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INFORMATION AND COMMUNICATION TECHNOLOGY IN CLASSROOM SITUATIONS IN RURAL AND URBAN AREAS IN ZIMBABWE: A COMPARATIVE STUDY ON THE USE OF DIGITAL AND PROJECTED MEDIA IN TEACHING AND LEARNING AT SIX SECONDARY SCHOOLS IN MASVINGO

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ABSTRACT

Information and communication technology have taken centre stage of almost every interaction, communication and learning processes among people of this world. This study is a comparative analysis of the usefulness of modern information and communication technology (ICT) in the transmission and movement of information in the teaching and learning processes at high schools in Zimbabwe. In the contemporary times most projected media are computerized and, thus, may require advanced expertise in operating them. It has been also argued that projected media makes learning real, practical, interactive, and above all, more permanent than other teaching and learning aids. The objectives of this study were to establish forms of projected media in use in urban and rural schools in Zimbabwe; to investigate the extent to which these projected media are really of use in these schools; and to establish challenges faced by these schools in their endeavours in the use of projected media. The central argument in the study is that proper use of projected media leads to efficiency and effectiveness in the teaching and learning processes. Research methods involved both a theoretical review and an empirical study based on case studies, making use of comparative and exploratory approaches. The study established that while urban secondary schools have some forms of contemporary projected media, rural secondary schools do not have most of these projected media; the expertise and zeal to use the projected media is very low in both urban and rural schools; and proper use of projected media leads to efficiency and effectiveness in the teaching and learning processes. Among other recommendations, the study recommends continuous professional development of teachers in the use of projected media; and partnerships with stakeholders so that the school has a wider base for resource mobilisation.

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Keywords: Information, Communication technology, Projected media, Teaching, Learning, Instructional media, Computer, Projectors, Urban, Rural, Secondary school.

Contribution/ Originality

The overall aim of this study is to contribute a theoretical framework that will help towards the generation, development and use of ICTs and projected media in both urban and rural secondary schools in Zimbabwe and the world. Our aim is to widen the knowledge base and understanding of the generation, development and utilisation of ICTs and projected media in Zimbabwe and the global community.

1. INTRODUCTION

In this comparative study we assess the nature, use and challenges of using projected media in the communication, teaching and learning processes at high schools in Zimbabwe using six secondary schools (three urban and three rural) in Masvingo district as case studies. We argue that modern projected media is largely computerized. This makes them demand not only people with special expertise to operate them, but also electricity and specialised accessories to ensure that they function as desired. Otherwise they degenerate into simple decorations. We further argue that proper use of projected media leads to efficiency and effectiveness in the teaching and learning processes. Projected media make learning experiential, real and more permanent. We divide the paper into subsections, namely: definition of terms; orientation of the study; statement of the problem; objectives of the study; selected forms of projected media; research methods; findings; and conclusions and recommendations.

Our central argument in this study is that adoption and proper use of projected media leads to efficiency and effectiveness in the teaching and learning processes.

2. DEFINITION OF TERMS

2.1. Information and Communication Technology (ICT)

In this paper we adopt [Wertlen \[1\]](#) definition of information and communication technology. He sees ICT as a general term that describes any technology that helps to produce, manipulate, store, communicate, and/or disseminate information. [Siraj-Blatchford and Siraj-Blatchford \[2\]](#) define it as 'anything which allows us to get information, to communicate with each other, or to have an effect on the environments using electronic or digital equipment.' Elsewhere [\[3\]](#) we argue that ICT encompasses 'the enabling tools that facilitate storage, handling and sharing of data and information.'

2.2. Projected Media

This is teaching media that is projected by using some certain devices. They are classified into projected still / motionless media (slide, overhead projector, in focus, etc) and projected motion media (film, television, video, computer, etc). According to [Jimoh \[4\]](#), projected media are

one of the three main categories of instructional media or teaching aids, the other two being non-projected media and phenomenal / manipulative media. They could be visual, audio and audio-visual in nature. Jimoh [4] further groups them into film/film projectors, video cassette / video disc machines, tape recorders/recordings; radio, slide projectors, overhead transparencies/overhead projectors, opaque projectors (Episcope) and computer instructional system.

2.3. Teaching and Learning

Teaching is a multifaceted process encompassing a variety of activities which are all aimed at promoting learning in students and learners. For Marton and Booth [5], learning is about how we perceive and understand the world, about making meaning. For Fry, et al. [6] learning is not a single thing; it may involve mastering abstract principles, understanding proofs, remembering factual information, acquiring methods, techniques and approaches, recognition, reasoning, debating ideas, or developing behaviour appropriate to specific situations; it is about change. In short, as observed by Shumbaonda and Maringe [7], learning can simply be seen as change of behaviour resulting from experience.

2.4. Rural Areas

Worldwide there is no agreement on what a rural area is. Musingafi and Zebron [3] define a rural area as an area characterised by sparse population, and where the manufacturing base is mostly weak due to poor development or unavailability of the required infrastructure. In fact, in the context of developing countries like Zimbabwe, rural areas can be seen as open areas, with low population densities, and high proportion of unsettled land area used for primary production like agriculture, livestock, forestry, fisheries and other related activities. Residents of these areas are largely dependent on these primary production activities as their principal source of livelihood.

2.5. Urban Areas

Like in the case of rural area, there is no agreement on what an urban area is. In simple terms an urban area is an area characterised by high population density. Most inhabitants of urban areas work in industrial, manufacturing, retailing and service industries, but not agricultural or farming jobs. In this paper we refer to all cities and towns and their surrounding townships and suburbs as urban areas.

3. ORIENTATION OF THE STUDY

Projected media is a form of instructional media. It therefore follows that before we get deep into projected media, it is important that we are clear on what we mean by instructional media. In the classroom situation instructional media can simply be seen as teaching aids. They are devices used by the teachers to transmit instructional content to students. Thus, instructional media are

simply means of communication. Communication is simply an exchange of ideas, information, knowledge or message. This exchange of information is only possible through a medium. Therefore, in the final analysis, media are means through which information, messages or knowledge are transferred from one person to another or one place to another. In this context, instructional media refers to those carriers of instructional content. Awo-Efebo [8] defines instructional media as anything that can help the teacher to communicate effectively his/her ideas to the students so that at the end of instruction, the students can do that which the teacher stated in the objectives. These materials and equipment include real objects, projected and non-projected images, models, prints, non-print, among many others. For Ajayi-Dopemu [9] instructional media refer to the various information carriers employed in instruction. Television, radio, teaching machines, textbooks, computers, models and pictures are some of these available instructional media which make it possible for instruction to take place, besides the teachers [9]. Thus from these sample definitions we can state that instructional media are those things that teachers use in order to communicate effectively instructional concepts, principles, philosophy, theories, values, and norms to the learner so that at the end, the set educational and specific objectives will be achieved. The purpose of these teaching aids is to ensure effectiveness and efficiency in the teaching and learning process. According to Eze [10], when properly combined and appropriately used, these media and aids could help the teacher to teach more efficiently and effectively and learner to learn faster, better, retain longer and transfer learned material more effectively. Jimoh [4] observes that teaching aids enhance teaching for desired social and behavioural change. They possess some inherent advantages that make them unique in teaching. They provide the teacher with interesting platforms for conveying information since they motivate learners to want to learn more and more [4]. Also, by providing opportunities for private study and reference, the learner's interest and curiosity are increasingly stimulated. Further, the teacher is assisted in overcoming physical difficulties that could have hindered his effective presentation of a given topic. They generally make teaching and learning easier and less stressful. They are equally indispensable catalysts of social and intellectual development of the learners [4].

According to Eze [10], besides using instructional media to enrich the learning capabilities of the learner, they are also used for the following functions:

- to reinforce and enrich the mastery of the subject matter by the students teachers;
- to help student teachers to acquire necessary professional (teaching) skills;
- to help student-teachers to gain confidence more quickly;
- to promote and enhance the attainment of instructional/objectives;
- to make learning real and meaningful;
- to facilitate communication and transfer of ideas;
- to improve the quality of teaching and learning;
- to make the task of the teacher simpler while broadening the scope of

interaction with materials;

- to stimulate and sustain learners' interest;
- to make instructional communication more convenient , faster and precise; and
- to promote interaction in the teaching and learning process.

[Ema and Ajayi](#) [11] assert that teaching equipment and materials have changed over the years, not only to facilitate the teaching and learning situation but also to address the instructional needs of individuals and groups. [Orakwe](#) [12] explains that, “the concept of teaching aids has gone through several evolutionary stages from the simple aids, instructional technology, media to communication and educational technology”. This however, tells us that instructional materials are not just objects or equipment used during teaching-learning process but they are those objects improvised by the teacher to make conceptual abstraction more concrete and practical to the learners. Instructional materials are the relevant materials utilised by a teacher during instructional process for the purpose of making the contents of the instructions more practical and less vague [12].

[Ema and Ajayi](#) [11] believe that without the teacher who is knowledgeable, instructional materials cannot create change and progress. Effective communication is usually the result of a careful selection of the appropriate medium or combination of media available by an effective teacher. This is to ensure the transmission of message from one source to another by the use of form or illustration that seems desirable and depict the real situations of the audience. It is referred to as the interaction of an individual or group with the environment through all the senses. The practical justification is that it is an instrument for accelerating the pace of all human transformation, to shake-off inertia in a people, achieve mobilisation and direct their productive forces in improving their living condition [11].

However, the success of using the teaching aids to meet the teaching objectives demands adaptability, flexibility, and effective use and communication skills of the teacher to satisfy instructional delivery.

4. STATEMENT OF THE PROBLEM

The above orientation shows that teaching aids have been progressively changing as determined by the demands of the changing learning environments. Worldwide, it has been noted that rural areas lag behind urban areas in terms of infrastructure and resources for socio-economic development. In the developing countries like Zimbabwe the situation is believed to be worse. In teaching this would translate to lack of qualified and experienced teachers, obsolete teaching aids and instructional media, poor and distant schools, lack of electricity and other enabling equipment, and so on. Yet, without adequate facilities and the teacher who is knowledgeable, instructional media (whether projected media or otherwise) cannot make any significant impact on the learning process. Projected media is usually digital media that require electricity or other forms of energy like batteries for them to be of any use. They also require technical expertise to operate and use them in classroom situations. Our question, thus, focuses on

the feasibility and usefulness of modern projected media in rural and urban areas classrooms in Zimbabwe considering the fact that in the past fifteen years Zimbabwe has passed through economic hardships that crippled the promising education standards in both urban and rural areas.

5. RESEARCH OBJECTIVES

Overall, this paper seeks to contribute a theoretical framework on how contemporary projected media can be of use in rural and urban areas high schools in Zimbabwe. Specifically the paper seeks:

- to establish forms of projected media in use in high schools in Zimbabwe;
- to investigate the extent to which these projected media are really of use in these schools; and
- to establish challenges and opportunities to the use of projected media in high schools in Zimbabwe.

6. SELECTED FORMS OF PROJECTED MEDIA

According to Sampath, et al. [13] projected media involve an enlargement of the image of the material or text projected on a screen which is at a distance from the projector. In most cases use of projected media requires that the room in use should either be totally or partially dark. The bright colours and images on the screen catch the attention of the students. Sound and motion make the presentation more dynamic as compared to non-projected aids. As already shown above, equipment used for projection requires eclectic power.

Oyedele1, et al. [14] observe that projected media like the overhead and LCD projectors are critical in learning, especially with regards their use of colour, overlays, revelations, demonstrations, enlargements and animation. Other projected aids include video cassette recorders and video cameras, slide projectors and episcopes as well as computers. In this study the computer is of great interest since most contemporary projected media are computerized. Studies ([15]; [16]; [17]) in other countries, especially in developed economies, have established that schools with computers, with access to internet, with the use of educational CD ROM, video-cassettes and other modern projected media in instruction increase the source of information not only for the teachers but also for the students. Such media greatly contribute to the concretization of subject matter of the curricula; support the development of creative abilities, independent thinking and problem solving for the students; support the development of positive attitude to the studied field; increase objective approach to the instruction; enable the teachers to apply creative teaching strategies, problem instruction connected with work in groups; and so on Nováková [15].

More importantly, with regards ICTs in education, it has been argued that the advent of computers and advanced information and communication technology calls for modification of students' and teachers' roles as it triggers a shift from teacher-centered to constructivist modes of

classroom instruction ([18]; [19]), and causes teachers to confront their established beliefs about instruction ([20]). Thus, as educational innovations change the modes of school instruction in developed economies, this is also felt in developing economies (Zimbabwe included) of the world. We, thus, look at the simple computer in more detail than the other projected media. We will also address merits and demerits of using computers in classroom situations.

6.1. Computer Instructional Systems

Jimoh [4] observes that the computer has been found to be the most suitable, and versatile medium for individualised learning because of its immense capacity as a data processor. In developed economies, computer as an instructional media in classroom situations is used in many ways for effective instructional delivery. Mass instruction, group learning, individualised instructions and computer conferencing system are among some of the ways in which computer is used as a projected instructional media in the classroom. Jimoh [4] acknowledges three broad ways by which the computer contributes to teaching and learning situations: mass instruction, individualised instruction and group learning.

The computer technology has made it possible for teachers and students to avail themselves of internet facilities [4]. Websites abound where instructors and learners can visit in order to obtain needed educational information. Efficient teachers have simplified and improved educational information delivery, assessment and assimilation by their students by simply referring them to designated websites where they either receive instructions or find simplified notes on educational topics. Many libraries are now going on-line with the effect that learners and researchers can visit them electronically by means of computers instead of having to go physically to such centres. As observed by Jimoh [4], this is highly innovative.

Historical events, pictures, videos and sites are also captured and played on computer as visual aids, making learning interesting and less abstract [11]. This does not only make lessons, for example History lessons, more historically interactive, but it makes them more practical and experiential. For example, teaching about massacres at Chimoyo in Mozambique during the Zimbabwe liberation war by the Rhodesian forces is very abstract to those who were not there, especially children born after end of the brutal war. Videos played on computer or any other electronic visual instructional learning aid makes the lesson real and more captivating. The same applies to other wars, revolutions and past experiences throughout human life in this world.

The major problem with use of computers in the classroom is that in most cases both the teacher and students may be computer illiterate especially in developing countries like Zimbabwe where exposure to computer technology is limited. Burton and Wynn [18] observe that the level of computer literacy among academic staff can be surprisingly low. With the exception of those working in areas where computers are regularly used, few will be able to pick up an unfamiliar package and learn how to use it effectively. Training is the simple and obvious solution, which means that money and resources have to be made available for staff development. This again may be beyond institutional financial resource capability in most developing countries, Zimbabwe

included. Still, it is important to note that both teachers and their students have to be trained in working with computers for effective use of the computer as projected instructional media in high school and secondary school lessons in Zimbabwe and other developing countries.

6.2. Filmstrips

Filmstrips are connected series of pictures, drawings, photographs and diagrams joined together to illustrate a single concept, story or a lesson [21]. They differ from moving films in that there is no appearance of movement.

6.3. Slide Projectors

Slides involve projection through the passing of strong light on transparent slide. A slide projector is a lighthouse with a hauler for holding the slides [21]. It is valuable where motion in pictures is given less importance for comprehension. When compared to filmstrips, slides require little more space for storage than filmstrips [21]

6.4. Overhead Projectors

According to Burton and Wynn [18], despite all advances in technology, the most widely used projected and visual aid is the overhead projector. It is perceived by teachers to be simple and straight forward to use, and it is generally readily available in most education institutions.

An overhead projector is used to present large size transparencies with normal daylight condition [22]. Where slides require total or partial darkness; overhead projectors do not require blackout. Students can take notes in the normal mode as they do when working without an overhead projector. According to Burton and Wynn [18], the benefit of desktop presentation devices such as overhead projectors is the amount of control that the teacher has over the whole process, and the high quality output which is available to those who use the device. In addition the presentations are readily and easily copied and distributed to both students and teachers using electronic mail facilities and computer network servers.

It is, however, unusual to see graphics or illustrations on traditional overheads unless they have been photocopied - which often means poor quality, drawn by hand or provided at great expense by a graphic designer. With modern overhead projectors this problem can be dealt with. Burton and Wynn [18] observe that with desktop presentation software it is a very simple procedure to include a wide variety of high quality graphic images, ranging from maps to cartoons, graphs and charts in modern projectors.

6.5. RGB Projectors

According to Burton and Wynn [18], an RGB projector is a device which is generally mounted from the ceiling and is therefore a permanent fixture in the room. It is sometimes known as a "Barco" and has three light guns - a red, a green and a blue (hence RGB). The interface connects the computer to a plug in the wall which in turn is connected to the projector. Because

the image is projected from the ceiling there are no problems with members of the audience having their vision obscured by the projection device. The teacher can also move freely in front of the screen without casting a shadow. A disadvantage of this system is that the room lighting needs to be dimmed to produce optimum readability. This can cause problems with the audience taking notes or the speaker/lecturer maintaining eye contact with the audience.

6.6. Opaque Projector

An opaque projector is used to project opaque material like pictures or drawings in a book or magazine [22]. The projection made by opaque projector depends upon the distance at which the projector is from the screen. An important feature of opaque projector is that text, maps, diagrams and other materials available in books or magazines can appropriately be projected without removing them from their original source [22].

6.7. PC to TV Adaptor

A useful piece of presentation technology for the small room presentation is the PC to TV interface. This simply enables the speaker to connect a laptop PC directly into a television in order to project the computer images.

6.8. Scanners and Cameras

According to Burton and Wynn [18], a scanner is a device used for converting line drawings or pictures or photographs into a computer readable form. Scanners come in black and white or colour and are useful for scanning images into presentations. However, they are expensive, and image editing software is usually required to convert the scanned images to the required sizes and formats. Using a scanner is probably too complicated and time consuming for most teachers to bother with on a day-to-day basis. However, digital photography may offer an effective alternative.

7. BARRIERS TO USE OF PROJECTED MEDIA IN SCHOOLS

Ertmer [23] categorised barriers of technology integration by teachers into two broader classifications. These include first-order barriers ‘extrinsic’ to teachers like access, time, support, resources and training; and second-order barriers ‘intrinsic’ to teachers like attitudes, beliefs, practices and resistance. In this section we briefly look at some of these barriers.

7.1. Availability and Access to Media and Technical Support

Availability of and access to instructional technology resources and technical support determine the frequency with which teachers use instructional materials [24]. Thus the frequency with which teachers use projected media is related to the availability of technological hardware in the classroom. A study by Kadzera [25] established that lack of instructional media resources are one of the reasons for minimal use of instructional technology in teachers training

institution in Malawi. Earlier, in Ethiopia, Asegedom [26] had also found that lack of the required instructional media resources in the one hand, and failure of school pedagogical centres to make these resources available and accessible on the other, were the major reasons for teachers' limited use of instructional media. Fuller [27] also concluded that teachers are encouraged to use technology in classroom if they are given technical support.

7.2. Workload

The amount of school subjects taught, the number of students in class, time constrain during planning, and the weekly teaching load has been cited as a major factor influencing much of what teachers do in their classrooms ([28]; [29]; [30]; [20]). Moore, et al. [28] reported that teachers resent assignments requiring them to teach subjects they do not know; entail considerable time for class preparations; or teaching very large classes. Earle [21] identified shortage of 'planning time' among teachers as one of the major restraining factors of technology integration in school. This is why Wang and Reeves [31] recommend that instructional designers and researchers need to seriously consider teachers' perspectives while attempting to integrate instructional technology in schools.

7.3. School Culture and Leadership Support

Leadership has been established as one of the most important factors affecting the successful integration of technology in the classroom situation ([32]; [33]; [34]). In the British school system, Tearle [34] found that the school culture and the principal's leadership are important in ICT implementation. Other researchers [26, 32, 33] concluded that the principal's support encourages teachers to use technology in the classroom. Parker [35] noted that technophobia among principals can hold back successful information technology implementation in school.

8. RESEARCH METHODS

This study was based on extensive review of theoretical literature, personal experience and empirical study in six secondary schools (three urban and three rural) in Masvingo district. The writers have taught at secondary school level in both rural and urban areas in Zimbabwe for more than ten years each. The following sources were consulted to ensure a balanced review of both primary and secondary sources of relevance: published academic works, academic journals, Internet sights, workshop reports and minutes, as well as magazines and newspapers. Data was collected through the use of documented, experiential observation and questionnaire data collection techniques.

The scope of the empirical investigation was limited to six secondary schools in Masvingo district: Rural schools (Mapakomhere High School, Mapanzure High School; Manunure High School); and urban schools (Christian College High School; Mucheke High School; Ndarama High School). The selection of the schools was based on convenience sampling. The researchers had colleagues working at these schools who acted as focal point teachers and assistant researchers.

These colleagues were responsible for taking the questionnaires to three of their heads of departments, the deputy head and the headmaster at each of the sampled schools. This made a total of five participants at each of the six secondary schools. All in all research participants added up to a total of thirty (15 female and 15 male). The questionnaire required respondents to answer 2 demographic questions (sex and age) and five thematic questions on meaning of projected media; types and availability of projected media; the extent to which the available projected media are of use; and challenges encountered in using projected media in the school.

Except for the question on the extent to which projected media is used in the schools, all the other thematic questions were open ended questions giving respondents room to express themselves in the way they wanted to. This was purposely done with the intention to capture respondents' perceptions, feelings and emotions.

9. EMPIRICAL FINDINGS

In this section we discuss findings of the empirical studies at the six schools. In the discussion we compare the situation in rural settings to that in urban settings. The aim is to see if there is any significant difference between urban and rural schools in light of the past 15 years economic hardships. We start by looking at the demographic characteristics of participants before we get into their responses to questions addressing thematic issues of the study.

Table-1. Distribution of participants

School	Position	Sex	Age Group (Years)				Total
			20-29	30-39	40-49	50 and above	
Mapakomhere High School	Head / Deputy	Male	0 (0%)	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)
		Female	0 (0%)	0 (0%)	1 (3.3%)	0 (0%)	1 (3.3%)
	HOD	Male	0 (0%)	0 (0%)	1 (3.3%)	0 (0%)	1 (3.3%)
		Female	0 (0%)	1 (3.3%)	1 (3.3%)	0 (0%)	2 (6.7%)
Mapanzure High School	Head / Deputy	Male	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)	2 (6.7%)
		Female	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	HOD	Male	0 (0%)	1 (3.3%)	1 (3.3%)	0 (0%)	2 (6.7%)
		Female	0 (0%)	1 (3.3%)	0 (0%)	0 (0%)	1 (3.3%)
Manunure High School	Head / Deputy	Male	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)	2 (6.7%)
		Female	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	HOD	Male	0 (0%)	1 (3.3%)	0 (0%)	0 (0%)	1 (3.3%)
		Female	0 (0%)	1 (3.3%)	1 (3.3%)	0 (0%)	2 (6.7%)
Christian College High School	Head / Deputy	Male	0 (0%)	0 (0%)	1 (3.3%)	0 (0%)	1 (3.3%)
		Female	0 (0%)	0 (0%)	1 (3.3%)	0 (0%)	1 (3.3%)
	HOD	Male	0 (0%)	1 (3.3%)	0 (0%)	0 (0%)	1 (3.3%)
		Female	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)	2 (6.7%)
Mucheke High School	Head / Deputy	Male	0 (0%)	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)
		Female	0 (0%)	0 (0%)	1 (3.3%)	0 (0%)	1 (3.3%)
	HOD	Male	0 (0%)	0 (0%)	1 (3.3%)	0 (0%)	1 (3.3%)
		Female	0 (0%)	1 (3.3%)	1 (3.3%)	0 (0%)	2 (6.7%)
Ndarama High School	Head / Deputy	Male	0 (0%)	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)
		Female	0 (0%)	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)
	HOD	Male	0 (0%)	0 (0%)	0 (0%)	1 (3.3%)	1 (3.3%)
		Female	0 (0%)	1 (3.3%)	1 (3.3%)	0 (0%)	2 (6.7%)
Grand Total			0 (0%)	8 (27%)	14 (44%)	8 (27%)	30 (100%)

(Source: Primary data)

9.1. Demographic Characteristics of Participants

At the secondary schools, the conveniently sampled participants were distributed by department as in Table 1. The table summarises the distribution of the thirty questionnaire respondents. It shows that all participants were at the age of 30 years and above.

It is important to note that only 27% of the respondents were 50 years old and above. It is, thus, concluded that secondary school teachers in Zimbabwe are mostly concentrated in the middle age and thus relatively young. Young people have been found to be less resistant to change and innovation. These teachers, therefore, as relatively young professionals, are likely to be less resistant to new innovative teaching methods. If this is the case, then, if given the opportunity, we expect these teachers to readily accept and adopt new technology (i.e. computers, digital cameras, videos, and so on) in their teaching efforts. Since the study participants were conveniently sampled, response rate was at 100%. Also, assistant researchers and respondents agreed on date and time to come back and collect the completed questionnaire. Even headmasters and deputy headmasters met the agreed due date and time of collection of the questionnaire.

9.2. Respondents' Comparative Understanding of Projected Media

In this section we start by capturing sample definitions of projected media from male and female respondents: two (male and female) from urban school; and two (male and female) from rural school. The following are the unedited sample definitions of projected media by respondents:

- Projected media involve use of devices that enlarge and project the material taught to a distant wall or chart to raise interest and motivation of pupils in the learning process (male rural respondent).
- Projected media is instructional media that animate and project taught content to some surface to raise interest of students. It generally works with some form of electronic energy (female rural respondent).
- These are instructional equipment that project the image of the material or text taught to a screen located at some distance from the projector so that everyone sees the material projected easily. A common example is the overhead projector (female urban respondent).
- Projected media is largely electronic media that takes the material being taught and project it to the wall or any other upright surface like in the case of traditional films and bioscopes. The material can be in form of pictures, cartoons, live images, or even text content (male urban respondent).

As demonstrated in the above sample definitions, all respondents had some idea of what projected media is all about. This is not surprising as all sampled respondents had passed through some teacher education programme at college or university. It therefore, follows that what they say about the use of projected media is a true reflection of the situation in their schools. In other words, we conclude that their answers to thematic or research questions were a true reflection of their experiences and what they felt towards use of projected media in their schools.

9.3. Digital and Projected Media at Secondary School Level in Zimbabwe

Before commenting on the availability and use of projected media in Zimbabwe, let us make it clear that unlike the situation in most other African countries, in Zimbabwe most public and government institutions in both urban and rural areas are electrified. Nonetheless, respondents complained of what some of them called haphazard blackouts. Since the beginning of the Millennium, Zimbabwe has been experiencing power shortages due to political squabbles and the resulting poor performing economy. To deal with this challenge the government introduced electricity rationing throughout the country. We, thus, conclude that secondary schools in both rural and urban areas in Zimbabwe have limited access to electricity. Logically this affects their use of ICTs, projected media included.

The common identified projected media in the sampled schools were as follows:

- computers (all the sampled six schools);
- DVDs and DVD players (all three urban schools and one rural school);
- overheard projectors (all three urban schools and one rural school);
- scanners and cameras (all three urban schools);
- television sets (all three urban schools and two rural schools); and
- radios, cassettes and cassette players (all the sampled six schools).

These findings show that in terms of digital and projected media, urban secondary schools are more resourced than rural secondary schools in Zimbabwe.

9.4. The Extent to which the Available Digital and Projected Media are of use in the Schools

The availability situation above tells us there is very limited use of digital and projected media in rural secondary schools in Zimbabwe simply because they are not there. Responses to the question on this issue were as in Table 2.

Table-2. Perception on the level at which projected media is used in the schools

School Location	Strongly Agree	Agree	Disagree	Strongly disagree
Rural	0	3	10	2
Urban	1	6	7	1
Total	1	9	17	3

(Source: Primary data)

Table 2 shows that there is limited use of projected media in the secondary schools, especially in rural areas. Basing on our experiences as teachers and explanations given by assistant researchers who acted as focal point teachers for this research, there are a number of reasons to this situation. All the reasons given fit well with Ertmer [29] categorisation of barriers to technology integration by teachers discussed above. The frequently stated reasons in both urban and rural secondary schools are summarised in the following bulletins:

- lack of resources;

- lack of leadership encouragement and support;
- work overload;
- lack of expertise;
- fear of new innovations;
- bad attitude (we did not use them at school; why should we use them with our students?)

We note with great concern that although all the studied schools had computers, these computers are nothing more than decorations. Most teachers cannot operate them due to lack of expertise and limitations by school management.

We also asked the focal point teachers whether they think projected media make teaching and learning more effective and efficient or not. They strongly agreed that if properly used, projected media lead to efficiency and effectiveness in the teaching and learning processes.

9.5. Challenges to use of Digital and Projected Media in Secondary Schools in Zimbabwe

From experiential observation, discussions with focal point teachers and reasons for not using digital and projected media above, we established that use of digital and projected media in Zimbabwe comes with its own challenges. We have already summarised these challenges as reasons for not using digital media in 9.4 above. At the risk of repetition we write them here in order of their importance as given by focal point teachers:

- poor teaching and leadership environment;
- discouragement by leadership;
- lack of resources;
- work overload;
- lack of training and expertise; and
- bad attitude..

10. CONCLUSIONS AND RECOMMENDATIONS

In this study we established that while urban secondary schools have some forms of contemporary projected media, rural secondary schools do not have most of these projected media; and that the expertise and zeal to use the projected media is very low in both urban and rural schools. We also established that proper use of projected media leads to efficiency and effectiveness in the teaching and learning processes. We therefore, recommend that

- government and schools embark on continuous professional development of teachers in the use of digital and projected media for them to avoid obsolescence;
- people appointed in school leadership positions be appropriately oriented so that they support and encourage use of digital and projected media in the classroom;
- authorities should reduce teachers' teaching load to a level that gives them room to prepare and use digital and projected media;
- reward those who use digital and projected media in teaching and learning; and

- schools make partnerships with stakeholders so that the school has a wider base for resource mobilisation.

REFERENCES

- [1] R. R. R. Wertlen, "eKhaya ICT." Available: <http://eKhayaICT.com> [Accessed 12 february 2014], 2014.
- [2] J. Siraj-Blatchford and D. C. Siraj-Blatchford, *More than computers: Information and communication technology in the early years*. London: The British Association of Early Childhood Education, 2003.
- [3] M. C. C. Musingafi and S. Zebron, "The role of information and communication technology in rural socio-economic development in Africa," *International Journal of Public Policy and Administration Research*, vol. 1, pp. 38-46, 2014.
- [4] M. F. Jimoh, *Teaching aids, a panacea for effective instructional delivery*. Plateau State: Saints' Academy, 2010.
- [5] F. Marton and S. Booth, *Learning and awareness*. Mahwah, NJ: Lawrence Erlbaum Associates, 1997.
- [6] H. Fry, S. Ketteridge, and S. Marshall, *Understanding student learning*. In Fry, H., Ketteridge, S. and Marshall, S. (Editors). *A handbook for teaching and learning in higher education: Enhancing academic practice*, 3rd ed. New York: Routledge, 2009.
- [7] W. Shumbaonda and F. Maringe, *A guide to school experiences: Module PGDE 306*. Harare: Zimbabwe Open University, 2000.
- [8] E. B. Awo-Efebo, *Effective teaching principles and practice*. Port-Harcourt: Paragrapics, 1999.
- [9] Y. Ajayi-Dopemu, *Production of instructional media*. In Agun, I. and Imogie, I. (Eds). *Fundamentals of education technology*. Ibadan: Y-Books, 1988.
- [10] P. I. Eze, "Instructional media for effective teaching and learning of Christian religious knowledge in senior secondary schools. Academic discourse," *An International Journal*, vol. 1, pp. 12-22.
- [11] E. Ema and D. T. Ajayi, *Educational technology: Methods, materials, machines*. Jos: Jos University Press Ltd, 2004.
- [12] I. T. C. Orakwe, *Social studies (Education Basics) for tertiary institutions*. Onitsha: Desvic, 2000.
- [13] K. Sampath, A. Pannnerveselvam, and S. Santhan, *Introduction to educational technology*, 4th ed. New Delhi: Sterling Publishers, 1998.
- [14] V. Oyedele1, J. Rwambiwa, and A. Mamvuto, "Using educational media and technology in teaching and learning processes: A case of trainee teachers at Africa university," *Academic Research International*, vol. 4, pp. 292-300, 2013.
- [15] H. Nováková, "Dissemination, implementation and evaluation of educational materials on biotechnology: Final scientific report 1998 – 2000," EIBE – Czech Republic2000.
- [16] L. Kouba, *Technology systems in instruction I*. Prague: Charles University, 1995.
- [17] L. Kouba, *Technology systems in instruction II*. Prague: Charles University, 1996.
- [18] A. Burton and S. Wynn, *Making the most of electronic media for teaching and learning*. In J. Steele and J. G. Hedberg (Eds). *Learning environment technology: Selected papers from LETA 94*. Canberra: AJET Publications, 1994.
- [19] M. Neo, "Learning with multimedia: Engaging students in constructivist learning," *International Journal of Instructional Media*, vol. 34, pp. 149-158, 2007.
- [20] G. C. Rakes, V. S. Fields, and K. E. Cox, "The influence of teachers' technology use on instructional practices," *Journal of Research on Technology in Education*, vol. 38, pp. 409- 424, 2006.

- [21] R. S. Earle, "The integration of instructional technology into public education: Promises and challenges," *ET Magazine*, vol. 42, pp. 5-13, 2002.
- [22] S. Akram, S. Malik, and K. Malik, "Use of audio visual aids for effective teaching of biology at secondary schools level," *Leadership Management*, vol. 50, pp. 10597-10605, 2012.
- [23] P. Ertmer, "Addressing first and second-order barriers to change: Strategies for technology implementation," *Educational Technology Research and Development*, vol. 47, pp. 47-6, 1999.
- [24] N. Bitner and J. Bitner, "Integrating technology into the classroom: Eight keys to success," *Journal of Technology and Teacher Education*, vol. 10, pp. 95-100, 2002.
- [25] C. M. Kadzera, "Use of instructional technologies in teacher training colleges in Malawi," PhD Thesis, Virginia Polytechnic Institute and State University, USA, 2006.
- [26] A. Asegedom, "Teacher perceptions of educational problems in Ethiopia, quality education in Ethiopia," Vision for the 21st Century: Proceedings of National Conference in Awassa College of Teacher Education. 12-28, July 1998, Awassa, 1998.
- [27] H. L. Fuller, "First teach their teachers: Technology support and computer use in academic subjects," *Journal of Research on Computing in Education*, vol. 32, pp. 511-535, 2000.
- [28] S. J. Moore, J. B. Harrison, and M. L. Donaldson, "Who stays in teaching and why? A review of the literature on teacher retention." Available: <http://www.gse.harvard.edu/~ngt> [Accessed on August 18, 2014], 2005.
- [29] R. Arends, *Classroom instruction and management*. New York: McGraw-Hill, 1997.
- [30] M. Betz, "Information technology and schools: The principal's role," *Educational Technology and Society*, vol. 3, pp. 1-19, 2000.
- [31] F. Wang and T. C. Reeves, "Why do teachers need to use technology in their classrooms? Issues, problems, and solutions," *Computers in the Schools*, vol. 20, pp. 49-65, 2006.
- [32] M. Afshari, K. Abu Bakar, W. Su Luan, B. Abu Samah, and F. Say Fooi, "School leadership and information communication technology," *The Turkish online Journal of Educational Technology*, vol. 7, pp. 82-91, 2000.
- [33] C. Dawson and G. C. Rakes, "The influence of principals' technology training on the integration of technology in schools," *Journal of Research on Technology in Education*, vol. 36, pp. 29-49, 2003.
- [34] P. Tearle, "ICT implementation: What makes the difference?," *British Journal of Educational Technology*, vol. 34, pp. 567-583, 2003.
- [35] M. Parker, "Staking a claim in the future," *Daily Telegraph*, vol. 16, June, p. 26, 1999.

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