

INFLUENCE OF TEACHERS' QUALIFICATION ON STUDENTS' PERFORMANCE IN 'A'-LEVEL SCIENCES AT SELECTED SECONDARY SCHOOLS IN MUTARE DISTRICT, MANICALAND PROVINCE IN ZIMBABWE

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ABSTRACT

This research study reviewed the influence of teachers' qualification on students' performance in 'A'-level Science subjects at selected secondary schools in the Mutare District, Manicaland Province in Zimbabwe. The researchers were spurred into investigating this area because of the misgivings of various presuppositions as regards to poor performance in 'A'-level Science subjects. A qualitative research design was used in this study. Quota and purposive sampling techniques were used to select the schools and participants. The sample included twelve 'A'-level science teachers, three heads of department and three school heads. Semi-structured interviews, focus group discussions, document analysis and observation were used in collecting the study data. These data were analysed and discussed using the thematic approach based on the research questions. The major findings of this research were that teaching qualification has a great influence on students' performance in 'A'-level Science subjects, as students taught by a qualified teacher performed better in the public examinations than those taught by unqualified teacher. Another finding was that practical lessons which are key components of Science subjects were been shunned by unqualified teachers. In addition, it emerged that most teachers were not using scientific methods in teaching Science subjects and this was negatively affecting their students' performance in Science subjects. Moreover, findings from this research study indicated that subject matter knowledge, pedagogy studies, professional development and years of experience were imperative and positively influencing students' academic achievements. The conclusions of this study were that teachers' qualification is crucial in any educational system and it is important to recruit qualified teachers in Science subjects. As a result, it is important to ensure that each teacher is academically and professionally qualified to teach their assigned subjects. This study therefore recommends that school heads should work closely with the district schools' inspectors to ensure the recruitment and deployment of academically and professionally qualified teachers. It also recommends the review of the teacher training system in Zimbabwe, in order to adequately prepare teachers to meet the current trends in education.

Keywords: Influence, qualification, performance, 'A'-level Science subjects.

1. INTRODUCTION

An examination and understanding of the factors that cause low pass rate in 'A'-level Science subjects such as Biology, Chemistry, Physics and Mathematics in Zimbabwe is vital in improving the pass rate in line with the Zimbabwean government's Science Technology Engineering and Mathematics (STEM) initiative. Harris and Sass (2011), Dilshad (2010) and Muzenda (2013) concur that, students' poor performance in Science subjects globally is basically due to the lack of qualified teachers as well as unavailability and/or insufficiency of materials in the laboratories. In South Africa, Collins (2008) observed that the low educational attainment among South African blacks as opposed to that of the whites is greatly as a result of the unavailability of qualified interactionist in schools. Zimbabwe boasts of being a knowledge-based society, but the performance of students in 'A'-level Science subjects threatens to keep the country from development. Results released by the Zimbabwe Schools Examinations Council (ZIMSEC) from 2014 to 2016 show that students are shying away from Science subjects and many of those who sit for such exams fail dismally, at a time the country is expected to be building a base for innovation and technological advancement with the STEM initiative under the government's Zimbabwe Agenda for Sustainable Social and Economic Transformation (ZIMASSET) philosophy (ZIMSEC Handbook 2016). The 2014 Advanced level results analysis revealed that, Biology had a pass rate of 75.68%, Chemistry had 77.66%, and Mathematics had 73.02%, while Physics had 89.68%. The national Science subjects pass rate in 2014 was at 84.17%. In the November 2015 results, it was revealed that of the candidates who got grade E or better, Biology recorded 80.34%, Chemistry recorded 80.22%, and Physics recorded 83.80%, while Mathematics recorded 72.18% (ZIMSEC Handbook 2016). Manicaland Province was ranked 3rd place in Science subjects in 2014 with an 'A'-level pass rate of 87.6% and 2nd place in 2015 with 89.3%. However, these figures do not portray the real situation as they were calculated from a grade E and above. On the other hand, the percentage pass rate from grade C and above was well below 45%.

In the researchers' view, a number of reasons such as not using laboratories effectively and teachers' qualification (to mention a few) can be identified as factors contributing to the poor performance of students in the 'A'-level Science subjects as compared to other learning areas that recorded 100% pass rate. Globally, students' poor performance in Science subjects can be linked to the lack of qualified teachers as well as the unavailability and/or insufficiency of materials in the laboratories (Harris and Sass (2011), Dilshad (2010) and Muzenda (2013)).

Teachers' qualification has been used as one of the key policy mechanism in the deployment of teachers to different learning areas at 'A'-level. When Zimbabwe attained its political independence in 1980, the demand for education became grew. The policy of the Universal Primary Education in fulfillment of ZANU-PF 1980 election manifesto among other factors resulted in the swelling up of school enrolments both for primary and secondary education against the background of few numbers of qualified teachers. Soon after Independence (in 1980), the government of Zimbabwe embarked on the process of reforming the inherited education system and redressing the disparities and inequalities thereto. In 1980, for example, the ZANU-PF government regarded and continued to regard education as a fundamental human right and emphasized on high pass rate.

Rapid growth in scientific knowledge and the ever increasing pace of technological change in society in general and at work place in particular, posed great challenges for Science education. By the turn of millennium, in 2000, for instance, the emergency of unknown

diseases, increase in HIV and cancer cases, the use of fertilisers, hybrid seeds and the use of computer aided design in manufacturing became the order of the day. These scientific and technological advances continued to re-organize work relations at the work place and demand new and ever-changing work skills. It is the researchers' view that Science education should develop in such citizen, the capacity to learn and use relevant skills in daily lives. The learning of subject matter and instructional strategies must also change accordingly. This kind of education requires teachers who are competent and poses serious implications for teacher training institutions (Chivore, 1990). Government addressed this problem by setting up colleges and universities in different models to train 'A'-level Science teachers.

An exodus of qualified and experienced Mathematics and Science teachers has resulted in schools in Zimbabwe being manned by inexperienced and unqualified teachers and this immensely contributed to poor performance by school children in these subjects. The economic meltdown from 2000 to 2010 in Zimbabwe also triggered one of the worst episodes of technical skills shortage. As a result, the economic difficulties in the country reversed some of the gains previously achieved in the provision of education. However, the situation has not improved as the conditions of service and salaries still remain unattractive. The president of the Zimbabwe Teachers Association (ZIMTA) in 2008 argued that the socio-economic status of the teachers in Zimbabwe has declined drastically over the years (Ministry of Education Report on Performance in Schools 2012). Thus, the schools are failing to attract qualified and experienced teachers. It is also noted that the then Minister of Finance in his 2011 budget speech indicated that in 2010, 24% of the teachers in schools in Zimbabwe were unqualified. The quality of education of a nation like Zimbabwe can be determined by the quality of her teachers (Ministry of Education Report on Performance in Schools 2012). The most important factor in improving students' achievement in 'A'-level Science subjects is by employing seasoned qualified teachers in all schools (Shumbayawonda, 2013). According to one educationist and lecturer, it is important to first of all look at the methodologies and styles of learning that are being used in teaching Science subjects in Zimbabwe before looking at the educators or the learners (*The Herald*, Zimbabwe 2015).

The government of Zimbabwe's STEM initiative can be realised in investment in quality teachers as this is related to the improvement in students' performance. Teacher's characteristics such as certification status and degree in area of specialization are very significant and positively correlated with students learning outcomes in Science and Mathematics (Ngara and Ngwarati, 2012). With the increased demands for accountability in line with performance standards and with the growing demand for evidence-based policy making, students' achievements are considered an accurate measure of effectiveness and in turn became a basis for value-added teacher assessment systems. The qualification of a teacher is the major determinant of the quality of the education system of any country like Zimbabwe. The aim of this research is to examine if teachers' qualification can be used to improve students' performances in 'A'-level Science subjects at selected secondary schools in the Mutare District, Manicaland Province in Zimbabwe.

2. RESEARCH QUESTIONS

Five research questions were generated for this study:

1. What is the influence of teachers' qualification on their students' performance in the 'A'-level Science subjects?
2. What factors affect the pass rate in 'A'-level Science subjects at selected secondary schools in Mutare District, Manicaland Province in Zimbabwe?

3. What are the effects of the pass rate posted in 'A'-level Science subjects at selected secondary schools in Mutare District, Manicaland Province in Zimbabwe?
4. How are the cardinal components parts of 'A'-level Science subjects' syllabi taught at selected secondary schools in Mutare District, Manicaland Province in Zimbabwe?
5. What strategies can be used to improve teachers' qualification in order to improve low performance in 'A'-level Science subjects at selected schools in Mutare District, Manicaland Province in Zimbabwe?

3. METHODOLOGY

3.1 Research Design

A research design is a plan and structure of the investigation to obtain evidence and answers to research questions (Oyedele, 2011). It is the blue print of research project. It is the researchers' overall plan for obtaining answers to the research questions. This study used the qualitative research design through which the researchers collected data on participants' feelings, attitudes, perceptions, habits and responses to the influence of teachers' qualification on students' performance in 'A'-level Science subjects at selected secondary schools in Mutare District, Manicaland Province in Zimbabwe.

3.2 Population and Sampling

The study was conducted at three secondary schools drawn from eight (8) government schools, three (3) mission schools and two (2) private schools in Mutare District, Manicaland Province in Zimbabwe. There were a total of thirteen (13) school heads, thirteen (13) heads of department, and fifty two (52) 'A'-level Science teachers.

To obtain information regarding the influence of teachers' qualification on students' performance in 'A'-level Science subjects at the selected secondary schools, three (3) school heads, three (3) heads of (Science) department and twelve (12) 'A'-level Science subjects teachers were chosen to be participants in this study. Information obtained from the three school heads included ministerial policy on teaching of Science subjects, teachers' qualifications and pass rates posted in their respective schools. The three heads of Science department provided information on the 'A'-level Science subjects' syllabi and departmental policy in their respective schools, while the 'A'-level Science teachers provided information on their lesson preparations and delivery methods, class management and their opinions on the results of their 'A'-level Science students.

Quota sampling was used to divide high schools in Mutare district into three main groups. Creswell (2013) defines quota sampling as a non-probability sampling technique wherein the assembled sample has the same proportions of individuals as the entire population with respect to known characteristics, traits or focused phenomenon. Each sub-group was treated as a separate population from which a representative sample was obtained (Creswell, 2013). The resulting three groups were Government schools, Mission schools and Private schools and all these groups offered Science subjects at 'A'-level. A sample school was drawn independently from each sub-group by using the purposive sampling technique. That is, out of the eight government schools, one school was selected, while one school from the three mission schools and one school from the two private schools were also selected as the sample schools. In addition, school heads and heads of (Science) department in the Mutare District were chosen to be participants of this study through purposive sampling. In purposive sampling as alluded by Cohen, Manion and Morrison (2011), researchers hand pick the cases to be involved in the sample on the basis of their judgement or possession of the particular characteristics being sought after, in this case, the school heads and heads of department. By

virtue of their positions, the school heads and heads of department were necessary in this study. Using this sampling technique, the total number of school heads came to three while that of the heads of department also came to three. Furthermore, snowball sampling technique was applied to identify the Science teachers out of the teachers from the three selected schools. Cohen et al. (2011) argue that in snowball sampling the researcher identified subjects or individuals who have the characteristics in which s/he is interested in. Using this technique, the researchers identified four Science teachers as follows: one Physics teacher, one Mathematics teacher, one Biology teacher and one Chemistry teacher from one school and these were later used as informants to identify other related subject teachers from the other two selected schools.

3.3 Data Collection Instruments

The intention of data collection instruments is to enable researcher to decide on the most appropriate instruments to use for the collection of their data, and to design such instruments. The strengths and weaknesses of these instruments are set out, so that decisions on their suitability and the criteria of fitness for purpose can be addressed. According to Punch (2010), direct observation focuses on the physical environment, teaching methods and nonverbal behaviour, while semi-structured interviews material are used to discover the participants' responses to, perceptions of, messages contained in and attitudes to the topic under discussion. Focus group discussion on the other hand collects information on the teaching methods used by 'A'-level Science teachers (Punch, 2010), whileas documentary analysis gathers information on the teachers' qualification and syllabi.

3.3.1 The Semi-Structured Interview

The three selected school heads and the three selected heads of (Science) department were interviewed to give their feelings on the influence of teachers' qualification on students' performance in 'A'-level Science subjects. The semi-structured interviews also gathered information on the teachers' qualification, factors affecting pass rate, effects of low pass rate, teaching methods of 'A'-level Science subjects and on strategies used to improve pass rate in 'A'-level Science subjects. Kvale (1996:14) in Cohen et al. (2011) remarks that a semi-structured interview is an interchange of views between two or more people on a topic of mutual interest. A semi-structured interview is a tool that collects data through direct verbal interaction between the investigator and respondent. It is a two - person conversation initiated by the interviewer for the specific purpose of obtaining relevant research information. Semi-structured interviews are particularly conducted when complex topics are involved because the interviewer has the opportunity of giving a full and detailed explanation of the study to the respondents.

For this study, a semi-structured interview was designed by the researchers and a recording device was used together with the interview notes. A semi-structured interview was selected because it was the quickest method of obtaining information on the topic under investigation. Krueger and Casey (2015) argued that in semi-structured interview, the interviewer can add a clarifying remark to difficult questions. The semi-structured interview technique made sure that all questions are answered, at the same time enabling the interviewer to observe non-verbal behaviour which cannot be seen in a questionnaire (Punch, 2010).

This direct interaction that is evident in the interview is the source of both main advantages and disadvantages. Interviews are affected by the problem of trust and social distance (Oyedele, 2011). However researchers can overcome this problem by creating good rapport with the interviewees. The researchers ask good relevant questions to overcome the problem

of avoidance tactic that is adopted by most respondents if they feel the research is of no benefit to them. Respondents' answers can be affected by their actions to the interviewer's sex, race, social class, age, dress and physical appearance. Being neutral to all responses minimized the problem of bias. During the interviewing stage of this study, the interviewers did not show their approval or disapproval to the participants' responses. The three selected school heads and three selected heads of (Science) department as well as the twelve selected teachers were interviewed to give their feelings on the influence of teachers' qualification on students' performance in 'A'-level Science subjects. The researchers conducted the interview session in private and this ensured control over the environment as well as confidentiality.

3.3.2 Focus Group Discussions

Focus Group Discussion was used to collect data on factors that contribute to pass rate in 'A' level Sciences, effects of low pass rate and some of the teaching methods suggested in Sciences. A focus group is made up of people who have specific common characteristic that they are willing to discuss in a focussed manner so as to help understand the topic of interest (Denscombe, 2010). The researchers invited Sciences teachers at each school and conducted a discussion. This was done twice at each secondary school selected for study. According to Krueger and Casey (2015), the size of the group does not seem to have a standard although it ranges from as small as four members, to as many as twelve members. Ritchie and Lewis (2014), opined that the major advantages of focus group discussions are that, firstly, it provides a more natural setting than other methods and the group members influence one another during the discussions. Secondly, focus group discussions are particularly effective in bringing out people's perceptions, feelings, experiences, or thinking about an issue of interest (Krueger and Casey, 2015; Ritchie and Lewis, 2014).

3.3.3 Direct Observation

In this study, the researchers were the observers. Direct observation as a data collecting instrument was used to gather data on the teaching methods of 'A'-level Science subjects, teaching of practical lessons and laboratories. A major advantage of direct observation is that it shows you something, without the filtering effect of language (Gordon and Marian, 2011). However, it is necessary to define precisely and unambiguously what is to be observed. What people do may differ from what they say they do. Thus, direct observation provides a reality check under these circumstances and enables a researcher to look afresh at everyday behaviour that otherwise might be taken for granted, expected or go unnoticed (Gordon and Marian, 2011). The distinctive feature of direct observation as a research process is that it offers an investigator the opportunity to gather live data from naturally occurring social situations. It enables the researchers to observe and gather data on a number of settings, including physical setting, human setting, interactional setting and content setting. For this study, the researchers visited the participant's schools and observed both the theory and practical lessons. During the observations, the researchers observed the teaching methods suggested in Science subjects, how practical lessons were being conducted and laboratories at the three schools under study.

3.3.4 Documentary Analysis

In this study, documentary analysis was used to establish the teachers' qualification distribution, Science subjects' syllabi, departmental policy and results posted by the 'A'-level Science teachers in the three selected schools. Punch (2010) argues that documentary analysis entails the identification of relevant documents and the extraction of relevant information from them, for the purpose of finding out more about the studied phenomenon using the extracted information. In this study, policy documents related to qualification from

the Ministry of Higher Education in Zimbabwe and the Teachers' College were obtained and analysed. Other documents that were included in this study were the Science subjects' syllabi, statements of results and departmental policy.

According to Oyedele (2011), it can be primary or eye-witness accounts or it can be secondary gathered by form of interviewing eye witnesses or by reading documents. Documents are of high quality hence more valuable in soliciting responses. As a vital tool for gathering data, documentary analysis offers the researcher several benefits. Krueger and Casey (2015) indicated that documentary analysis allows the researcher to gather data not from the words of the participants, but rather facilitates the access of information that could be difficult to gain through the use of other tools such as the interviews. It also enables the researcher to access data at a time convenient to him/her (Ritchie and Lewis 2014). Documentary analysis can ensure the collection of data that is specific, for example, teachers' qualification and national results for authenticity. For this study, the researchers established the authenticity of all the used documentary sources.

4. FINDINGS

4.1 Teaching qualification and experience of the research participants

Table 1 shows the documentary analysis done on the qualifications of teachers, heads of (Science) department and school heads and their sex. The participants' qualification, regardless of their job title, ranges from Certificate to Masters Degrees.

Table 1: Summary of Qualifications of Research Participants and their Sex

Qualification	Teachers			Heads of Department			School Heads		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
CE	1	0	1	0	0	0	0	0	0
B.Sc.	1	4	5	0	0	0	0	0	0
B.Sc. Ed or B Ed	1	4	5	1	2	3	0	0	0
M.Sc. Ed or M Ed	0	1	1	0	0	0	0	3	3
Total	3	9	12	1	2	3	0	3	3

CE: Certificate of Education **B.Sc.:** Bachelors of Science

B.Sc. Ed or B Ed: Bachelors of Science Education or Bachelors of Education

M.Sc. Ed or M Ed: Masters of Science Education or Masters of Education

Table 2 shows the teaching experience of teachers, heads of (Science) department and school heads and their sex. The teachers had a variety of teaching experience, ranging from 0 to 30 years.

Table 2: Summary of the Documentary Analysis of Years of Experience of Research Participants and their sex

Experience (in years)	Teachers			Heads of Department			School Heads		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
0-10	1	7	8	0	0	0	0	0	0
11-20	1	2	3	1	2	3	0	0	0
21-30	1	0	1	0	0	0	0	3	3
Total	3	9	12	1	2	3	0	3	3

4.2 Information on 'A'-Level Science Subjects' Enrolment and Pass Rate at Selected Secondary Schools

The 'A'-level Science subjects' enrolment at selected secondary schools on average is given in Table 3.

Table 3: Summary of the Documentary Analysis of Average Number of Students doing 'A'-level Science Subjects

School	2014				2015				2016			
	Bio	Ch	Ph	Ma	Bio	Ch	Phy	Ma	Bio	Ch	Ph	Ma
SX	5	10	10	15	4	10	10	15	4	12	13	20
SY	10	15	15	25	10	15	15	20	10	15	15	25
SZ	10	15	15	20	10	15	15	25	15	20	20	30

Bio: Biology **Ch:** Chemistry **Ph:** Physics **Ma:** Mathematics

The 'A'-level Science subjects' pass rates from 2014 to 2016 at the selected secondary schools in Mutare District, Manicaland Province in Zimbabwe are shown in Table 4.

Table 4: Summary of the Documentary Analysis of Selected Secondary Schools National Pass Rate

School	Grade	2014				2015				2016			
		Bio (%)	Ch (%)	Ph (%)	Ma (%)	Bio (%)	Ch (%)	Phy (%)	Ma (%)	Bio (%)	Ch (%)	Ph (%)	Ma (%)
SX	E+	80	100	100	100	90	80	100	100	100	100	100	100
	C+	60	46	60	60	40	56	46	60	40	43	56	40
SY	E+	80	80	100	90	100	100	100	100	100	100	96	90
	C+	40	56	43	51	56	60	60	56.2	50.2	53.3	46.6	57.7
SZ	E+	100	100	100	100	100	100	100	100	100	100	100	100
	C+	56	63.3	54	60	50	65	65	64	56	66	63.3	65

Bio: Biology **Ch:** Chemistry **Ph:** Physics **Ma:** Mathematics

4.3 Participants' View on the Influence of Teachers' Qualification on Students' Performance in 'A'-Level Science Subjects.

From the findings obtained from the conducted semi-structured interviews and focus group discussions, the head from school SX pointed out that the personnel at disposal contributed immensely to the decline in pass rate. An analysis of qualification documents indicated that three out of four of the 'A'-level Science subjects' teachers at school SX do not possess teaching qualification. This was also supported by observations checklist, where most of these teachers had challenges in organizing teaching-and-learning tasks, let alone break syllabus meaningfully. The head from school SY reported that the pass rate is fluctuating, and partly attributed it to the lack of laboratory resources and largely due to the technical skills shortage. The raised issue regarding technical skills shortage pointed to the shortage of qualified personnel in the school. An analysis of laboratories shown in Table 6 revealed that the laboratories in these schools were adequately equipped, so were the libraries. What it means then is that the teachers manning these laboratories lack some specific kind of skill to effectively teach 'A'-level Science subjects. During the interview, the head from school SZ felt that the recruitment of specialists in 'A'-level Science subjects has had a positive influence in raising the pass rate at his school.

The data collected through the semi-structured interviews with administrators and 'A'-level Science subjects' teachers were analysed in a similar way. Two of the three heads of (Science) department concurred that teachers' qualification has an influence on students' performance in 'A'-level Science subjects. However, one participant is of a different opinion, and his responses were that:

"Qualification has nothing to do with students' performance. I am the head of department for Sciences for the past twenty years at this school and have been teaching Chemistry for more than thirty years and I am the best performer. Check my record and compare it with those who claim to be qualified. Where does qualification get in then?"

Science subjects' teachers were consulted on their views on the influence of teachers' qualification on students' performance in 'A'-level Science subjects. Five teachers reported that teachers with teaching qualification can organize their teaching-and-learning activities well. Findings also from an observation checklist shown in Table 5 indicated that seven teachers without teaching qualification struggle in the development of their lessons which might impact on their students' performances in 'A'-level Science subjects.

Table 5. Observation Checklist of Teaching-and-Learning Activities in 'A'-Level Science Subjects

Observation	Teacher With Qualification		Teacher Without Qualification	
	Good	Not Good	Good	Not Good
Lesson development	✓			✓
Organizing learning activities	✓			✓
Competent skills	✓			✓
Syllabus/content mastery	✓		✓	
Teaching methods	✓			✓
Students feedback	✓		✓	

4.4 Participants' Views on Factors Affecting Pass Rate in 'A'-Level Science Subjects

Findings from this research study generated from semi-structured interviews, and focus group discussion illustrated that several factors affected the pass rate in 'A'-level Science subjects. Some of the factors identified included, inadequately equipped laboratories, shortage of text books, learners' attitudes and teachers' having no teaching qualifications. In addition to the foregoing, findings from the documentary analysis of teachers' qualifications, six out of twelve participants did not have teaching qualification. Conversely, six of the teachers responded that teaching qualification is the main factor that affect pass rate. One teacher was quick to point out that:

"Teaching qualification is the main factor that affect pass rate in 'A'-level Science subjects since the subjects require a scientific approach which is gained through teacher education."

Furthermore, the respondents indicated that the important role of the teacher in the learning is unquestionable. Responses from focus group discussions were that teachers have a lot of influence on their classroom practices.

It was clear from the findings that the pass rate in selected schools was not pleasing, but six of the teachers attributed that to inadequately equipped laboratories and shortage of text books. A documentary analysis into the inventory of laboratories (shown in Table 6) in each school per subject revealed that the laboratories are well equipped. In addition, there were quite good number of current text books in each subject. With practical lessons very cardinal in the teaching-and-learning of Science subjects, it is safe to conclude that most of the teachers were not hands-on in conducting practical lessons, but rather jump to the conclusions that their laboratories were poorly-equipped for their use.

Table 6. Number of Laboratories and Textbooks at the Three Selected Schools

School	Biology		Chemistry		Physics		Mathematics
	Labs	Textbooks	Labs	Textbooks	Labs	Textbooks	Text books
SX	1	25	1	25	1	25	35
SY	1	15	1	20	1	15	40
SZ	1	10	1	30	1	20	42

Six out of twelve teachers cited that learners' attitude was one of the factors that affected pass rate in their school. It was at school SY that one participant said

"We can talk about qualification or laboratories or text books, yes, they do contribute to low pass rate, but it is the attitude of learners themselves. You can get a teacher from the moon, but learners' input is critical."

Research conducted in South Africa by Collins (2008) reflects that teacher methodology influenced pupils' performance. More precisely,

"Low educational attainment among South Africa blacks as opposed to that of whites is greatly as a result of the unavailability of among others, similarly qualified interactionalist in school."

This is the reason why 'A'-level Science subjects' teachers training should be in such a way that competent teachers are produced. The Bindura University Science Teacher Training program has opened new and current impetus to training of teachers with a unique concept of Applied Science Education.

Figure 1 shows a part of a Biology laboratory at school SY. A look at it shows that it is well equipped. This contradicts the response that lack of well-equipped laboratories was the main reason that affect pass rate at 'A'-level Science subjects.



Figure 1 Part of a Biology Laboratory Set-up

Figure 2 shows the Fume Cardboard in a Chemistry laboratory at school SX. This set up is usually financially costly. However, if schools such as school SX can have this set-up in their laboratories, it implies that these schools are able to meet all the required resources in their laboratories. Fume cardboards emit gases out of the laboratory, and this is very important in modern laboratories, which is a testimony of a well-equipped laboratories.



Figure 2 A Fume Cardboard Set-up in a Chemistry laboratory

4.5 The Importance of Teaching Qualification and Experience in Syllabus Interpretation

The researchers of this study conducted documentary analysis on teachers' qualification, experience and syllabi and how it was broken into meaningful teachable units. This revealed that six teachers out of twelve had teaching qualification and an experience of between ten and twenty years. On being asked whether they had a full understanding of the syllabi, Science subjects' teachers responded differently. Six of them responded that they had a full

understanding of the syllabi and can interpret it well. During a focus group discussion at school SZ, teachers concurred that qualification and experience work hand in glove hand. They unanimously agreed that if one is not qualified, there are challenges related to syllabus interpretation and organizing tasks. It was at this same school that the head of (Science) department said that they complete the syllabus in 15 months.

In addition, the researchers of this study wanted to find out how the syllabus was being interpreted by unqualified teachers in these schools. One respondent was quick to point out that

“Syllabus is just a document; what matters most is the content. I did my degree in this area and I am well versed with the content. I can decide to use my content knowledge to teach my students.”

On being asked the time they take to complete the syllabus, six of the teachers who do not possess teaching qualification concurred that they need more than fifteen months to complete the syllabus. The time they take to complete the syllabus, which is more than fifteen months is a testimony of inadequate competent skills that can only be exhibited by an unqualified teacher.

4.6 The Effects of Low Pass Rate on School Enrolment

One of the overarching findings of this research was that low pass rate impacted negatively on the image of the school thereby leading to reductions in their enrolment numbers. A documentary analysis of the enrolment numbers for the period 2014 to 2016 showed a downward trend in schools SX and SY. This might be closely attributed by the posted poor ‘A’-level Science subjects results as many students were shying away from taking Science subjects. On being asked the question on the effects of low pass rate, one participant testified to that reasoning as follows:

“Our enrolment in Biology is going down of late. This is attributed to low pass rate posted in the subjects for the past two years. The situation is different from Mathematics which is on the rise. If we need to keep afloat, there is urgent need to address the problem.”

One out of the twelve teachers further argued that it is not only the school enrolment that is affected but also that it reverses the gains of the government’s STEM initiative. All the three heads concurred that the government is worried and has stepped in with textbooks, computers and scholarships to attract the best students who are less privileged. The move is to ensure improved pass rate in the ‘A’-level Science subjects.

4.7 Teaching Methods Suggested in Science Subjects

Responses from interviews, observations and focus group discussions were used to provide findings to the research questions.

The question on teaching methods suggested in Science subjects was asked to heads of (Science) department and Science subjects’ teachers. The three heads of department concurred that six methods, to mention, lecture method, peer instruction, authentic learning, laboratory approach, scientific method and testing were widely suggested in the teaching of Science subjects. Responses from semi-structured interviews and focus group discussion questions revealed that, all Science subjects’ teachers used lecture and testing methods. For key methods like peer instruction, authentic learning, and scientific methods, only four out of the twelve teachers used them. Eight of the teachers interviewed expressed ignorance of these methods. One respondent said,

“I don't know these methods you are talking about, what I know is that I present my lesson and ask students to get in pairs or groups to work on tasks which we then discuss as a class. After a topic we have a test that's all.”

Observations conducted revealed that lecture method and testing method are widely used. At all the three schools, findings showed that only four of the twelve teachers used laboratory approach which is key in 'A'-level Science subjects. It was also observed that eight of the teachers were not using authentic learning which is more Science oriented.

On being asked whether the selection and use of teaching methods has something to do with teachers' qualification, six of the teachers unanimously agreed that the ability to use these methods is an indicator of the teacher's training. Six of the teachers, for example, could not tell the activities that fell under peer instruction which is a clear indication that they do not even use these in their teaching-and-learning experience.

4.8 The Importance of a Practical Lesson

Direct observation and semi-structured interviews were used to collect data on this theme. The question was on how a practical lesson is being conducted was asked from the Science subjects teachers. Various responses were collected. Four out of twelve teachers said they used the laboratory approach most of the time, while eight of the teachers responded that they do not use or hardly use the laboratory approach. On further being asked why they do not use the laboratory approach, the teachers concurred that it took a skilled personnel to prepare a practical lesson and analyse the results. They explained that preparing solutions require someone well versed with the reagents and concentrations. A teacher from school SZ responded that

“There is need for a laboratory technician to prepare and set up a practical lesson, without which I cannot teach that component part of the syllabus.”

At school SX, teachers who were observed were using the laboratory approach method. The teachers explained that they can prepare and set up practical lessons. Figure 3 shows a practical lesson being conducted at school SX. The observation made revealed that laboratories were adequately equipped and had enough reagents.

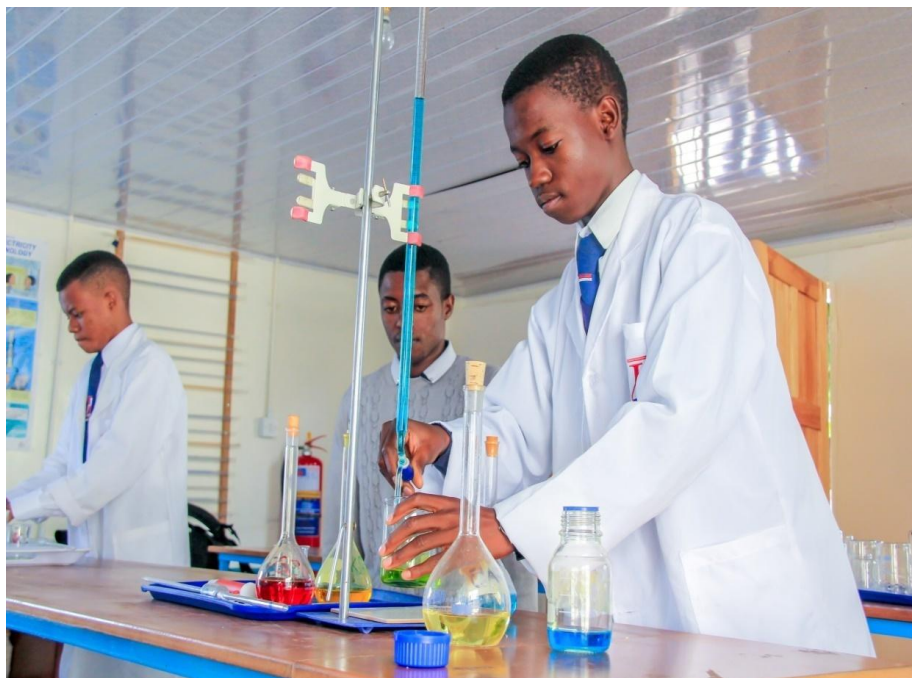


Figure 3 Photograph taken during an observation of a practical session at school SX

4.9 Strategies to Improve Pass Rate in ‘A’-Level Sciences

Responses from the interview and focus group discussions were used to provide findings to this theme. Responses from school heads revealed that teaching qualifications can be used effectively to correct low pass rate in Science subjects. Six teachers also agreed that the deployment of experienced and qualified teachers will bring out good results. Six of the teachers had a different view. They responded that anyone willing to learn, regardless of qualification and experience can produce results. However, it was interesting to note that all the schools’ administrators and teachers concurred that one should have done ‘A’-level at that particular subject if he/she is to teach effectively. On asked about the strategies to be used, one teacher from school SX said:

“Two strategies are key if results are to be realised. These are recruitment of qualified teachers and deployment of experienced teachers.”

The study revealed that at school SZ, some strides in recruiting qualified teachers as way of correcting low pass rate were put in place. On the other hand, heads of department saw it as societal responsibilities to redress poor performance in ‘A’-level Science subjects. The researchers of this study observed that two heads of (Science) department concurred that teaching qualifications can be used to correct low pass rate in ‘A’-level Science subjects. One of the two heads of department revealed that:

“I have always made it a point that I recommend qualified teachers for placement. This had made it possible to have our results on the upward trend.”

The other head of department when asked about the effectiveness of teaching qualification and experience had a different view as follows:

“Teaching qualification is just a government system to do staffing but teaching qualification has nothing to do with performance of students.”

In addition, the researchers of this study wanted to find out whether the attainment of ‘A’-level certificate has an effect on improving performance. All the teachers and heads of

department unanimously agreed that teacher should have done the subject he/she is teaching at 'A'-level. The conclusion was that teachers who have done the subject at 'A'-level are better prepared to teach the subject matter than those who did not do the subject at 'A'-level.

4.10 Role of Teacher Training Institutions in Preparing Teachers to Improve Performance in 'A'-Level Science subjects

One of the major themes that the researcher explored was the role of teacher training institutions in preparing highly qualified teachers in a bid to improve performance. The researchers solicited views of the school heads and heads of department, and Science subjects' teachers. The study also sought to find out whether the schools were equal partners in the training of teachers.

The question, what role is played by the teacher training institutions, was responded to differently by the school heads. Two of the school heads are of the view that the product is as good as the manufacturer. One school head responded that no matter how good a teacher training institution is, if the recipient of the training is not good enough, the instruction does not bear fruits. He said:

"It is not the teacher training institution that determines the quality of a teacher; rather it is the prospective teacher's reaction and assimilation of instruction that makes him/her a quality teacher."

On being asked the question that, the curriculum in teacher training institutions needs to be revised, school heads are of the opinion that the curriculum used in teacher training institutions is devoid from current trends in Education. The same question was put forward to the heads of Science department. The three heads of department concurred that there is urgent need to realign the curriculum in teacher training institutions to the new curriculum; especially in line with STEM initiatives. One head of department responded that:

"If the goals of the STEM initiatives are to be realised there is urgent need of teacher training institutions to revise their curriculum. Teachers should not be strangers when they look into the syllabus."

The researchers also wanted to know the role played by teacher training institutions and schools in the training of teachers to improve the quality of teachers in a bid to improve students' performance. All school heads responded that schools should be equal partners in the training of teachers, as they provide mentorship to trainee teachers. The Science subjects' teachers were also asked the same question. Six of the teachers acknowledged the benefits of working under a mentor. Six teachers were unable to explain this kind of relationship. This is so because they did not receive teacher education.

5. DISCUSSION AND INTERPRETATION

One of the key findings of this research study was that teachers' qualification has a great influence on students' performance. This finding is consistent with what Goe et al. (2011) says as regards teachers' qualification. Teachers' qualification is a particular skill or type of experience or knowledge someone possesses to make him or her suitable to teach. This is in line with Shumbayawonda (2013), who says that the most important factor in improving students' achievement in 'A'-level Science subjects is by employing seasoned qualified teachers in all schools. A teacher's qualification gives an indication of their ability level as well as their quality in that specific area of specialization. That is why Chikwature, Oyedele & Ntini (2016) concluded that a teacher's quality is a crucial driving force for the improvement of students' achievement. The lack of qualified personnel, as witnessed by the

exodus of experienced teachers from 2008 to 2010, created a great challenge in the country. It was therefore necessary for the government to increase teachers' capacitation.

In addition, teaching qualification was found to be the major contributing factor that affect pass rate in 'A'-level Science subjects. This finding is an indication that despite adequate to well-equipped laboratories in schools, some of the teachers teaching 'A'-level Science subjects lack the prerequisite skills needed in teaching 'A'-level Science subjects. This is in line with the observation made by Shamim, Rashid and Rashid (2013) that teachers should have to apply specific abilities without which their influence may not be reflected in their students' performance in the subject. For students to be able to make connection between what was taught in school and its application in problem solving in real life, the teacher has to be effective and adequate in their teachings. A qualified teacher is able to use differentiated instruction in a bid to accommodate all the learners in a class, thereby raising the pass rate. This is in line with what was reported in literature that teachers' professional standards make explicit the role of the teacher as a change agent leading learning (Ellis, 2011). This study revealed that half of Science subjects' teachers under study had no teaching qualification. It is important to highlight that several of the pedagogical studies of teachers' preparation programs reinforce the view that the pedagogical aspect of teachers' preparation is important. Likewise, the researchers of this study critically examined the teacher education training models being mindful that the curriculum or syllabus is often the initial communication tool that students receive as well as being the most formal mechanism for sharing information with students regarding the subject matter. This is vital, because of the effects it has on teaching practice and for their ultimate impact on students' achievement. Similar findings were noted in a study conducted by Shamim et al. (2013) who found out that those pedagogical studies enable teachers to harmonize the minds and emotions of their students in class thereby resulting into higher academic achievement. As a result, an absence of these will affect the delivery of lessons which in turn affect the pass rate. One of the trending topical issues in Zimbabwe is the Teacher Professional Standards. If the teaching profession was to be professionalized, (more) quality teachers will be produced.

Another key finding of this research study was that syllabus is interpreted wrongly by most teachers. Content materials and learning areas are stipulated in the syllabus and it requires a qualified and competent teacher to organize meaningful learning tasks. If well qualified teachers were employed, results will come. However, it is the researchers' opinion that qualification plus teaching experience will do well to produce good results. Teachers' profession relates to competence in the instruction and management of students and materials in the classroom. Moreover, it is also important to highlight that qualification does not mean everything. Findings from this study have also indicated that some of the qualified teachers were not posting good results as opposed to some unqualified teachers who are doing well. However, teachers with teaching qualification can organize their teaching-and- learning activities well, while teachers without teaching qualification struggled in the development of lessons which might have impacted the students' performances in the 'A'-level Science subjects. Shamim, et al. (2013), observed that one of the most important factors in the teaching process is the qualification of the teacher. It was also noted that unqualified teachers took more than fifteen months to complete the syllabus, which is a clear indication of their inadequacy in content knowledge and syllabus interpretation.

Also emerged from this study was that low pass rate has a long and lasting effect on school enrolment. It is the mandate of every school to protect and maintain the image of school. One such strategy is to perform well in public examinations. These examples were earlier on

articulated by Shumbayawonda (2013), who stated that low pass rate impacted negatively on both the school and the nation. It reflects also on the teacher training institutions where the curriculum had to be re-aligned to meet demand of the day. One educationist and lecturer noted that it was important first of all to look at the methodologies and styles of learning that were being used in the teaching of Science subjects in Zimbabwe before looking at the educators or the learners (*The Herald, Zimbabwe, 2015*). Responses on the teaching methods mostly used by teachers pointed to methods that were already divorced from the teaching of Science subjects. This also exposes the teacher training institutions and their curriculum. This means that concerted efforts have to be made to develop appropriate teacher training programs if results are to be improved.

Another key finding of this research was that most teachers do not use teaching methods suggested in Science subjects and this has affected the pass rate. Ampiah, Akwesi, Kutor and Brown (2012), in relation to the above, said that pedagogy in teachers' education in Africa received much attention as it was the key to unlocking content. This is consistent with what was reported in the literatures earlier on that Science subjects require teaching strategies that are scientific oriented. Teaching methods like lecture and group discussion are not mostly suggested in Science subjects. It is most appropriate then that all unqualified practising teachers should undergo special training in this regards. The challenge with such an undertaking is that funds are limited to carry out these special trainings. For this reason, the researchers of this study are recommending that schools should engage District Schools Inspector to recruit 'A'-level Science teachers proficiently to raise the pass rate of A'-level Science subjects.

In addition, the research also found out that practical lessons were mostly shunned by the 'A'-level Science teachers. This was a surprising finding considering the importance of a practical lesson in Science subjects. In an examination, the practical paper should record a best grade in the final analysis of the results. This finding may also be deemed worrisome given the government efforts to train those who hold content in related fields to undergo teacher training program to be full-fledged teachers through institutions like Bindura University of Science Education, Zimbabwe Open University, Africa University and Solusi University to mention a few. This is in agreement with what was reported in the literature that teachers who have more training conduct practical lessons well and produce students who have the better achievement rate (Stronge and Ward, 2011). This is true as training is any activity which is directed towards the acquisition of specific knowledge and skills for the purpose of an occupation or task.

Another key finding of this research was that deployment of qualified and experienced teachers in subjects they specialised at in University or Teacher Training College improves pass rate. In coherence with the review of related literature overview, some of the responses from this study implicitly indicated that the strategies required to improve pass rate should include deployment of qualified teachers and revising of teacher education curriculum in teacher training institutions in Zimbabwe. The argument was that one does not give what he does not possess. This was also in line with what was explained earlier in the Zimbabwe Teacher Education (2012), which explains that there is a positive relationship between teachers' preparation in the subject matter they later teach and students' achievement. In addition, Shamim et al. (2013) observed that recent studies revealed a positive correlation between content knowledge and students' achievement.

Last but not least, the researchers of this study found out that teacher training institutions should play a major part in improving students' performance in 'A'-level Science subjects by revising their curriculum to improve teacher qualification, which in turn will improve pass rate. Lack of qualification has proved to be one of the main factors affecting pass rate. Based on the findings of this study, this can be taken as a true assertion since all other reasons like experience or having done the subject at 'A'-level hinge on teacher qualification. Shamim, et al. (2013) observed that one of the most important factors in the teaching process is the qualification of the teacher. Ampiah et al. (2012), in relation to the above, said that pedagogy in teachers' education in Africa received much attention as it was the key to unlocking content. Chikwature, Oyedele & Ntini (2016) took a similar standpoint. They noted that good and quality education cannot be achieved if teacher training institutions fail to revise their curriculum to meet current demands. It is therefore the researchers' (of this study) view that improved curriculum positively influences quality teachers who will in turn produce quality results. Schools should embrace a cordial relationship with teacher training institutions in the form of providing mentorship to trainee students.

6. CONCLUSIONS

Based on the findings of this study, the following are the conclusions. Firstly, teachers' qualification has a great influence on students' performance. That is, teachers' qualification is crucial in any educational system which is why it is important to ensure that every teacher is academically and professionally qualified. This is because one can only give what he/she possesses. Secondly, a qualified teacher is able to use differentiated instruction in teaching-and-learning, thereby accommodating all the learners in a class, and in turn raising the pass rate of the class. Thus, it is important to recruit qualified and experienced teachers to improve results. Thirdly, every school should protect and maintain the image of school, by performing well in public examinations, as low pass rate has a long and lasting (negative) effect on school enrolment. Lastly, there should be a concerted effort by both teacher training institutions and schools to work together in improving the quality of a teacher.

7. IMPLICATIONS

One of the implications of this research study is that whatever the student learnt and how she/he was taught will ultimately determine the academic performance. Also implied is that a teacher who is deficient in good teaching strategy will produce poor students. Similarly, a teacher who cannot motivate his or her students to learn will produce poor students. Additionally, this study implied that the government should make deliberate efforts to provide sound teacher education in the country, for the production of well qualified teachers and good results. Furthermore, it emerged from this study that possessing a qualification is not a passport to improved performance, since unqualified teachers can also still produce results. However, teacher qualification is essential if improved performance is to be realised.

8. RECOMMENDATIONS

In light of the above mentioned conclusions, the following recommendations are suggested for the 'A'-level Science subject teachers, administrators, teacher training institutions and the Zimbabwean government.

For Science Subjects Teachers:

- It is necessary to ensure that teachers receive pre-service content and pedagogical knowledge adequately to meet the current trend in Science education.

- Less experienced teachers should work closely with and should be mentored by experienced teachers to get more insight on how key components are taught.

For Administrators:

- The administrators in liaison with District school inspectors should always make an effort to engage the services of qualified and experienced teachers.
- Administrators should arrange workshops for Science teachers in line with the current educational trends.

For Teacher Training Institutions:

- Teachers' colleges should enjoy the autonomy in deciding the curricula using guidelines provided by the Department of Teacher Education at the University of Zimbabwe.
- It is also recommended that a common curriculum be designed so that uniformity is achieved if the (good) results needed are to be achieved.
- Teacher training institutions should also comply with government standards regarding the provision of quality education. Any existing colleges that have not met up with the standards provided by the government should be given a specific time to accomplish this, otherwise risk losing their registration license.

For the Government:

- Government should professionalize the teaching profession as in other countries like America. For example, in America, to be awarded Qualified Teachers' Status one needs to understand and uphold the professional code of the General Teaching Council of England.
- In addition, government should put up a strategy of checking the proliferation of colleges of education in the country to ensure that the standards are not (been) compromised.

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