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Research Paper

Teachers' perceptions towards the Botswana educational television program (Betv) in delivering instruction on mathematics and science

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Abstract. This study examined the perceptions of Mathematics and Science teachers in senior secondary schools, in the Serowe and Palapye regions regarding the effectiveness of Botswana educational television (Betv) program in supplementing the school's instructional delivery. This was a descriptive study designed to assess the status as it was in schools. A close ended survey questionnaire was used to collect data from a census of 60 Mathematics and Science teachers. Data was analysed using the SPSS to compute frequencies, percentages, means and standard deviations to describe the current status on how teachers perceived the adoption of television in educational program. The study revealed that teacher respondents perceived the television important as the results showed that "*There should be more TV and radio programs for all subjects*" (Mean = 4.30; Std. Dev = .73). The results however pointed out that '*You can study through television only when you are good at both mathematics and science*" (Mean = 4.30; Std. Dev = .73). The paper recommended further comprehensive research covering more schools and diverse stakeholders in the country.

Keywords: Teachers, perceptions, Mathematics, Instructional delivery, questionnaire.

INTRODUCTION

The introduction of television as a technique for classroom instruction came about as an innovation to enhance education and learning (EDC's, 2004; Bacon and Jakovich, 2001). In 2011, the Botswana's Ministry of Education, Skills and Development (MoESD), saw a need to introduce a program called Botswana educational television (BeTv) which was driven by the need of school curriculum to support and facilitate the national goal of education that aimed at preparing educated and globally competitive human resource by 2016. Students in schools had been observed to be perfuming badly and in large numbers (Thamani, 2014; Botswana Daily News, 2014) in the Primary School Leaving Examinations (PSLE), Junior Secondary Education (JSE) as well as the Botswana General Certificate of Secondary Education (BGCSE). The same sentiments were shared by Mphale (2014) who reported students' performance in schools as an indication of the decline in the standard of education.

Observed also was that, the number of secondary school private students re-siting the examinations to improve their grades after they had performed badly in the terminal examinations was increasing very year (BEC, 2014). For example, in the 2014 results for the BGCSE, 6,988 had re-taken the examination for upgrading. These were known as Back-to-school students (BEC, 2014). The Ministry of Education and Skills Development (MoESD) therefore expanded on the teaching of the Botswana General Certificate of Secondary Examination (BGCSE) Maths and Science through BeTv. This was a joint initiative with the Japanese government (BOPA News, June 2011). The new television initiative was meant to reach out to both out-of-school and in-school children who had the need for (i) supplementing their examinations, (ii) revising Maths and Science curricular while at home and/or (iii) reaching out to resource challenged students in remote and rural areas. The BeTv

instruction is broadcast in the Botswana Television net work weekly from Monday to Friday between 11:00 am and 1:00 pm. The broadcasting schedule is also repeated on Saturday's between 11:00 am and 1:00 pm to ensure that those who missed the lessons during the week days could be able to watch and listen on weekends. The programme is broadcast in collaboration with the Botswana College of Distance and Open Learning (BOCODOL) as a joint program; students tutored through the BeTv ultimately take the formal Botswana Examination Council's (BEC) examinations just like other students in the formal education system.

Progress has so far been made to the extent that instruction for the Botswana General Certificate of Secondary Education (BGCSE) science subjects are supplemented and complimented through television. Important to note in this regard is that, instructional delivery in education plays a key role on students' achievement and understanding of the subject matter (Ballard and Bates, 2008). Airasian (n.d) stated that instruction is a method or a technique that is used to deliver information to a learner so as to change behavior. For example, the lecture method, discussions, worksheets, cooperative projects including homework given to students to complete are instances of practice used to help students learn.

Important also at this point is the fact that the Botswana's national television (Btv) was first introduced in 2000 and it is now fifteen years old. Before its inception the majority the people of Botswana watched and viewed foreign channels mainly from South African for both educational and social purposes. Generally, as observed by the researchers, programs aired on the Botswana television seem to be educational portraying the action of imparting knowledge and experiences to the society more than just being a mere entertainment. For example, the *Morwalela* television program creates awareness education on the HIV/AIDS issues*, the Talk back* show for secondary schools' students and teachers acting on emerging issues affecting students learning in schools, the *itshireletse* by the Botswana Police service provides education for the community about crime prevention and control. Other programmes aired on the Botswana television since its inception include *Molemo wa Kgamg* and *Matlho a phage* also cutting across issues that affect the education sector and the community as a whole. Thus, the purpose of this study is to examine the perceptions of teachers of Maths and Science towards the adoption of television as a medium of instruction.

The use of television in education is one of the new phases of development in the Botswana's education. Currently the effectiveness of this programme is not known as the program has existed for five years. Teachers as practitioners are the right stakeholders to give their perceptions regarding the effectiveness and usefulness of education programs. Thus, the study is justified. Television instruction (Saltrick et al., 2004; Bacon and Jakovich, 2001) as a technique for delivering classroom instruction has been adapted and integrated in several countries.

Trends in perceptions

People perceive things in different ways. Most individuals seem to perceive television as a major innovation promoting interactive education. Contrary to this, a study by Ryan-Nicholls (1996) reported that interactiveness of instructional television was minimal, but somewhat providing equal learning opportunities to learners in different places. According to Moeller (1996), the interest about television as a medium of instruction in education has gone up because it is thought to: i) enhance the literacy development of both young and old folks, ii) reach out to more learners in distant and remote areas, and iii) enhance the development of new visual technologies. Moeller (1996) acknowledges through research that the content of the television has influence on people's behavior, attitudes, beliefs and values, knowledge, and cognitive skills. These give a scenario on how television is perceived by both young and adults.

Perception is a psychological concept which plays a major role in understanding the status of an innovation adopted in any situation. In agricultural education, studies on perceptions such as Muchiri et al. (2013), Okeafor (2002), Hulela and Matsolo (2010), Martin and Omer (1990) provided the relevant information to understand the phenomena being studied thus influencing appropriate decision making in education. Perception involves four unconscious steps taking place within a person that start with stimulation and ends with the interpretation of the situation. Figure 1 shows how the information about innovation is received and interpreted. As indicated by Pickens (2005), perception can be interpreted to mean what people take through their biological senses of sight, hearing, touching, feeling and tasting about the situation and environment around them as illustrated in Figure 1.

In teaching and learning processes, educators' perceptions about a classroom instruction such as the television programme which was integrated to enhance students' learning would be crucial. This would mean students grasp subject matter taught and make appropriate interpretation to get meaning out of their education. In other words, how people see the world around them is important and worth noting to improve the education of children. Due to the complexity of assumption depending on what the senses perceive, different kinds of interpretations will always emerge because of the different perceptions. For example, a modal, color, depth, form, speech, harmonic pitch and rhythmic kinds of perceptions do exist thus influence different interpretations about an innovation. In Botswana, television has been introduced as a way to improve the

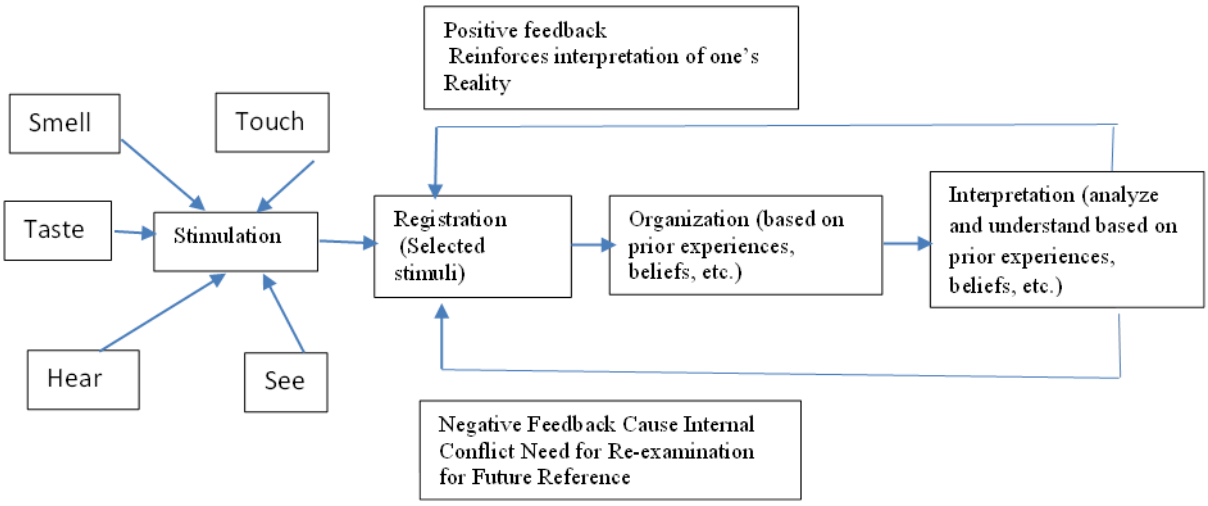

Figure 1. Perception Processing System (Adapted Pickens J, 2005).

quality of education and become a supplementary to the classroom instruction for those in remote areas. This means that the perceptions of teachers as practitioners regarding television in education start with their attitude, whether they like it or not and ends with their interpretation of the use of television to achieve their goal of education.

As described by Lindsay and Norman (1977) in Pickens (2005) the concept of perception is the process by which people interpret and organize impressions they hold about a phenomenon to create a meaningful experience of the world around them. Figure 1 shows how people view the world about television in education, followed by record of it based on prior experiences, beliefs, and then interpretation based on benefits and disadvantages the television brings to education.

Television in education

According to WSIS (2005), Arokoyo (2003) as cited in Chhachhar et al. (2012) television and radio programs were imperious today in the dissemination of information with regard to '*education, knowledge in the social life similarly human development and inclination to growth.* The authors further stated that these were communication technology tools popularly *used to disseminate* the systematic, technical and scientific information to the community today (p. 11004). Noted also was that k*nowledge, information and awareness were the most vital factors in success of human development'* nowadays (Chhachhar et al., 2012; ibid).

Moeller (1996) pointed out that traditionally, educators have perceived television as not particularly beneficial to literacy development, but today research has found that television has enhanced the literacy development of both children and adults. It was found that television was accessible medium thus having the potential to reach out to learners that have not been able to participate in traditional literacy programs. It also provides the opportunity to use video records and playback, CD-ROM and videodisk technology, multimedia computer technology) making it possible to provide learners with more control and interactivity thus adapting televised instructions to the needs of a variety of learners and learning styles (Moeller, 1996).

Roberts and Herrington (2005:577) also pointed out that the use of television for classroom instruction provides an opportunity for '*interactive collaborative, constructivist, situated, and authentic learning*'. The authors further alluded to the fact that despite these benefits educators were not familiar with how the television could make teaching and learning interactive. Roberts and Herrington (2005) also reported that if television was to be adopted in educational settings there is still a need to consider some research, sound pedagogy, research-driven guidelines, and further establish the existing attitudes towards television usage in education. Alchter (2011) shared the same sentiments on the use and adoption of television in education. However, Akhter's evaluation of the effectiveness of television in distance education revealed that although it was worthy being used since majority of students get benefit out of it, challenges do exist. The study found some challenges associated with the use of television in teaching and learning, these included the majority of students missing the broadcasts schedule of programs and close to half of those surveyed viewed the program could not provide an opportunity to note down the important features during the broadcasting since some would be slow probably lacking technology to record the program. The study also pointed out that the television

content could also have effects on people's behavior, attitudes, beliefs and values, knowledge and cognitive skills which are important. For example as pointed out by Khan and Syed (2014), it is clear that children who spend more time watching television may experience challenges. What is not understood about the television is the effects of the transience, the pace at which the information presented to learners, how the design of television programs affects' viewers' literacy-related behaviors, attitudes, and how skills on television is perceived by educators Thus, this study was designed to describe the perceptions of teachers regarding the effectiveness of the BeTv in disseminating information secondary school students.

According to Perraton and Creed (2000) curriculum delivery through the use of television programs is a form of information and communication technology (ICT) which was part of an agreement made during the Jotien Declaration in the early 1990s in Beijing, China, as a way to improve the quality of education. Perraton and Creed further explained that, ICT was to be explored as a way to "support the education system, not to replace it, but to 'play a part in meeting the needs of children or adults who cannot get to school or conventional class.' Furthermore, ICT was also to make sense and consider technologies from the print media to "broadcasting to computers" (Perraton and Creed, 2000; Noor-Ul-Amin, n.d). Such forms of educating the nation through ICT could be associated with what Perraton and Creed (2000) termed 'telematics', 'open learning', and 'open and distance learning' designed to assist children in their homes which may be remote from the school learning environment. These were forms of expansion referred to in teaching and learning in educational institutions. How people see the use of television in education, its benefits and disadvantages in education is important. How we see things depends on where you look for. For example, when we listen at the sound made in broadcasting the television and not considering how far it reaches in the country in terms of students reached one may not see the benefits and advantages of using television in education.

Purpose of the study

The purpose of the study is to describe how teachers of Mathematics and Science in secondary schools perceive the Botswana educational television program and its utility. The study specifically investigated the:

1. Personal characteristics of teacher respondents in the study. How do these assist in your study? Does the perception depend on the gender of the participant?
2. Perceptions of teacher respondents in delivery of instruction through television.
3. Perceived effectiveness of the programme in addressing the needs of learners.

METHODOLOGY

Design of the study, population and sampling

The study used a descriptive research design whereby a survey instrument was used to collect data from Mathematics and Science teachers on their perceptions regarding the use of television in selected senior secondary schools in the Central District. Sixty (60) Mathematics and Science teachers made up the population because the two subjects were offered through the use of the television programme. All 60 teachers of Mathematics and Sciences at Lotsane senior secondary school in Palapye and Swaneng Hill School in Serowe constituted the population of this study. This was a census study whereby all Science and Mathematics teachers the in two senior secondary schools were involved.

Data instrument

The questionnaire was designed by the researchers guided by the literature as described in Leung, 2001 and Taylor-Powell (1996). The instrument had three parts. The first part of the questionnaire required the teacher respondents to provide information on their characteristics such as educational background, frequency of watching the program, gender and the subject taught. The second part of the questionnaire required the teachers to indicate the level at which they perceived the television delivering instructions. In part three, the teacher respondents were asked to indicate the perceived effectiveness and value of the program in disseminating knowledge and skills to students. In addition, the teacher respondents were asked to respond to items seeking for information on the quality of material broadcast to learners through the television program. The statements contained in parts 1 and 2 of the questionnaire were constructed expressing the opinions; views and perceptions regarding classroom instructional delivery through television programme. The questionnaire was close-ended requiring teachers to indicate their responses expressing their level of agreement with the statements about perceptions, use and benefits of the television in curriculum delivery. Each statement in the questionnaire was anchored with a likert-type of scale to indicate the response as 1 = Strongly Disagree; 2 = Disagree; 3 = Not Sure; 4 = Agree; or 5 = Strongly Agree. Respondents were required to answer by checking on the appropriate level of the scale provided.

Data collecting process and analysis

A population of sixty (60) teachers of secondary schools was surveyed to investigate their perceptions regarding the use and effectiveness of the television on education.

Questionnaires were hand delivered to teachers in the two schools at the time when one of the researchers was involved in a six week Field Practical Training attachment for Botswana College of Agriculture at the respective schools. The completed questionnaires were returned to the researcher on self-addressed envelopes which were enclosed in the package when handed over to the school administrators. Follow ups were made with six teachers who did not return the completed questionnaire to the school administrator after one week. The return rate was 85% at first week and finally response rate of 100% was achieved as all members of the group returned the completed questionnaire after two weeks. Data was analysed using the Statistical Package for Social Science (SPSS) software version 20 was used. The data was analysed using the descriptive statistics such as percentages, mean, standard deviation and frequencies according to the variables studied. The means and standard deviations were used to describe the perceptions of senior secondary schools' teachers regarding the Botswana educational television (BeTv). Frequencies and percentages were used to describe respondents' demographic characteristics.

Content validity and reliability

Agriculture science teachers at Naledi senior secondary school were used for piloting the instrument so as to estimate the reliability of the items in the questionnaire by computing the Crobach Alpha coefficient value. The coefficient value for the items in the instrument was recorded as .675 and the instrument was assumed to be reliable enough for use in the study. The reliability of the questionnaire explains the degree to which an instrument can be depended upon to secure consistent results whenever the process is repeated (Weiner, 2007; Kimberlin and Winterstein, 2008).

The content validity (Haynes et al., 1995) of the questionnaire was determined by experts of the Agricultural Education unit and the senior technician at Botswana College of Agriculture (BCA). The suggestions made by the experts were considered and some modifications were made on the questionnaire before administering the final survey. Haynes et al. (1995) described content validity as the degree to which elements of an instrument used in a study are pertinent to and representative of the targeted constructs being assessed for a specific purpose.

Limitation of the study

Due to resource limitations, the study used only schools in the proximity of the researchers where the researchers travelled for Field Practical Training (FPT) during winter session of the academic year 2013/14. The human subjects in the study were informed about the importance of the study in education, confidentiality of the information they provided and that should they want to withdraw they were free to do so. The teachers consented to participate in the study.

RESULTS AND DISCUSSION

Table 1 shows the demographic information of the teacher respondents. The teachers were asked to provide their personal characteristics to examine the kind of teachers responding to the survey. The results in Table 1 showed that there were more male teachers surveyed than were women teachers. Approximately fifty percent were in the age range of 31 to 40 years followed by a proportion of one quarter of teachers who were in the age of 21 years to 30 years old and those between 41 years old to 50 years. If plotted on a graph would show a normal distribution of teachers in terms of the age of teachers showing few young and old teachers while majority of the teachers were in the middle of the distribution curve. Three quarter of the teachers were science specialists, majority had taught for a period between 11 and 15 years while the second largest proportion of experience were those in the range of less than 10 years. It can be concluded that the majority of teachers surveyed were not experienced in teaching with 10 to 15 years and were within their tender age as they were mainly between 31 and 40 years old.

Table 2 showed the results of teachers' perceptions regarding the use of television in delivering instruction in education. The results as shown in Table 2 showed the mean and standard deviation for each statement describing the teacher perceptions regarding the use of television in education. The highest means were recorded on statements which stated that "*There should be more TV and radio programs for all subjects*" (Mean = 4.30; Std. Dev = .73 and "*You can study through television only when you are good at both mathematics and science*" Mean = 4.30; Std. Dev = .73. This means that Mathematics and Science teachers' perceived television important in delivering instruction in education, but believe that students who use television should be good in Science and Mathematics. In these results, teachers surveyed, as indicated through the results, tended to align the effectiveness of the use of television in education with Mathematics and Science may be because the two subjects were used. The results in Table 2 also implied that television in education is believed to be popular and effective in education as shown by high statistical means. However, as shown by the standard deviation, it can be deduced from the table that there were variations in terms of how teachers surveyed viewed the relevance of the television as used in schools. This is in line with conflicts raised by Kirkorian et al. (2008) that television tend to have effect on poor

Table 1. Demographic information.

Parameter		Frequency (*f*)	Percentage (%)
Gender	Male	12	20
	Female	48	80
Age of respondents	Between 21 - 30 years old	15	25
	Between 31 - 40 years old	27	45
	Between 41 - 50 years old	15	25
	Between 51 years old and above	3	5
Subject specialisation	Sciences	45	75
	Mathematics	15	25
Teaching experience in years	<10 years in teaching	18	30
	11 - 15 years in teaching	24	40
	16 - 20 years in teaching	9	15
	21 years and above in teaching	9	15
Frequency of watching BeTv	Once in two chances	10	17
	Twice as broadcasted	42	70
	Not sure	8	13

Table 2. Perceptions of senior secondary school teachers' regarding instructional delivery through television.

Statement	Mean	Std. Dev
At school you hear a lot about the Botswana's educational television program	2.50	1.32
I will probably choose a job in television presentation	2.52	1.02
Television program should be popularised to all learners	4.45	.51
There should be more TV and radio programs for all subjects	4.30	.73
Because television influences bad behaviour on children it should be used less frequent for learning	3.45	1.28
Television does not teach a lot of mathematics	3.05	1.05
The BeTv has brought more good things than bad	3.00	1.12
BeTv is complicated	3.10	1.17
To teach through BeTv program you have to take a thorough training course	3.10	1.12
You have to be smart to present a course content	3.35	1.09
You have to be smart to study through television	2.55	1.23
BeTv is only for smart educators	3.63	1.17
To study through BeTv you have to be talented	2.79	1.36
You can study through television only when you are good at both mathematics and science.	4.30	.73

cognitive development skills for toddlers and enhances academic achievement of school going children. Although research has shown some positive impact of television on children, it has also raised concern on development of children who watch Tv for a longer time at an early age. Jusoff and Sahimi (2009) reported that children who spend more time watching television tend to be addicted to television, develop obesity and get affected on language and cognitive development leading to behavior problems, attention disorder and aggression. Kirkorian et al. (2008) felt that perhaps it would be equally good for television producers and parents to take steps in exploiting the positive effects of media such as television in education while on the other hand curtailing the negative effects brought about by the same media.

In Table 2 results show higher means which means respondent teachers perceived television as important in Mathematics and Science. In this regard, teachers surveyed seem to believe that instruction through television was effective as shown by higher means on a five point likert scale. According to Lackner (2000) and Steinberg (2011) there is need to deliver teaching and learning strategies to parents so that they can initiate dialogues with their children around television in order to

Table 3. The value of using television in education as perceived by teachers.

Television in education	Mean	Std. Dev
Is good for the future of the country	4.05	.94
Makes education programs reach out to all	2.95	1.32
Is very important to learners of all types	3.45	1.28
Helps develop cognitive thinking of learners	2.10	.55
Can be a powerful tool for children if used wisely	4.20	.77
Can be a an effective tool for children if used wisely	4.25	.79
Can help young people discover where they fit in the society	3.65	.93
Helps students develop closer relationships with peers and family	3.35	1.09
Teaches students to understand complex social aspects of communication	3.45	.94
Is associated with obesity in children who spend more time watching	3.25	1.12

benefit from the television programs. The authors believe that children who benefit from television programs were those whose parents guide them (Steinberg, 2011).

Teachers were also asked to indicate the value in using television to teach Science and Mathematics in schools. The results as shown in Table 3 showed that the majority of the statements yielded high means on 5 point likert-type scale. The statistical Mean = 4.25; Std. Dev = .79 was high enough to imply positively perceived to be effective in education. This mean means that the majority of the teachers believed that television could be an effective tool for children if used wisely in education. The results were in line with studies conducted by Akhter (2011) on distance education, Chhachhar et al. (2012) and Moeller (1996) on learning from television which demonstrated television effectiveness in dissemination of information particularly to the society. Important also in Table 3 is the fact that respondents agreed that television was important and valuable in education, but when used cautiously. This means that television programs could deliver important curriculum materials, but there is a need to be careful on how, when and what is taught to children. This means some of these materials could have negative results for students. Television on its own is interactive like several other digital technologies, thus giving children the assessment in line with how they learn.

Since teachers surveyed seem to like the adoption of television in education based on a case study, perhaps it would be appropriate to conduct a countrywide study which will involve teachers in remote areas and students who are using the resource to learn so as to get the views of diverse stake holders. In a comprehensive research study involving diverse people it would be appropriate also to ask them to indicate the appropriate roles stakeholders should play when television programs were introduced to expand the school curriculum. That way the nation will commit itself and won the program.

The results in this study showed that teachers surveyed in this study had positive perceptions regarding the use and adoption of television in learning Mathematics and Science. The existing research studies clearly indicated that the use of television and other technologies in education for instructional purposes has grown (Birkenholz, 1991); and it continues to advance. However, as indicated by Roberts and Herrington (2005), if the adoption of television is to take off, there would be need to re-look at research conducted to inform the policy and classroom instructions. The value of television has been emphasised particularly in making the learning active and involving. It would also mean that, parents and other stakeholders in education should be prepared in order to assist learners in the use of television effectively. Television like several other technologies which make learning digital and interactive, should attract many children to get back to learning. In line with the form of learning it would be advisable to think of creating assessment in the same format or style so that learners interact with learning and be assessed online. Children should learn to use online assessment.

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