Factors Influencing the Use of Instructional Materials by Agriculture Teachers among Public and Private Secondary Schools in Botswana

Oladele O. Idowu
North-West University
Mafikeng Campus South Africa

Abstract

This paper examined and compared factors influencing the use of instructional materials (IMs) among agriculture teachers in public and private secondary schools in Gaborone, Botswana. The results show that teachers in public schools were younger and had fewer years of teaching experience, but had higher qualifications than those in private schools. The availability of IMs was higher in private than public schools, but teachers in public schools were more favorably disposed to IMs use than teachers in private school. Significant differences exist between public and private schools teachers for availability of IMs ($t = -2.33$, $p < 0.05$) and attitude towards the use of IMs ($t = 2.91$, $p < 0.05$). Important predictors of the use of IMs are availability of IMs ($t = 3.65$), teaching position ($t = 2.51$), and teaching experience ($t = -2.45$). Educational policy makers and planners should pay proper attention to these variables to improve the use of IMs in schools.

Introduction

Instructional materials are a variety of materials in various formats which influence student's learning and instructor's teaching which have evolved in recent years to include computer and VCR player/recorder technology, textbooks, library books, periodicals, pamphlets, art prints, study prints, pictures, transparencies, films, filmstrips, slides, videocassettes, videodiscs, audio cassettes, sound recordings, compact discs, computer software, CD-ROMS, and electronic resources. Varrella (1989) stated that several available instructional materials will serve their purposes, if effectively accessed and efficiently used. Instructional materials enhance effective and appropriate developmental experience, quality of instruction, instructional methods and techniques (Young, 1999). The use of a variety of instructional techniques helps to make learning more effective by appealing and maximizing the use of senses for learning. LittleJohn and Windeatt (1989) argue that materials have a hidden curriculum that includes attitudes toward knowledge, teaching and learning, relationship of teacher and student and the society. Materials have an underlying instructional philosophy, approach, method, and content, including both linguistic and cultural information. Illustrations are important because many people form impressions based on the visual presentation of ideas. It is important that illustrations avoid portraying characters as stereotypes or caricatures (Bebell et al., 2004).

The effectiveness of instructional materials depends upon the manner and the degree to which they meet the needs of teachers and students. Any evaluation must examine usage, scope of print and non print collections, frequency of removal of biased and outdated materials, and procedures that promote ease of use and accessibility (Bebell et al., 2004).

Instructional materials are selected based on the principles of provision of accurate, well-written materials that will enrich and support the adopted curriculum, taking into consideration varied interests, abilities, and maturity levels of the students served; provision of materials that will stimulate growth in factual knowledge, literary appreciation, aesthetic values, and ethical standards; provide a background of information that will enable students to make intelligent judgments in their daily lives. Others are selection of materials on opposing sides of controversial issues to provide guidance and practice in critical reading and thinking; representativeness of the many religious, ethnic, and cultural groups and their contributions to heritage; and placing principle above personal opinion and reason above prejudice in providing high quality and diverse materials (Young, 1999).

Instructional materials are often depicted as audio-visual aids used by a communicators to facilitate the understanding of learners by involving more of their senses, especially those that relate to hearing and seeing (Kitao and Kitao, 1997; Agbamu, 2006). Audio-visuals make learning relatively permanent, help to arouse and maintain interest of the learner, encourage learners' involvement in the learning process, stimulate self-activity, widen the range of probable experience, and help to add depth and variety to learning (Agbamu, 2006).

The foregoing describes the use and importance of instructional materials in teaching especially, agriculture which is a practical oriented subject. Despite the aforementioned qualities, inherent are several factors that affect the use of instructional materials, which can be classified as teacher, and technology related characteristics. Sahin (2006)

[1]Department of Agricultural Economics and Extension; Email: oladele20002001@yahoo.com

noted that computer expertise, computer access, attitude, support, and faculty characteristics were found as major factors that affect use of instructional computer technologies. Mumtaz, (2000) reported that a number of factors which influence teachers' decisions to use ICT as IMs in the classroom are access to resources, quality of software and hardware, ease of use, incentives to change, support and collegiality in their school, school and national polices, commitment to professional learning and background in formal computer training.

The objective of this study was to determine and compare factors influencing the use of instructional materials among agriculture teachers in public and private secondary schools in Botswana. Specifically, personal characteristics of teachers were identified, availability of instructional materials was ascertained, attitude to instructional materials was determined, significant differences were tested between private and public agriculture teachers and the determinants of instructional materials use were explored.

Materials and Methods

The study was carried out in Gaborone, the capital of Botswana, due to the highest concentration of public and private schools in the country. The target population was all agriculture science teachers in Gaborone. From the list of public schools, 14 were randomly selected and at least five out of an available eight teachers were interviewed per school. For the private schools, five schools were selected and at least two out of five available teachers were interviewed per school. The final sample size was 74 for public schools and 11 for private schools. A structured questionnaire was developed based on literature review and objectives of the study and comprised of personnel characteristics, attitude of teachers towards use of instructional materials, which was anchored on 5-point Likert scale of strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1), which were reversed for negative statements. With respect to availability, teachers were asked to indicate from a list of 16 instructional materials those that are available for use in their schools. The questionnaire was face validated by Lecturers from the Department of Agricultural Economics, Education and Extension in Botswana College of Agriculture and has a reliability coefficient of 0.90. Data were analyzed with Statistical Package for Social Sciences (SPSS) version 16 using frequency counts, percentages, t-test and probit regression analysis.

Results and Discussion

Table 1 shows the personal characteristics of agriculture science teachers for public and private schools. There are 57% and 64% males in public and private schools respectively, which may be attributable to high numbers of male enrollment in agriculture courses as influenced by the perception that agriculture is a male career. The majority (79%) of the public school agriculture teachers were between 25 and 35 years of age while at least 73% of the private school teachers were 35 years old. Closely related to the age categories of the teachers is their marital status, with 77% in the single category in public

Table 1. Distribution of Personal Characteristics of Respondents*

PERSONAL CHARACTERISTICS	PUBLIC SCHOOLS	PRIVATE SHOOLS
Gender		
Male	42 (56.8)	7 (63.6)
Female	32 (43.2)	4 (36.4)
Age (years)		
20-25	5 (6.8)	-
25-30	38 (51.4)	-
30-35	16 (21.6)	-
35-40	13 (17.6)	8 (72.70)
More than 40 years old	2 (2.7)	3 (27.3)
Marital status		
Single	57 (77.0)	-
Married	17 (23.0)	11 (100)
Qualification		
Diploma in Secondary education	18 (24.3)	-
Diploma in Agricultural education	12 (16.20	7 (63.6)
Higher Diploma in Agricultural education	4 (5.40)	-
BSc in Agricultural education	37 (50.0)	3 (27.3)
Others	3 (4.10)	1 (9.10
Position held		
Assistant teacher	18 (24.3)	-
Teacher	33 (44.6)	10 (90.9)
Senior teacher II	13 (17.6)	-
Others	10 (13.5)	1 (9.1)
Teaching experience		
Less than 5 years	38 (51.4)	-
5-10 years	19 (25.70)	9 (81.8)
10-15 years	15 (20.3)	2 (18.2)
More than 15 years	2 (2.80)	-

* Figures in parenthesis are percentages

schools, but all teachers in private schools were married. In the same vein, while 51% of teachers in public schools have less than five years of teaching experience, 81% of teachers in private schools have between five to ten years of teaching experience. This trend may be due to the fact that graduates from colleges and universities were placed on teaching jobs immediately after they have completed their studies. Table 1 further show that 50% have BSc degree in public schools as against 27% in private schools. Teachers in public schools are more qualified than those in private schools although teachers in private schools have longer years of teaching experience. This may be attributed to high wage demand by teachers with high qualification which private schools would avoid in order to increase their profit.

From the list of 16 instructional materials (IM) in Table 2 the most prominent IMs in public school are text books (95.9%), posters (91.9%), live specimens (81.1%), and television (86.5%). This may be linked with the adequate funding and finance support by government to public schools. Conversely, common IMs in private schools are textbooks (100%), flip chart (100%), audio recordings (100%), and agricultural laboratories (90.9%). The availability of these IMs in schools may be because they serve as prerequisites for approval from the Ministry of Education to establish private schools. The trend of IMS availability shows the commonly used IMs in both public and private schools. Notably, a greater percentage of private schools (90.9%) have agricultural laboratories, audio recordings (100%), flip chart (100%) and radio (72.7%) than public schools (66.2%, 24%, 77% and 26%, respectively). The public schools however had higher percentages in terms of 3-D models, over head projectors textbooks, television, live specimens, and posters. Kadzera (2006) reported a low usage of instructional materials among tutors in Teachers Training Colleges in Malawi. This was attributed to lack of training, unavailability of the technologies, and lack of maintenance.

Table 3 shows a list of 15 statements about teachers' attitude toward the use of IMs in public and private schools. The respondents were asked to rate the statements using 5- point Likert scale as follows; 1 (Strongly disagree), 2(Disagree), 3(uncertain), 4(Agree), and 5(Strongly agree). The actual mean is 3 due to the rating scale, and mean greater than 3 denoted that teachers were favorably disposed and mean of less than 3 denoted unfavorable dispositions by teachers. The results in Table 3 revealed that teachers in public schools were favorably disposed to IMs make teaching interesting (4.04), instructional materials increase students' understanding during lesson (3.93). Teachers in private school were favorable towards instructional materials increase students' understanding during lesson (3.36), activate and maintain interest of students (3.18). Table 4 shows that teachers in both public and private schools were unfavorably disposed to towards instructional material are a waste of teaching time (3.98 and 3.81 respectively). This might be due to the ability of the teachers to handle the IMs. Cavas et al. (2009) noted that Turkish science teachers have positive attitudes toward the use of ICT as instructional materials

The results of the t-test analysis showing differences between public and private teachers on availability, knowledge and attitude towards IMs are presented in Table 4. To determine significant differences, the t values for unequal variance were selected due to the difference in sample sizes of teachers in public and private schools. Significant differences exist between public and private schools' teachers for the variables, availability ($t = -2.33$, $p < 0.05$) and attitude towards the use of IMs ($t = 2.91$, $p < 0.05$). For availability of IMs for teaching, private schools have higher mean (24.72) which implies that there are more IMs available for teaching in private schools than public schools (22.63). With respect to attitude towards the use of IMs, teachers in public schools were more favorably disposed (43.04) than private school teachers (39.27). Cavas et al. (2009) reported that Turkish science teachers' attitudes toward the use of ICT as

Table 2. Availability of Instructional Materials in Public and Private Schools*

	PUBLIC SCHOOLS		PRIVATE SCHOOLS	
INSTRUCTIONAL MATERIAL	Available	Not available	Available	Not available
Agricultural laboratories	49 (66.2)	25 (33.8)	10 (90.9)	1 (9.1)
3-D models	40 (54.1)	34 (45.9)	2 (18.2)	9 (81.8)
Over head projectors	34 (45.9)	40 (54.1)	4 (36.4)	7 (63.6)
Text books	71 (95.9)	3 (4.1)	11 (100)	-
Work books	17 (23)	57 (77)	-	11 (100)
Television	64 (86.5)	10 (13.5)	4 (36.4)	7 (63.6)
Audio recordings	24 (32.4)	50 (67.6)	11 (100)	-
Slide projector	27 (36.5)	47 (63.5)	1 (9.1)	10 (90.9)
Slides	27 (36.5)	47 (63.5)	1 (9.1)	10 (90.9)
Microscope	31 (41.9)	43 (58.1)	1 (9.1)	10 (90.9)
Live specimens	60 (81.1)	14 (18.9)	5 (45.5)	6 (54.5)
Flip chart	57 (77)	17 (23)	11 (100)	-
Posters	68 (91.9)	6 (8.1)	5 (45.5)	6 (54.5)
Radio	26 (35.1)	48 (64.9)	8 (72.7)	3 (27.3)
Tapes	24 (32.4)	50 (67.6)	1 (9.1)	10 (90.9)
Chalk/white board	74 (100)	0(0)	11 (100)	-

* Figures in parenthesis are percentages

Table 3. Attitude of Teachers in Public and Private Schools towards Use of Instructional Materials*

Attitudinal statements	Public		Private	
	Mean	SD	Mean	SD
Instructional materials are easy to use	1.59	0.70	1.27	0.46
They make teaching interesting	4.04	0.91	2.90	1.13
Instructional material increase students' understanding during lesson	3.93	1.18	3.36	0.80
Instructional material are a waste of teaching time	3.98	1.01	3.81	0.60
With use of instructional material, the syllabus is not completed	3.72	0.86	3.27	0.46
Cannot use instructional material	2.63	0.76	2.18	0.75
Instructional materials are difficult to prepare	2.02	0.93	1.81	0.40
I have adequate knowledge in using instructional materials	1.54	0.86	1.18	0.40
I need training to use various instructional materials	2.02	0.66	1.27	0.46
Instructional materials activate and maintain interest of students	2.41	1.29	3.18	1.40
Instructional materials are accurate and current	2.54	1.04	2.09	0.30
There is no sufficient time for field trips and visits	2.85	1.08	2.27	0.46
It is difficult to have appointment with Subject matter specialists	3.00	1.20	2.36	0.80
Instructional material is readily available in my school	3.62	1.33	3.63	0.80
Instructional materials does not provide for student participation	1.44	0.50	1.45	0.52

* Figures in parenthesis are percentages

Table 4. T-test Analysis of Showing Differences in Availability, Knowledge and Attitude between Public and Private Schools Use of Instructional Materials

Variables	Groups	N	Mean	Std. Deviation	Std. Error Mean	t	df	p
IMs availability	Public school	74	22.63	2.84	0.33	-2.33	13	.036
	Private school	11	24.72	2.76	0.83			
Knowledge of IMs Use	Public school	74	24.28	1.45	0.16	0.68	14	.507
	Private school	11	24.00	1.26	0.38			
Attitude towards IMs Use	Public school	74	43.04	5.69	0.66	2.91	18	.009
	Private school	11	39.27	3.69	1.11			

Table 5. Probit Regression Analysis of Factors Influencing the Use of Instructional Materials in Public and Private Schools

Parameters	Regression Estimate	Std. Error	t	p
Availability	0.16	0.04	3.65	0.00
Knowledge	0.06	0.03	1.72	0.08
Attitude	0.002	0.01	0.106	0.91
Gender	0.03	0.10	0.28	0.77
Age	-0.19	0.10	-1.77	0.07
Marital status	-0.30	0.16	-1.79	0.07
Qualification	-0.02	0.06	-0.35	0.72
Position	0.12	0.05	2.51	0.01
Teaching experience	-0.19	0.08	-2.45	0.01
Teachers' Groups (public/private)	-1.01	0.27	-3.65	0.00
Intercept	-7.99	1.82	-4.37	0.00
Chi-Square	131.65			
df	73			
p	0.00			

instructional materials do not differ regarding gender, but differs regarding age, ownership at home and experience.

From the results of the Probit model presented in Table 5 the Chi-square value was used to determine the goodness of fit of the model. The value is statistically significant at one percent level. The result also shows that four variables are statistically significant at 5%. These are availability of IMs (t = 3.65), teaching position (t = 2.51), teaching experience (t = -2.45), and groups (t=-3.65). Seemingly, the more the availability of IMs, the higher the teaching position the more the use of IMs in public and private schools by agriculture science teachers. Furthermore, the inverse relationship between teaching experience and teachers' groups suggest that the use of IMs is dependent on the years of teaching experience and whether the teacher belongs to public or private schools. It also indicates that an increase in any of these variables will lead to a decrease in the probability of use of IMs in the schools.

Summary

The paper has clearly shown that agriculture science teachers in public schools are younger with fewer years of teaching experience than private schools but teacher in public schools have higher qualifications than those in private schools. Instructional materials are more available for teaching in private schools than public schools but teachers in public schools are more favorably disposed to the use of instructional materials than teachers in private school. Prominent instructional materials in public schools are text books, posters, live specimens and television, while in private schools are text books, flip chart, audio recordings and agricultural laboratories. Significant differences exist between public and private schools' teachers for availability of instructional materials and attitude towards the use of instructional materials. Important predictors of the use of instructional materials are availability, teaching position, and teaching experience. It is therefore important that educational policy makers pay proper attention to these variables to improve the use of instructional materials in schools. The study recommends that emphasis should be placed on the

use of instructional materials in preparing teachers and provision of in-service training to update skills.

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