

Communicating in the Public Sphere: Attitudes Toward Different Public Instructional Communication Methods

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An effective response to global environmental challenges requires analysis of communication patterns, processes and approaches. In addition, improving communication through emerging information and communication technologies (ICT) also must be explored. Understanding recipients' perception of the innovations used in information diffusion is also necessary. This study, using a sample of 120 subjects, examined attitudes of leaders of community-based natural resources organizations toward two approaches used in public instructional communication in the Okavango Delta, Botswana. The quasi-experimental study also explored the effect of demographic variables on subjects' attitudes. The results demonstrated more favorable attitudes toward the visualized method than the traditional verbal method, suggesting subjects' preference and acceptance for the visualized public instructional communication approaches. Results also indicated a differential effect of age on attitude toward methods of communication. The results of the study highlight the importance for practitioners to use integrated communication approaches in the public sphere. Suggestions for future research are offered.

Keywords: Community Leaders; Attitudes; Instructional Communication; Visualized Communications; Traditional Verbal Communication

The complexities of ever-increasing global environmental problems, coupled with the growing outcry for environmental stewardship, underscore the need for all sectors and citizenry to demonstrate environmental responsibility. To promote responsible environmental behaviors, it is necessary for practitioners and scholars in environmental communication to explore effective environmental communication strategies

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(McManus, 1996; Outram, 2010) and to harness the potential offered by emerging information and communication technologies (ICTs). Environmental problems, being mostly preventive innovations, present an additional communication challenge. They are complex and uncertain, with the benefits of current prevention strategies often occurring in the distant future (Rogers, 2003). The scenario highlights the need to examine communication strategies and processes with a view to understanding how they contribute to the sustainable adoption of environmental conservation innovations.

An effective information flow processes between the sources and recipients can enhance support for policy-making and public involvement in environmental sustainability (Pillmann, 2000; Pleasant, Good, Shanahan, & Cohen, 2002). The flow processes include diverse approaches such as public meetings, mass media, and interpersonal communications, as well as information and communications technologies (Dickinger, Heinzmann, & Murphy, 2005). Emerging ICTs have been heralded as promising communication tools, mainly for their potential to improve information communication in the public sphere (Lundgren & McMakin, 2004; Meitner, Gandy, & Sheppard, 2005; Wilson & McGaughey, 2000; Zimmerman, Akerelrea, Smith, Kapler & O'Keefe, 2006). Specifically, it is suggested that the utility of using computer-aided visuals and animations in natural resources management and the environmental field is ideal for communicating complex science and environmental information as they can effectively visualize and simplify otherwise abstract and complex phenomena for ease of understanding, even to a lay audience.

Although the potential benefits of using new ICTs to enhance communication in the public sphere may be obvious, it is equally important to understand the recipients' attitudes and perceptions toward the communication tools and technologies. Understanding recipients' attitudes will help in the design of strategies and interventions using ICTs that will optimize reception of information disseminated. Literature suggests that individuals' attitudes are critical for perception of innovation, adoption of innovations, and promotion of desired behaviors (Ajzen & Fischhoff, 1980; Rogers, 2003). Others have noted that positive attitudes toward attributes of innovation diffusion tools are significant predictors of the actual diffusion of such innovations (e.g. Sahin & Thompson, 2006). In light of this, the goal of this study was to examine stakeholder attitudes toward public instructional communication methods used in environmental information diffusion in the Okavango Delta, Botswana. It was hypothesized that subjects will have more favorable attitudes toward the visualized public instructional communication method than the traditional verbal one. The study further hypothesized that demographic characteristics such as age, gender, and education will significantly contribute to subjects' attitudes toward the two communication methods. This research is part of a larger study examining relative effects of different communication approaches and prediction of knowledge-sharing behaviors.

Diffusion of Innovations

Diffusion of innovations theory has made significant contributions to the understanding and promotion of behavioral and social change, mainly in the adoption of

innovations (Rogers, 2003; Wejnert, 2002). The diffusion model has found application in diverse disciplines such as political science, public health, communication, history, economics, technology, education, and agriculture (Sahin & Thompson, 2006; Wejnert, 2002). The theory focuses on the process through which innovations, in the form of new ideas, practices, and objects/products, are disseminated to recipients for adoption (Rogers, 2002, 2003). The diffusion model conceptualizes information passage through an innovation-decision process made up of five stages: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation (Rogers, 2002). Rogers (2003) stated that the process entails a progression whereby:

An individual (or other decision making unit) passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation, to making decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. (p. 168)

The process highlights the key role played by affective factors, mainly attitudes during the innovation-decision process. The diffusion theory postulates that attitudes of the adopters towards the innovations determine the rate at which an individual will adopt or reject an innovation and, hence, pass through the innovation-decision-making process. (Haider & Kreps, 2004; Hornik, 2004; Minishi-Majanja & Kiplang'at, 2005; Rogers, 2003)

Attitudes affect behavior through their intervention "between the knowledge and decision functions in the innovation-decision process" (Rogers, 2003, p. 174). ICTs are considered ideal to effectively promote adoption of innovations, mainly for their potential to appeal, attract, and optimize the recipients' attention, thereby promoting information processing and committal to long-term memory (Outram, 2010). In public communication interventions using instructional technology, individuals' attitudes toward communication innovations will affect their responses to messages communicated and consequently inform the decision to adopt or reject. Individuals with favorable attitudes toward a communication innovation or attitude object are likely to be more cognitively engaged, thereby increasing the likelihood of adoption than those who do not. Affective factors, mainly when they are not favorable, have the potential to cloud the cognitive processes to make informed decisions regarding the innovation (Ajzen, 2001; Haider & Kreps, 2004). Individuals with an attitude toward an innovation often demonstrate two common tendencies: selective exposure and selective perception (Ajzen, 2001; Ajzen & Fishbein, 2000; Rogers, 2003). Adopters' attitude toward an innovation is, therefore, of considerable import in the diffusion process.

The concept of attitudes as it relates to an issue, object/product, or act is corroborated by others (e.g. Ajzen, 2001; Ajzen & Fischhoff, 1980; Ajzen & Fishbein, 1973, 2000). Attitude is generally defined as a representation of an individual's predisposition to either respond favorably or unfavorably to an issue, object/product, or act (Ajzen & Fischhoff, 1980; Ajzen & Fishbein, 1977, 1980, 2000; Chaplin, 1975; Fishbein & Raven, 1962). Information diffusion interventions should prioritize understanding of adopters' attitudes toward objects used in information dissemination for optimized effect. The objects could be electronic

media, print media, information communication technologies, or social and cultural communication infrastructures. Information communication technology products include deployment of computers and related software (e.g. PowerPoint) to facilitate instruction and improve quality of learning. Based on diffusion of innovations and theory of attitudes, individuals' perceptions and attitudes of the communication instructional aids and methods can impact information reception and, consequently, behavioral responses (Ajzen, 2001; Rogers, 2003). Accordingly, attitudes, whether positive or negative, affect implementation and evaluation of the innovation (Haider & Kreps, 2004). There are, however, other factors that may affect the rate of adoption of an innovation such as education, openness to change, characteristics of the innovation and diffusion systems, and an individual's innovativeness (Hornik, 2004). For the latter, the diffusion theory postulates five adopter categories within members of a social system based on innovativeness: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards (Rogers, 2003).

The diffusion of innovation theory is not without criticisms and limitations. Apart from the four major criticisms advanced against the diffusion research (see Rogers, 2003, chapter 3), others have critiqued it for its centrifugal, linear, monologue-like, and top-down approach, with the focus on transfer vision of communication (e.g. Bucchi, 2008; Tufte & Mefalopoulos, 2009; Walker, 2007; White, 2009). The theory is deemed non-participatory, and without regard to local knowledge and context. An alternative approach for addressing these limitations is by embracing a participatory communication approach, where stakeholders engage in problem identification and finding solutions through interactive dialog, deliberation, and learning (Walker, 2007). This approach has found application in development interventions. It benefits information diffusion by broadening the boundaries beyond mere information diffusion to more interactive ways of communicating, which combines both elements of monologic and dialogic approaches (Tufte & Mefalopoulos, 2009). While acknowledging these limitations, the current study was guided by the diffusion theory's concept of attitudes in studying attitudes toward the use of different public instructional methods and tools as attitude objects.

Literature Review

New ICTs provide communicators with added advantages of enhancing effectiveness of information diffusion interventions, thereby heightening the potential adoption of innovations (Munyua, Adera, & Jensen, 2009; Outram, 2010). Studies addressing the potential utility of instructional computer technologies and related software, such as PowerPoint, abound in education, though often yielding mixed results (Amare, 2006; Large, 1996; Szabo & Hastings, 2000). A majority of studies in education compared the effectiveness of the traditional lecture method with the visualized PowerPoint and assessed attitudes toward the methods. These studies found that subjects' attitudes, mainly students, were more favorable toward the

PowerPoint instructional method than the traditional lecture type. However, in most cases, the positive effect of PowerPoint was not matched by performance. Another field where the potential of information visualization was examined is health communication, mainly exploring the utility of visuals in promoting responsible medication behaviors (Filippatou & Pumfrey, 1996; Houts, Doak, Doak, & Loscalzo, 2006). A content analysis by Rowley-Jolivet (2004) found that different scientific disciplines used visuals in conference presentations differently, thereby concluding that visual communication is a social-cultural or disciplinary context. The finding underscores the importance of understanding the visual taste and culture of people when using visuals to communicate.

In the general public sphere, initiatives were undertaken to explore the potential role of visualization in communicating complex and abstract concepts, such as models and technically loaded jargon to non-expert publics (e.g. Derrick, Miller, & Andrews, 2008; Kennedy, 1994; Meitner et al., 2005; Siber, 2005). Neto's (2006) study investigated the utility of different presentation methods and visualization techniques in communicating architectural design model proposals among different stakeholders. The study explored participants' preferences for the different design presentation methods used and found that presentations using combined visualized techniques, such as video and animation, were mostly preferred. The potential of television as a visual and information dissemination tool was examined using extension farm audiences and watershed communities (Kroetz & Cole, 1978; Wagenet et al., 2005). The studies found that the programs were more effective in disseminating environmental information, mainly in the light that public meeting attendance was declining. However, the main limitation of these studies is that the sample is often biased to one age, income, and educational group (Wagenet et al., 2005). Academia has also ventured in the use of visual representation, such as in photo-elicitation and visual survey tools studies where interview discussions are stimulated and guided by visual images (Harper, 2002; Singhal & Devi, 2003; Smith, 2010). These techniques, using either photographs or video, are regarded as a form of participatory communication and have been featured in sustainable development projects (Walker, 2007).

In the environmental field, a study by Zimmerman et al. (2006) explored the relative effects of visualized and animated presentations and non-visualized presentations. The study, using a sample of students, urban and rural publics, also examined subjects' attitudes toward different communication media. The findings were similar to studies in educational settings in that they found that while the subjects' attitudes toward visualized presentation techniques were more favorable than the non-visualized, performance, in terms of knowledge assessment outcomes, was not commensurate with attitudes toward the methods. The study concluded that visualized presentations could enhance public understanding of complex ecological information, such as forest dynamics.

Several studies have expressed that the effects of visualized presentations on adult populations are largely unknown, owing to these studies' tendency of relying on a convenient sample of college students (Amare, 2006; Large, 1996; Zimmerman

et al., 2006). They recommended future research to focus on adults outside of formal educational settings. Since visualized communications use computer technology, the focus on adult populations becomes necessary because some studies have suggested that older adults tend to have negative attitudes toward use of new forms of computer-related technology than younger people (Czaja & Sharit, 1998). However, other studies have found that older people tend to adopt technology based on perceived usefulness and value (Brickfield, 1984; Czaja, Guerrier, Nair, & Landauer, 1993). It can be assumed that adults will have positive attitudes to new information and communication technology when they perceive it as a useful instructional communication tool, as well as having favorable attitudes toward the tool.

Considering that computer-aided instruction and communication, such as PowerPoint presentations, are often coupled with visuals, others have asserted that adults "have less need of visuals" (Large, 1996, p. 15) than students. Amare (2006) stated that people get saturated with PowerPoint as they grow older. However, Zimmerman et al. (2006) specifically argued that the complexity of natural resource management information demands that innovative public instructional approaches (such as visualized and animated computer technology) are investigated, as they may aid comprehension of complex and abstract environmental concepts and information by adults in the public sphere. Visualized communication is considered ideal to promote adoption of innovations in the public sphere, as it has the appeal to attract recipients' attention, thereby promoting information processing. However, concomitant to utilizing the new ICTs, it is necessary to understand recipients' attitudes toward the communication technologies. Literature suggests that recipients' attitudes toward information technology objects may impact the speed of innovation adoption.

The current study focused primarily on examining stakeholder attitudes toward communication methods in Botswana, with the view that recipients' attitudes toward methods used in communication may play a critical role in reception and adoption of environmental innovations. The visualization studies conducted to date were carried out in developed country contexts, with very few focusing on adults in developing countries. This study is an attempt to bridge this gap by conducting the study in a developing country, thereby providing a different setting and cultural context. Apart from extending scholarly research to a developing world context, the study was carried out in Botswana as part of the overall applied and active research on environmental communication and education undertaken by the University of Botswana's Okavango Research Institute (ORI). The quest to focus research on this field came when ORI identified stakeholders' need to be informed about scientific environmental research findings, as well as the center's need and social responsibility to communicate environmental research to the public, mainly stakeholders within the region. The study targeted the region as a way of understanding and identifying environmental communication practices and approaches most suitable for the region, and stakeholders' responses to emerging ICT innovations.

Methodology

Sampling and Design

The study was conducted in Ngamiland district, northwestern Botswana (Figure 1), using a cluster sample of 13 villages engaged in community-based natural resources management program (CBNRM). The 13 villages were randomly sampled from a list of CBNRM community-based organizations registered in the Ngamiland CBNRM Forum. A sample of 120 CBNRM leaders from the respective sampled villages took part in the quasi-experimental study.

The research design assumed a counter-balanced design whereby the administration of the experimental treatments was reversed across the different groups. The CBNRM leaders were selected because they are frequently used by environmental agencies as agents of environmental conservation information.

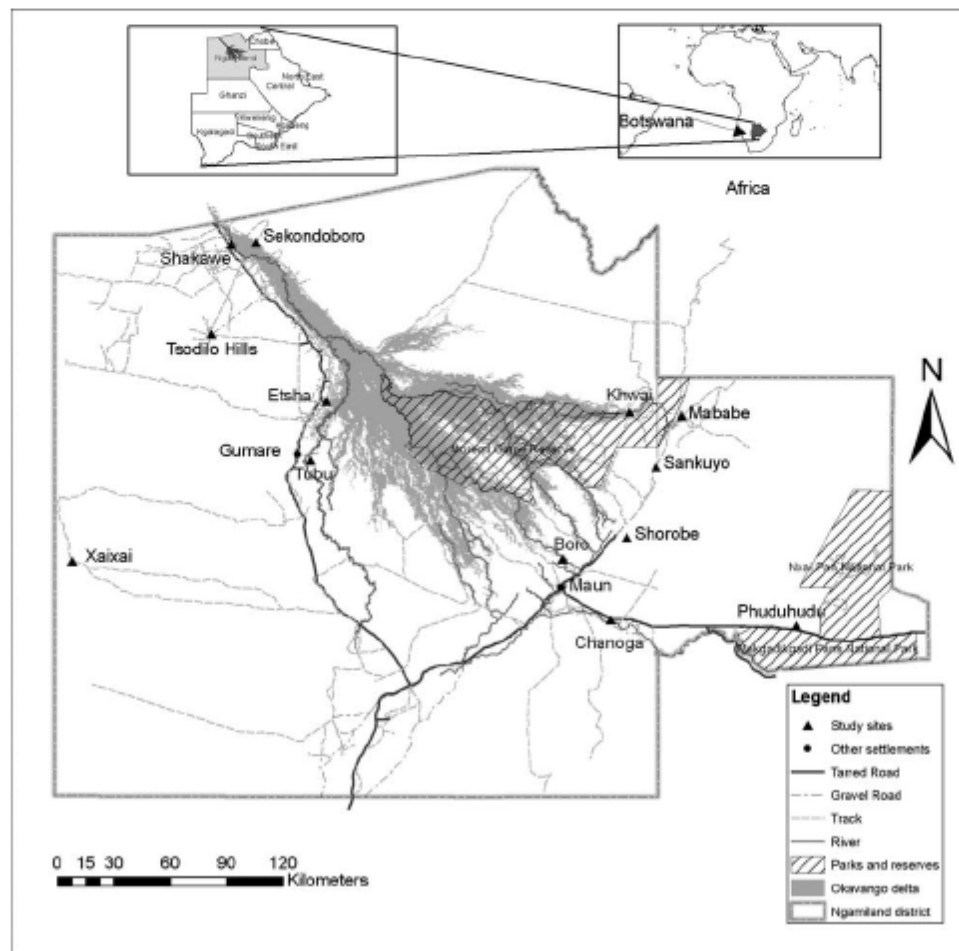


Figure 1. Map of study area.

The CBNRM leaders are formal opinion leaders within their respective communities because they have been elected following democratic principles (Valente & Davis, 1999). Their roles in innovation diffusion are similar to other opinion leaders noted elsewhere, such as providing information to members of their social system, serving as communication intermediaries of environmental agencies, and playing a “bridging” role between the agencies and their communities (Zhang & Dong, 2008). Use of opinion leaders is notable in that it facilitates broad-based coverage, and has the potential of enhancing rapid and sustained diffusion. The targeting of the current study to the CBNRM leaders made the sample a convenience sample.

Procedure

Workshops were organized together with participating community trustees. During the half-day workshops, subjects were exposed to two experimental treatments: a visualized and a traditional verbal communication method. For the purpose of the study, a visualized communication method consisted of a PowerPoint presentation developed using photographic pictures related to the subject of interest. The visuals had additional bulleted text, and a formal presentation was given orally. The traditional communication method was a common and formal public communication method where information was presented orally without using visual aids. This is the normal way of communicating with this audience in this region.

The visualized presentation addressed the subject of waste management in the Okavango Delta, with all photographs in the presentation taken within the Okavango Delta area for contextual relevance. The traditional verbal presentation addressed fire management, with fire issues discussed also relevant to the Okavango Delta and immediate environs. The presentations were standardized, with each presentation taking approximately 45 minutes. The presentations were developed in collaboration with a panel of experts to ascertain equivalence in regard to concepts, complexity, and length. After exposure to the two experimental treatments, subjects completed a semantic differential scale questionnaire.

Instrumentation

The questionnaire assessed subjects’ attitudes toward the two communication approaches: traditional verbal and visualized methods. In constructing the scale, several suggestions made in the literature were considered, such as the relevance of adjectives to the subjects, the number of adjectives, the layout of the questionnaire, and the number of response option points (Al-Hindawe, 1996; Alreck & Settle, 2004; Ary, Jacobs, Razavier, & Sorensen, 2006; Clark & Watson, 1995). The scale captured both experiential and instrument components of the subjects’ attitudes (Ajzen, 2006). For the purpose of the study, an individual’s attitude toward a method of communication was defined as the degree to which an individual had a favorable or unfavorable experiential and evaluative feeling toward a method and was

measured using a five-point semantic differential scale. Subjects were required to respond to five-item bipolar adjectives preceded by a statement "I feel traditional verbal method is... 'good...bad,' 'boring...exciting,' 'effective...ineffective,' 'unattractive...attractive,' and 'valuable...worthless.'" The same layout was followed for the visualized method and the scales were placed side-by-side to facilitate comparisons. All positive end points were later coded 5, while negative endpoints were coded 1. The polarity of items was randomized to counteract response bias (Al-Hindawe, 1996; Ary et al., 2006), and subjects were asked to respond by placing a mark in the response option that best reflected their position.

Prior to the study's implementation, a panel of experts comprised of university faculty reviewed the instrument for face and content validity. Moreover, a pilot study involving a similar group of subjects was conducted to test the stimulus and to pretest the instrument. Using data from the pilot sample, the reliability coefficients of the two parts of the instrument were computed. The scales' reliabilities had Cronbach alpha coefficients of 0.84 for the traditional verbal method and 0.89 for the visualized method. Based on the conventional benchmark minimum of 0.70 and the maximum of 0.90 often noted in the literature (De Vellis, 2003; Nunnally, 1978; Streiner, 2003), the attitude scale was considered acceptable for use as an instrument to measure the subjects' attitudes.

Data Analysis

Data was analyzed using one-way repeated measure ANCOVA. Covariates were education and familiarity with ORI. A one-way mixed between-within repeated measures ANCOVA was conducted to examine the effect of method and demographic variables on attitude ratings, controlling for education and familiarity with ORI. The three basic assumptions for repeated measures analysis were examined: (1) independence of observations, (2) multivariate normality, and (3) sphericity (Stevens, 2002, 2009; Tabachnick & Fidell, 2001). Independence of observations was ensued as subjects' responses were independent of one another. The assumption of sphericity was not relevant for the analysis because (1) there were only two levels of the treatment, and (2) multivariate analysis, a route assumed during data analysis, rendered it unimportant (Stevens, 2009; Tabachnick & Fidell, 2001). For multivariate normality, the inspection of frequency distributions of groups' mean scores indicated a reasonably normal distribution, showing that the assumption was tenable. Other assumptions related to the ANCOVA designs were also assessed and found tenable, such as reliability of covariates, linearity, multicollinearity, and homogeneity of regression hyperplanes.

Although computations for descriptive statistics for demographic variables were based on 120 subjects, the multivariate inferential statistics computations used 117 subjects. Data for three subjects was incomplete because the subjects did not attend the entire presentation.

Results

Socio-Demographic Characteristics

One hundred and twenty subjects from 13 community-based organizations' Board of Trustees from the Ngamiland district of Botswana participated in the study. The subjects were predominantly male (about 72%, $n = 86$). The age range of the subjects was 20–72 years ($M = 35.95$, $SD = 13.02$). The majority of the sample (60%, $n = 72$) had completed secondary education or done tertiary studies (a minimum of 10 years of formal education), thereby making the sample moderately educated when compared to the general public. Those with primary education (maximum seven years of basic education) or no formal education were 28.3% and 11.7%, respectively. Forty-three percent ($n = 52$) of the subjects held executive Board positions (chairperson, secretary, treasurer, and deputies), with 18% ($n = 21$) being ex-officio members in the form of community advisors and key trusts employees. The rest of the subjects were additional Board members. Only two women held the top two portfolio offices, one a chairperson and the other a vice chairperson. The subjects' sources of environmental knowledge, mainly related to wildfires and waste management, included schools, environmental agencies, experts, and oral tradition. Approximately 40% (41.7%; $n = 50$) had attended a wildfire management workshop in the past, and 45.8% ($n = 55$) had attended a workshop dealing with waste management.

The subjects were asked to rate their familiarity and level of interaction with the ORI staff on a scale of "not at all familiar" (coded 1) to "very familiar" (coded 5). The mean familiarity with the ORI staff was 2.32 ($SD = 1.34$, $n = 120$), indicating that on average, the subjects were slightly familiar with the ORI staff. Subjects were asked whether they had ever attended an environmental conservation workshop on wildfires or waste management. The majority of subjects indicated that they had not attended a workshop dealing with the two topics; 58.3% ($n = 70$) had not attended a wildfire workshop, and 54.2% ($n = 65$) had not attended a waste management workshop.

Attitudes Toward Communication Methods

The subjects' attitudes toward the two communication methods were evaluated using one-way repeated measures ANCOVA. It was hypothesized that subjects would have more favorable attitudes toward the visualized public instructional communication method than the traditional verbal method. The mean attitude ratings scores were higher for the visualized method ($M = 4.68$, $SD = .59$, $n = 117$) than for the traditional method ($M = 3.81$, $SD = 1.00$, $n = 117$). Statistical significance tests revealed a significant difference in the groups' mean attitudes rating scores between the visualized and traditional verbal group, $F(1,114) = 4.75$, $p = 0.03$, Wilks's lambda = 0.96, with a large effect size ($\eta^2 = 0.40$). This indicated that subjects' attitude ratings of the two public instructional communication methods differed significantly, with one method rated higher than the other. The mean group attitude

scores revealed that subjects rated the visualized presentation significantly higher ($M = 4.68$, $SD = 0.59$) than the traditional verbal presentation method ($M = 3.81$, $SD = 1.00$). This suggested that visualized presentations were more favored or preferred over the traditional verbal communication methods. However, considering that the response codes ranged from 1 to 5, the mean attitude rating score for the traditional verbal method is still positive, though it is less than the mean score for the visualized method. The significant finding meant that the research hypothesis that subjects will have more favorable attitudes toward the visualized communication method than the traditional verbal method was supported.

Effect of method by age on attitudes. A one-way mixed between-within repeated measures ANCOVA was conducted to examine the effect of method and age group on attitude ratings, controlling for education and familiarity with ORI. Method was the repeated measures factor, while age group (derived by collapsing the recorded age variable into four groups/quartiles) was the between factor. Means and standard deviations comparing subjects' age groups are shown in Table 1. The mean values show that all of the age groups generally gave higher ratings for visualized method than the traditional verbal method. The oldest age group mean rating scores were highest for both the traditional verbal and visualized method.

When the groups were tested for statistical differences, the analysis revealed a statistically significant difference between the overall attitude group means scores by age group, $F(1, 110) = 4.15$, $p = 0.04$, Wilks's lambda = 0.96, with a small effect size ($\eta^2 = 0.04$). This suggested that the at least one of the four age groups (Group 1: 20–26 years; Group 2: 27–31; Group 3: 32–39 years; Group 4: 40–72) was different in mean rating scores for attitudes based on method, i.e. at least one age group showed higher preference for one method compared to the others.

Least significant difference post hoc pairwise comparisons (Table 2) revealed significant differences effects between age groups 20–26 years and 27–31 years ($p = 0.03$). There were two significant differences between the oldest group (40–72 years), one with the 27–31 years age group ($p = 0.001$); and the other with the age group 32–39 years ($p = 0.04$). The only age group that was not significantly different from the oldest age group (40–72) was the youngest age group: 20–26 years ($p = 0.10$).

Table 1 Mean scores for attitudes toward communication methods across age groups.

Age group ^a	<i>n</i>	Traditional verbal		Visualized	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
20–26	29	3.91	0.98	4.68	0.69
27–31	27	3.29	1.14	4.69	0.63
32–39	27	3.97	0.91	4.50	0.62
40–72	32	3.99	0.86	4.83	0.35
Total	117	3.81	1.00	4.68	0.59

^aRecorded variable dividing age into four equal groups.

Table 2 Least significance square pairwise comparisons mean attitude differences among age groups.

Age group ^a	Age groups	MD	SE	<i>p</i>	95% CI	
					LL	UL
20–26	27–31	0.34*	0.15	0.03	0.04	0.63
	32–39	0.04	0.15	0.80	–0.26	0.33
	40–72	–0.29	0.18	0.10	–0.65	0.06
27–31	20–26	–0.34*	0.15	0.03	–0.63	–0.04
	32–39	–0.30	0.15	0.05	–0.60	0.00
	40–72	–0.63*	0.19	0.00	–1.00	–0.26
32–39	20–26	–0.04	0.15	0.80	–0.33	0.26
	27–31	0.30	0.15	0.05	0.00	0.60
	40–72	–0.33*	0.16	0.04	–0.66	–0.01
40–72	20–26	0.29	0.18	0.10	–0.06	0.65
	27–31	0.63*	0.19	0.00	0.26	1.00
	31–39	0.33*	0.16	0.04	0.01	0.66

^aRecorded variable dividing age into four equal groups.

**p* < 0.05.

Note: *N* = 117; MD = mean difference; CI = confidence interval; LL = lower limit; UL = upper limit.

Inspection of the estimated means (Table 3) showed that for the significantly different age groups, the average attitude ratings decreased from the oldest age group to the second youngest age group. On average, the older group tended to rate attitude toward a communication method more favorably compared to the two immediate age groups below them. The lack of significance difference between the oldest age group and the youngest age group pairwise comparison indicated that both the two age groups' attitude ratings toward communication methods were basically the same. The ratings only differed between the oldest age group and all others except the youngest. The significant difference between the youngest age group and the one immediately following indicated that the youngest group ratings were more favorable than the next immediate ones.

Further re-examination of the separate group mean ratings (Table 1) for the two communication methods revealed that the two age groups' (20–26 years and 40–72

Table 3 Estimated means for least significant difference post hoc contrast for attitude.

Age group ^a	<i>M</i>	SE	95% CI	
			LL	UL
20–26	4.25	0.11	4.03	4.46
27–31	3.91	0.11	3.68	4.14
31–39	4.21	0.10	4.01	4.41
40–72	4.54	0.12	4.30	4.78

^aRecorded variable dividing age into four equal groups.

Note: CI = confidence interval; LL = lower limit; UL = upper limit.

years) mean attitude ratings were generally highest for the two treatments. For the youngest age group and its next immediate age group, separate group means indicated that the youngest age group mean attitude ratings toward traditional verbal communication method were higher, ($M = 3.91$, $SD = 0.98$) than the age group 27–31 years ($M = 3.29$, $SD = 1.15$).

Effect of method by gender on attitudes. The mixed between-within subjects repeated measures ANCOVA was conducted to evaluate the effect of method of communication (traditional verbal & visualized) on subjects' attitude measures, across gender (male and female). As Table 4 illustrates, subjects' overall attitudes toward the two methods were positive, with mean scores of 3.81 ($SD = 1.00$) and 4.68 ($SD = .59$) for traditional verbal and visualized respectively. The mean attitude rating scores for the two communication methods across gender generally show almost equal mean attitude rating scores across gender for the traditional verbal method. For the visualized method, males tended to rate the method a bit higher than females. However, both gender groups tended to rate the visualized communication method higher than the traditional verbal method.

Further evaluation of the group means revealed no significant interaction between attitude object and gender, $F(1, 114) = 0.80$, $p = 0.37$, Wilks's lambda = 0.99, with a small effect size ($\eta^2 = 0.01$). This indicated that gender had no differential effects on subjects' attitudes toward a communication method. There was a substantial main effect of type of communication method on attitude ratings, $F(1, 114) = 25.42$, $p = 0.00$, Wilks's lambda = 0.82, $\eta^2 = 0.18$. The highly significant difference suggests a change in attitude ratings across the two communication methods. The highly significant finding with a large effect size confirms the significant main effect of the type of communication method on attitude rating scores. For the group factors main effects, there was no significant effect of gender, $F(1, 114) = 0.18$, $p = 0.67$, with a very small effect size ($\eta^2 = 0.002$), indicating that attitude ratings for male and female subjects were in general the same. The result is supported by the descriptive statistics and the effect size. It is concluded that gender did not have an effect on subjects' attitude rating scores toward communication methods.

Effect of method by education on attitudes. Education was collapsed into three categories: "none," representing subjects with no formal education; "primary" for subjects who have gone through the first seven years of formal education; and

Table 4 Mean attitude ratings for males and females for the two communication methods.

Gender	<i>n</i>	Traditional verbal		Visualized	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Male	85	3.80	1.05	4.72	0.51
Female	32	3.81	0.88	4.56	0.74
Total	117	3.81	1.00	4.68	0.59

Table 5 Mean attitude scores for different educational groups for the two communication methods.

Education	<i>n</i>	Traditional verbal		Visualized	
		<i>M</i>	SD	<i>M</i>	SD
None	14	3.86	0.96	4.74	0.31
Primary	33	3.82	1.05	4.56	0.62
Secondary	70	3.79	1.00	4.72	0.61
Total	117	3.81	1.00	4.68	0.59

“secondary” signifying subjects who have gone beyond eight years of formal education. Statistical analysis revealed that mean attitude rating scores across the three education groups were generally higher for the visualized than the traditional verbal, suggesting that subjects in each educational group tended to rate a visualized communication method higher than the traditional verbal one. From Table 5, subjects with no formal education tended to rate either method highest, followed by those with secondary education, and then those with primary education.

The groups’ mean attitude rating scores were evaluated for significant difference using mixed between-within repeated measures ANCOVA. The interaction effect was not significant, $F(2, 113) = 0.16$, $p = 0.85$, Wilks’ lambda = 1.00, $\eta^2 = 0.003$, indicating that education had no differential effects on subjects’ ratings based on method. However, there was a highly significant main effect of the type of communication method on attitude ratings, $F(1, 113) = 22.16$, $p = 0.00$, Wilks’ lambda = 0.84, $\eta^2 = 0.16$. The highly significant difference suggests that the mean attitude rating scores for the two methods were different. Based on the descriptive statistics (Table 5), subjects’ mean attitude rating scores were higher for visualized communication method than the traditional method. Again, the result confirms the significant main effect of the type of communication method on attitude rating scores.

The main effect of education was also not significant, $F(2, 113) = 0.52$, $p = 0.60$, $\eta^2 = 0.01$, suggesting that the mean attitude scores for the three educational groups were not significantly different, and hence no effect of education on attitude ratings. It can be concluded that education had no effect on subjects’ attitude rating toward a method.

Discussion

The purpose of this study was to investigate the attitudes of CBNRM leaders’ attitudes toward two public instructional communication methods and examine whether the attitudes vary as a function of age, gender, or education. The main hypothesis that subjects will have more favorable attitudes toward the visualized public instructional communication method than the traditional verbal methods was supported. The highly significant difference between visualized and traditional verbal public communication method signified more favorable attitudes or preference for

the visualized method. The results are consistent with several study findings from student and adult samples (Amare, 2006; Harknett & Cobane, 1997; Szabo & Hastings, 2000; Zimmerman et al., 2006). These studies generally found that while people preferred or demonstrated more favorable attitudes toward visualized presentations than non-visualized, there were no accompanying and commensurate outcomes in terms of performance, grades, or scores. The results of a larger study examining the impacts of the two communication methods on subjects' knowledge also found that preference for a method did not match subjects' perceived knowledge gains (see Thakadu, 2010).

The finding showing more favorableness for the visualized public instructional communication method than the traditional verbal method points to the potential benefits of using a combined or integrated presentation method when communicating environmental issues to CBNRM leaders. Research has suggested that use of visuals may still benefit recall and attention (Amare, 2006; King & Rockwell, 1988; Szabo & Hastings, 2000). It is against this backdrop that it is deemed advisable to use an integrated public instructional communication approach that combines both the traditional and culturally familiar verbal method and the emerging visualized techniques.

The study found a differential effect of age on attitude mean rating scores. Results indicated that the oldest and the youngest age groups' overall attitudes ratings toward a communication method were higher, compared to other groups, indicating that the young and old adults tend to rate attitudes toward the two methods higher than other age groups. The results, as they relate to older adults, support the findings of Brickfield (1984) and Czaja et al. (1993), who found that older adults have positive attitudes to computer-aided communications. As these investigators indicated, positive attitudes, mainly among older adults, are enhanced when they realize and recognize the usefulness and benefits of computerized communications. Although there are similarities between this study and the two studies indicated, they each had a different focus. This study's focus was on the use of computer technology in public instructional communication, while the other studies focused on Internet and email communications. However, the diffusion of innovations theory also asserts that recognition of benefits of using an innovation by an individual may accelerate the passage along the innovation-decision process, ultimately culminating in confirmation (Rogers, 2003).

The finding points to the potential generational effects on attitudes toward communication methods that may have implications for practice. The youngest age group may be getting acculturated to both visualized communication and the traditional verbal method, while the oldest group may be relying on the experience and utility of the traditional verbal method, but at the same time recognizing the visualized method as an innovation worth adopting. The youngest age group, considering that they are also educated, may be more accustomed to visualized communication approaches at school, thereby harbouring more favorable attitudes toward it, and are thus more likely to rate the visualized communication method more highly. The oldest age group may perceive it as an innovation and rate it highly, compared to the traditional verbal method. Although the older adults may have had

little exposure and experience in receiving environmental messages in the public sphere through information and communication technology tools such as computers, the finding suggests that continued use of communication technologies will contribute to attaining the confirmation stage along the innovation-decision process.

The study's results further support the recommendation for the use of integrated communication approaches in the public sphere. Since audience segmentation based on age may be impractical in community settings, a combined verbal and visual method will help address the needs and communication preferences of the different age groups. Again, continued use of visualized communications may help further the acculturation process among the younger generation. This is necessary because the natural resources/environmental issues communicated to the stakeholders in local community settings are becoming more complex and abstract; hence, the use of visuals may greatly aid appeal for such issues (Zimmerman et al., 2006). Moreover, use of combined communication methods will prepare and acclimatize the younger generation of leaders to visualized communication and may significantly benefit from any future communication of environmental information using visualized techniques.

The results did not show any gender or education differences on attitudes. The non-significant effect of the two demographic variables on attitudes suggested no gender or education effects for overall attitudes toward the public instructional communication method. Although innovation literature (e.g. Hornik, 2004; Rogers, 2003) indicated that these variables could have an effect on attitudes, their non-significant effect in this study is not surprising. One possible explanation for this finding may be that potential effects of these variables were overshadowed because the majority of subjects ($n = 72$) had gone through secondary education, followed by primary ($n = 34$) and non-formal education ($n = 14$) categories, respectively. The secondary education category represents young subjects who may have already been acculturated to computer visualized instructions at school and exposed to the traditional verbal instructions as part of their roles as community leaders. Although the oldest adults were in the minority, they fall in the non-formal education group, with 13 of the 14 subjects in the non-formal education group in the oldest age group (40–72 years). Results have already demonstrated that the oldest age group tended to rate both methods highest, compared to other groups. The effect of the educated and the young, and the old and less educated, could be a factor in the non-significance effect education. The same applies to gender, as cross tabulations revealed that the majority of male or female subjects fell in the highest education group category, $n = 51$ and $n = 21$ respectively, which also is the youngest age group that rated either methods highly. Age, as demonstrated by the significant difference tests, was the critical factor in the study.

Conclusions

Community leaders in this study had more favorable attitudes toward the visualized public instructional method than the traditional verbal method, suggesting

preference and acceptance for the visualized public instructional communication approaches to the traditional verbal communication. The study also found differential effects of age on attitudes toward methods of communication, with the youngest and the oldest age groups rating their attitudes toward methods more favorably than other age groups. The results did not show any gender - or education-related effects, suggesting that the two variables did not have any effect on subjects' attitude toward the public instructional communication approaches.

Based on these results, the following conclusions can be drawn: (1) subjects had favorable attitudes toward the two communications approaches. However, they showed more favorable attitudes toward visualized communication method than the traditional verbal method, and (2) age had an important effect on attitudes. The results also demonstrated that subjects formed favorable attitudes to the new innovation-visualized communication approach and maintained favorable attitudes toward the traditional verbal method, though less favorable when compared to the visualized.

However, the present results must be interpreted in light of the study limitations. First, self-reported scale measures were used, thereby presenting a potential for social desirability bias among the subjects. However, the study attempted to minimize the limitation by including reversed items and emphasizing the need for objectivity from the subjects, with a view that their objective responses would help develop future workshops with improved communication practices for their own benefit. Secondly, generalization of the findings must be considered with the understanding that a convenience sample of CBNRM leaders from one district, representing one stakeholder only, was used. This limits the generalizability of the study findings beyond similar boards outside the district and other stakeholder groups. The results are also not generalizable to the general public served by these opinion leaders because opinion leaders such as these CBNRM board members are not representative of the general public in terms of key demographic and psychographics, such as education. For example, the current sample consisted of the majority of the subjects having completed a minimum of 10 years of basic education, which does not mirror the general populace's educational attainment. It is recommended that future research studies use probability sampling techniques and be extended to the general public.

The findings do, however, present a number of practical implications that direct future research and provide guidance to practitioners in environmental communication and education. Based on the findings, it is recommended that practitioners use an integrated public instructional communication strategy that uses both visual and verbal communication methods. The current practice in Botswana is that public meetings use verbal approaches only, though in other forums, such as workshops, visualized PowerPoint presentations are common. The complexities of environmental information and the abstractness of some of the environmental issues and concepts (e.g. climate change models) demand that innovation agencies use visualized communications to enhance communication agents' understanding of abstract concepts. This may improve their readiness to diffuse the acquired knowledge,

thereby optimizing their effectiveness. This is necessary as continued introduction and exposure of the subjects to the two forms of communication approaches will help in the maintenance and development of favorable attitudes to the two forms of communication. It will also contribute to the acculturation process within a seemingly non-visual culture.

Again, the need to use integrated public instructional communication approaches, using the traditional verbal method and the new visualized approaches becomes necessary because it is difficult in the public sphere to segment audiences' based on one preferred communication approach, because the public sphere attracts a mix of audiences with varied preferences. The mixed communication approaches may cater to diverse audience preferences. It is further recommended that practitioners should explore the potential of participatory communication, by putting the stakeholders at the forefront of identifying their local environmental problems, and initiating local solutions informed by local knowledge. The approach is regarded as a better alternative to the conventional monologic communication approach often assumed by most communication interventions.

The study also demonstrated the need for information diffusion agencies to understand recipients' attitudes about the communication methods they intend to use to disseminate information. Knowledge of information recipients' attitudes toward communication methods will better guide the source agencies on appropriate approaches and interventions to employ based on target recipients' preferences. Communicators could take advantage of recipients' favorable attitudes and the corresponding method to effectively advance their message, easing and accelerating adoption of innovations.

The study also highlighted the importance of undertaking similar studies in different cultures at different time points, emphasizing the dynamic nature of human cultures and developing world contexts. The changing cultural, demographic, and psychographic environment in developing countries, such as Botswana, demonstrates the importance of undertaking continuous studies to assess the effect of the changes in human behavior. The study shows the importance for researchers and practitioners to continue to explore the potential offered by different emerging communication methods and approaches, mainly visualized and animated, in order to improve the practice of information diffusion. In so doing, it is critical to assess the attitude of subjects toward the innovative communication technologies and approaches, as theory has pointed to the vital role played by attitudes toward adoption of innovations.

Future research should focus on extending the study to the general public, using mixed methods, and examining the influence of the source or presenter on the recipients' attitudes. Understanding the attitudes of target communication agents, such as opinion leaders, is important because research can inform practitioners on socially accepted tools that can be used to enhance comprehension of issues, as well as optimizing opinion leaders' effectiveness. These will contribute to furthering the rate at which preventive innovations are diffused within a social system.

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