Living cost	6	5	15	12.6	15	12.6	45	37.8	38	31.9	119	100
Allowance	12	10	20	16.8	15	12.6	35	29.	37	31	119	100

KEY: VL = Very Low, L = Low, M = Moderate, H = High, VH = Very High, **Source:** (Field data, 2023).

The study results in **Table 5** show that 37.8%, 31.9% of respondents agreed that living cost has a higher and very higher influence respectively. This finding suggests that cost of living may influence science teachers career changes as their earning might not be enough to support their living cost. Hence schools' administrators and policymakers should pay attention to teachers living cost against their earning, as well they should pay attention to economic inflation as living cost is influenced with national economic characteristics.

In addition, the results in **Table 5** indicates that, 29% and 31% of participants respectively maintained that allowance has higher and very higher influence on science teachers career change decision. These findings further imply that allowance just as salary amount and annual increment play a key role in influencing science teachers career change decision. Thus, improve in allowance may contribute to a decline in public secondary school's science teacher's turnover.

In regards to the association of economic factor and its influence on science teacher's retention, this finding corresponds with various scholarly. That have been conducted in both developed and developing countries. Most of these studies argued that change of career by most science teachers is a result of less work satisfaction amongst science teachers resulting from several reasons, including financial factors (Curran et al., 2017; Wronowski & Urick, 2019; Podolsky et al., 2019; Peist et al., 2020, Gu & Zhou, 2020).

3.3. Association between Science Teachers' Careers Change and the Student's Academic Performance

Table 6 indicates the association between teachers who changed their careers and student performance by comparing the average number of teachers who changed their careers with test one and test two results. Results reveal that there is a negative correlation between Teacher's Career Changes and student academic performance. Teacher Career Changes were tested in relation to performance on mid-term test results in nineteen schools. The results discovered a negative relation between Teacher Career Changes and Mid-term Test one results; the p -value was 0.624 between the average number of teachers who changed their career and Mid-term Test one results (in average scores).

Table 6. Association of science teachers career change on student performance (n = 19 schools).

		Average No. of teachers who changed career	Mid-term test one results (average scores)	Mid-term test two results (Average scores)
Average Number of teachers who changed their career	Pearson Correlation	1	-0.624**	-0.859**
	Sig. (2-tailed)		0.040	0.001
	N	19	19	19
Mid-term test one results (average scores)	Pearson Correlation	-0.624**	1	0.857**
	Sig. (2-tailed)	0.040		0.001
	N	19	19	19
Mid-term test two results (Average scores)	Pearson Correlation	-0.859**	0.857**	1
	Sig. (2-tailed)	0.001	0.001	
	N	19	19	19

$r = -0.64$, $p = 0.040$.

The p -value for the correlation between the number of teachers who changed their careers and mid-term test results is 0.040. This p -value is less than the conventional significance level of 0.05, suggesting that there is a statistically significant negative correlation between these two variables. The p -value for the correlation between the number of teachers who changed their careers and mid-term test two results is 0.001. This p -value is also less than 0.05, indicating a statistically significant negative correlation.

The p -value for the correlation between mid-term test one results and mid-term test two results is 0.001, indicating a statistically significant positive correlation between these two test scores. The overall association between the number of science teachers who changed their careers and student performance on mid-term tests is negative ($r = -0.624$). This suggests that as the number of teachers changing careers increases, there is a tendency for student performance on mid-term tests to decrease. The strength of the association is moderate to strong, with correlation coefficients ranging from -0.624 to -0.859 . A negative relationship implies that when science teachers change their careers, there is a tendency for students' performance in Mid-term tests to decline.

The study findings are supported by Gonzalez and Maxwell, 2018 who commented that the frequent change in teacher careers disrupts the continuity of instruction. Students have to adjust to new teaching styles, expectations and classroom routines. Constant adjustment disturbs and hinders their ability to focus on learning hence a decline in academic performance.

Moreover, the key informants addressed the association between a science teacher career change and students' academic performance as;

“What I know is that change of career by science teachers, has a direct effect on students' performance. If teachers shift from teaching, meaning we will have insufficient number of teachers which will lead to poor performance.” - P13

Responses from other key informants demonstrate that there is a need to improve education policy. For example, several respondents thought that:

“The average number of career changes seems to gradually increase over the years... as it is known, science teachers are fewer than social science teachers almost in each public secondary school. If a teacher changes their careers, it will obviously affect the number of science teachers hence affect learning process for overworking the few that remain.” - P13

“No replacement of teacher at particular time it demoralises other teachers and students to take learning. This is due to the low salary and low motivation to the science teachers making low effort of teaching to the public secondary schools, hence decreasing the performance in academic of students.” - P12

Correspondingly, another key informant indicated that the association between the change of career by science teachers and the student's performance is seen to be negatively associated as there is a decrease of registered science students, as she said:

“The students' performance in science falls down as a result of untaught lessons because of career change.” - P24

“There is increased under performance, truancy, bad behaviour, low performance in academic, truancy during hours, high cost of extra studies, loss of trust which is all working against the well-being of students’ academic life.” - P15.

“Students lack exposure toward science subject, students start to neglect studies because of the absence of teachers, this lead to the poor performance to the learners because of inadequate teachers especially science subjects.” - P11.

“Performance of students will decrease, the ratio between students and teachers will not be balanced, decrease on number of students taking science subject, decrease in attendance rate, and increase in students drop out from school and decrease in student’s completion rate” - P22

Similarly, several respondents commented that a science teacher’s career change is associated with a number of students enrolling for science subjects as per respondents’ opinions presented below:

“Decrease performance, students changing their dreams from technology and science to social, truancy decreases in science enrolment and decrease completion rates. Poor performance of students, number of students will decrease, students need to have cost for extra studies.” - P13

“Reduction of number of students who take science subjects, parents will use a lot of money for students to study science subjects on tuitions, the performance of science students will decrease due to lack of science teachers.” - P11

The findings of the study suggest that the career change of science teachers causes low morality in students, poor performance in science subjects, loss of study interest in sciences, increased rate of dropout amongst students, a drop-in completion rate, increased extra cost to keep up with the student’s education needs, and a reduction of number of students who are studying science subject.

3.4. Effectiveness of Strategies Used to Mitigate the Shortage of Science Teachers in Public Secondary Schools

3.4.1. Hiring of Part-Time Teachers

The study assessed participants’ opinions on strategies being implemented in various public secondary in regard to the retention of science teachers. Findings in **Table 7** show the majority of participants argued that hiring part-time teacher reduce the shortage of science teachers. This is translated in the number of participants that opted for strongly agree standing at 30%, with agree standing accounting 23%. In the same way, 10% of respondents did not respond to this question, with 16% disagreeing with this strategy. In addition, a notable number of participants strongly disagreed with the notion of hiring part-time teachers as a mitigation strategy. This implies that despite the fact that part-time teachers contribute positively to enhancing a learning culture helping public secondary schools to deal with the issue of shortage of science teachers is not a recommended strategy. Hence the effort of the government should be on hiring qualifying teachers and introducing effective strategies that promote a culture of retention of science teachers teaching in public secondary schools.

Table 7. Strategies used to mitigate the shortage of science teachers in public secondary schools.

Strategy	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	TOTAL
	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)
Does hiring part-time teachers help to reduce the shortage of science teachers?	36 (30)	27 (23)	12 (10)	19 (16)	25 (21)	119 (100)
Does policy promulgation have an impact on science teacher's turnover?	69 (58)	36 (30)	6 (5)	5 (4)	3 (3)	119 (100)
Does provision of incentives impact on reducing the shortage of science teachers?	73 (61)	42 (35)	1 (1)	2 (2)	1 (1)	119 (100)
Does training reduce the rate of career change among science teachers?	44 (37)	32 (27)	15 (12.5)	6 (5)	22 (18.5)	119 (100)

3.4.2. Policy Promulgation

Findings in **Table 7** indicate that about 88% of the respondents agreed that policy promulgation is critical in reducing impact of science teacher's turnover. This infers that the strategy is relevant in addressing challenge facing by public secondary schools in regards to science career changes. Therefore, the government should put more emphasis on developing and promulgating sound education policies that are very supportive to all stakeholders involved in the science education.

3.4.3. Financial Incentives

In terms of the application of financial incentives as mitigation strategy, the study results presented in **Table 7** reveal that 61% strongly agreed that incentive as mitigation strategy can help reduce the number of science teachers changing career. Hence the government and other actors with interest in science education could consider to practice issuing of incentives in order to address the shortage of science teachers in public secondary schools.

Similarly, the issue of incentive should not only be limited to financial inventiveness as respondents show there is a need to improve other areas within the whole school learning and teaching environment as part of incentive mechanism. These views are noted by a few responses from key informants who were of the opinion that:

“The payment system by the government should consider science teachers as they work as laboratory technicians, they should be paid higher, hardship al-

lowances and extra-duty allowances should be considered just as done in other science-based careers. There should be policy changes in consideration of science teachers to reduce career changing by giving them high salary like other science careers” - P5

The issue of inappropriate use of language by education inspectors when addressing teachers was commented by several key informants. The study findings show that teachers feel most government officials assigned with management and administration of schools are not friendly and used unprofessional language when interacting with them. For instance, key informants discussed below were of the views that:

“Educational inspectors should use good language, and there should be motivation, allowance should be paid to science teachers, improve the environment (rehabilitation of building).” - P13

“Education inspectors should use polite language to teachers, allowance and motivation should be paid to science teachers. Also, should increase motivation mechanism such as promotion and seminars.” - P10

3.4.4. Teachers’ Training

Findings in **Table 7** suggest that training for teachers is considered as critical in promoting a culture of retention in public secondary. The results show that 37% of respondent believe training is very critical, and 27% believe training is important. On the hand, 5% believe training has a very low influence and 18.5% show training does not entirely translate in retention. This implies that despite of offering training opportunity, there are higher chances of science teachers teaching in public secondary schools could still leave their positions in pursuit for better opportunity despite of receiving training.

Similarly, data from key informant’s interview revealed that teachers have the desire for better salary, improved working condition, a sense to feel respected and appreciated, increased opportunity to learn new things or improve their careers, and the desire for less overworked. For instance, two respondents said that:

“This thing of paying some people more and other less is not appropriate. We need higher salaries, desire for greater fulfilment and searching for something worth than teaching, reducing working pressure, learning new skills and experiences.” - P9.

“We use part-time teachers with low pay; we encourage students to make discussions among themselves. Increasing the salary to science teachers, teachers should only teach in the classroom and not in laboratory, allowances and motivation to science teachers.” - P13

“To increase high salaries to science teachers, to employ many science teachers, to improve working condition to teachers, facilitation of school buildings, to increase laboratory apparatus” - P12

However, there is a mixed feeling amongst the respondents in relation to hiring of part-time teachers with some respondents arguing that is a good strategy

but other noting that it is not something to rely on since it is ineffective as per the view discussed below:

“Our heads of schools normally higher teachers from nearby school or take form six leavers or even science teachers who are unemployed to save the situations. We also make use of volunteer teachers, and remedial hours of students.” - P16

“Not effective to use part time teachers to cover the gap of science teachers, as failure to pay them on time most demotivate them so is not very effective because sometimes, they are paid very late and in little amount of money, they are helpful but not effective. In short is a good strategy but not effective to mitigate the shortage of science technology on public secondary school.” - P10.

On the other hand, some key informants argued that hiring of part time teachers as a strategy to mitigate the shortage of science teachers in public secondary schools is important. One key informant commented that:

“Positive change: they help students to learn science instead of just reading notes or books without a teacher help. However, it has less than 50% efficient due to lack of motivation for volunteer teacher.” - P12

4. Conclusion

This study assessed science teachers' career change and its effects on students' performance in selected public secondary schools in Dodoma City. Firstly, in relations to the factors influencing science teachers' career change in public secondary schools, the study found that both social factors, administrative factors, and economic factors have a strong influence on science teachers' career change choices. Meaning that none of the factors should be neglected when addressing challenges facing public secondary schools' science students as a result of a shortage of science teachers.

Secondly, the study demonstrated that there is a negative association between science teacher's career change and the overall students' performance. Meaning that science teachers' career change is a multidimensional issue that requires not only agency responses but well thought and designed mechanism that could help mitigate several contributing factors for career change among science teachers in public secondary schools. The effects associated with science teachers' career change on overall students' academic performance include low morality, loss of study interest, increased rate of dropout amongst science students, increased number of students changing their career due to frustration, and cost of extra studies.

Lastly, the findings of the study suggest several strategies that can be implemented by administrators and policymakers to mitigate career change among science teachers in public secondary schools. This includes motivation strategies, providing opportunities for science career development, improving school learning and teaching environment, increasing the participation and involvement of science teachers in key decisions, promoting sound engagement be-

tween science teachers, science students and the school administrative board. These findings suggest that the policymakers and school administrators should improve learning and teaching environment, provide financial incentives, provide opportunities for science career development, and ensure science teachers are involved in the designing, implementation, monitoring and evaluation of various education policies.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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