

Perceived Effectiveness of Disruptive Technologies in Enhancing the Dissemination of Oral Health Information among the Undergraduate Students of a Selected University in Southwestern Nigeria

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Abstract

The study investigated the effectiveness of the innovative technologies in the dissemination of Oral Health information among the undergraduates of Obafemi Awolowo University, Ile-ife, Nigeria. The population is made of all registered students of Obafemi Awolowo University (OAU) Ile-Ife, Osun State, Nigeria. Two hundred and twelve sample selected through stratified sampling technique formed the sample used for the study. The sample was also randomized into 85 females and 127 males. One research instrument used to collect data for the study was a checklist questionnaire design on five points Likert Scale measuring; different types of disruptive technology students are exposed to, perceived usefulness of such oral health information received and oral health risk awareness. The instrument was validated using content validity and the opinion of experts in Dentistry, Tests and Measurement and Educational Technology. The reliability was measured using Cronbach Alpha method. A reliability coefficient of 0.87 was obtained. The data collected was analyzed using SPSS version 16.0. The results showed that the sample exhibited low oral health information with respect to tooth decay and gum diseases (23%). It was also revealed that no gender variation occurred in the degree or nature of oral health information received by the students from the different Faculties. However, of the disruptive technologies Television shows seem to have the highest patronage of 49%. This was closely followed by individual information received from medical doctors (44%), dentists (24%) and health talks (22%). In addition it was revealed that the students rated oral health risks awareness high (74%). In conclusion, it can be said that oral health information was slightly low. While oral health risks awareness was above average and majorly through the disruptive technologies (52%).

Keywords: Dentistry, Oral Health, periodontal diseases, socio-drama, oral cancer, NAFDAC, oral health risk awareness and disruptive technologies

1. Introduction

Background to the study

According to Rohde (1986) information whether in terms of physical object, such as books, journals, or the electronic channels are important for national development. Mchombu (2001) also points out the importance of information for societal survival. Man is exposed to different innovative methods of sourcing for information. The most recent one is the disruptive technology. The term "**disruptive technology**" sometimes has been used interchangeably to mean "disruptive innovation". It is a process that creates a new market and value network and eventually goes on to disrupt an existing market and value network (over a few years or decades) displacing an earlier technology. The term is used in business and technology literature to describe innovations that improve a product or service in a way that the market does not expect, typically first for a different set of consumers in the new market and later by lowering the price in the existing market. Christensen (2000) and Danneels (2004) identify different kinds of disruptive innovations, they include multi-media of different sorts like cloud computing, digital television, you-tube, social media and high cost DVDs and CDs that have revolutionized the information industries. The impact of these disruptive technologies on the overall development of the society can not be over emphasized. They have impacted all areas of human endeavour. In the area of health, we have seen how Internet and the new social media have disrupted the old traditional ways of information

sharing. In addition, it is also glaring to see how downloadable digital media displaced CDs and DVDs as channels for information dissemination. It is also glaring how cloud computing displaces other forms of local physical media to store digital data in general. The impact of the new disruptive technologies on information dissemination today is therefore very significant. It is therefore of paramount importance in health education

Disruptive Technology and Information Sharing.

Kinaki (1989) opines that information is “potentially useful in decision making, question answering and problem solving.” According to this school of thought, accessing and putting information to use can help to improve people’s lives at physical, economic, psychological and social level. In addition Kaniki 2001 says that the first step to every health choice is information. It is therefore the believe that improvement in the individual health depends on his ability to take responsibility for his health as an important component of his daily live. This active participation requires full and continuing access to health information. An opportunity that have been made possible through the disruptive technologies

Problems with Health Information in Nigeria

Gann(1986) defines Health information as information about our bodies, their working conditions illness, the available services inform of treatment and care, support and co-operation . According to Gann, it includes those facts, materials or news communicated to people, which help them to attain good health, mentally, socially and complete physical development .Presently, Mabawonku (1988) is of the view that dentistry and oral health issues in Nigeria are not receiving priority attention. Punch Daily News (2011) also indicates an upsurge in the reported case of dental caries and periodontal diseases. Also to support the above claim Olusile (2010) also supports the assertion that there is generally low awareness and inadequate access to oral health care among the students in Nigeria. This school of thought is of the opinion that when there is low oral health awareness, it will directly affect the health seeking behaviour of the individual and population. It therefore not an exaggeration to conclude that in Nigeria not many of the people are well informed about steps to take both in preventing as well as in the treatment of these diseases. Hence, the underutilization of oral health facilities and late presentation at the clinic culminates into resultant complications. Ibiyemi, 2009 and Olusile 2010 are of the view that if Nigeria is to effectively address the gap occasioned by low oral health awareness , then oral education has at various levels has to be encouraged. According to Ibiyemi (2009), there are three main levels of oral health education (a) Individual/Family Oral Health Education: consulting room, dental oral health education unit and the home; (b) Group Oral Health Education: lectures, group discussion, panel discussion, workshop, symposium, socio-drama/role-playing, demonstration and simulation exercise; (c) Oral Health Education for the General Public. To this school of thought technologies could be effectively utilized. These technologies include all forms of on-line/open source, blended learning, television, radio, the Internet, newspapers, social media, films, posters, billboards and signs. Others are Mobile Dental Health Exhibition, Dental Health Museums and Exhibition and visit to Dental Clinic. Effective communication is however seldom achieved through the use of one method alone; therefore attempt is usually made to combine variety of methods to accomplish the educational purpose. Health education uses a variety of methods to help people understand their own situations and choose actions that will improve their health. Hence the study is designed to investigate the perceived usefulness of these new media in improving students’ knowledge about oral health risk behaviours and the need to stem them down so as to live a healthy life.

Research Objectives

The following objectives are stated for the study:

- (a) determine the nature and degree of oral health information the students of Obafemi Awolowo University ,Ile-Ife are exposed to across the different faculties and gender;
- (b) examine the source of such oral health information with respect to disruptive technologies;
- (c) investigate the perceived usefulness of such oral health information with respect to the new technologies across the different groups; and

- (d) Investigate how these have affected students' awareness of oral health risk behaviours and healthy living across the various faculties and gender.

2. Method

The study Center

Nigeria is one of the African largest (923,768km²) countries and the most populous countries with an estimated population of 155,215,573 million as at 2009. As at today, there are over 38 universities approved by the National University Commission in the country. The study center is Obafemi Awolowo University, Ile-Ife, Osun State. The University was established in 1962 and is situated on a vast expanse of land totaling 11,861 hectares in Ile-Ife, Osun State, southwest of Nigeria. The Students population is over 45,861 including Distance Learning students. The University comprises the main campus, the student residential area, the staff quarters and a Teaching and Research Farm. It also comprises the academic, administrative units and other service centers. The student residential area is made up of 10 undergraduate hostels and a postgraduate hall of residence. There also exist on the university's campus a Health Center and the Dental Hospital unit of the Obafemi Awolowo University Teaching Hospital Complex. Outside the University, is the Moro satellite campus for the Distance Learning Programmes and International Institute for Tropical Agriculture (IITA) in Ibadan.

Population and Sampling

The sample was limited to only undergraduates while first year students were also excluded. This is because the first year students just resumed as new students at the time of this research. A stratified sampling technique was used to select 212 volunteers consisting 85 females and 127 males

Research Instrument

A check -list questionnaire was employed for the data collection. The questionnaire has five sections containing (i)biographic data of the samples(ii) oral health information (iii) different sources of Oral Health information. (iv) perceived usefulness of the disruptive technologies and (v) assessment of the oral health risk awareness. The instrument was designed using five point Likert Scale.

Validation Process

The questionnaire was validated using face and content validity. The instrument was presented to senior researchers from the Faculty of Education. Based on their assessments and recommendations modification was made to enhance the validity of the instrument. Reliability was measured using Cronbach Alpha method. A reliability coefficient of 0.87 was obtained.

Data Analysis

Analysis was carried out using SPSS Software Version 16.0.The extent of information received was measured using a weighted value of 5, 4, 3, 2 and 1 while the weight values of 3, 2 and 1 was assigned for section D.

3. Results and Discussion

Two hundred and twelve undergraduates completed the questionnaires comprising of 40.1% females and 59.9% males. Ninety one percent of the samples were between 15 and 20 years, 86% between 21 to 25 years and 18 % were between 26 to 30 years. 13% were in year II, 26% in year III. 28% in year IV,26%% in year V and 5.2% in year VI. Fourteen point two percent of the undergraduates specialized in Sciences, 9.9% in Humanities; 43% in Technology; 21% in Social Sciences and 21 in Health Sciences/Pharmacy. It was further revealed that the oral health information received from the different sources was slightly low(48%, Table 1 refers). The following can be adduced as the reasons,(i) Obafemi Awolowo University Health Center, which should been the first point of call for the students was poorly

equipped with modern dental health facilities and staff. (ii) in the same vein, the Obafemi Awolowo Teaching Hospital Dental Center which should have been a potent source of oral health information is seldomly patronized by the students.

Table 1: Nature and the degree of oral health information received

S/N	Oral health related conditions	Very Much (5)	Much (4)	Fair (3)	Poor (2)	None at all (1)	Total	Information Received (IR)	($\bar{IR} - \bar{IR}$)
1	Tooth decay	60	136	168	36	87	487	2.30	-0.1
2	Gum diseases	20	80	159	54	100	413	1.95	-0.45
3	Toothache	100	156	153	92	72	573	2.70	0.3
4	Tooth sensitivity	75	144	150	58	76	503	2.37	-0.03
5	Tooth brushing	330	208	96	24	44	702	3.31	0.91
6	Fluoride toothpaste	130	176	126	40	68	540	2.55	0.15
7	Oral cancer	45	40	75	58	132	350	1.65	-0.75
Total								16.83	
Mean								2.40	

Information about tooth brushing had the highest score followed by tooth ache and fluoride toothpaste respectively. Like wise it was found that students had problems accessing information about tooth decay, gum diseases, tooth sensitivity and oral cancer. This was reflected in their responses when it was said that they received inadequate information about tooth decay and gum diseases. Substantial information received by the students on tooth-brushing and toothpaste might probably be explained by the unrelenting media advertisement of the homecare products manufacturers and the major manufacturers. The results as revealed in Table 2 showed that there was no gender difference in the nature of oral health information received. This showed that both sexes were exposed equally to the same oral health information on the university campus.

This is not a surprise because they were exposed to the same academic and social environment and the diverse socio-cultural factors which may have played significant role. The result however was different with respect to age of the students. There was difference in the degree of oral health information received across the different age group of 16 to 20 years having the highest mean while 25 and above have the lowest. However when this finding was subjected to test of significance the results showed that the difference was not statistically significant. This finding can be explained by the fact that this age group is that of the adolescence stage. It is the developmental stage when youths move from parental control to establishing their own separate relationships with peers and other sources of health information in order to make their own choices. (Klein and Wilson, 2002)

Table 2: Extent and degree of oral health information received according to gender

S/N	Oral health related conditions	Female	Male
1	Tooth decay	2.45	2.29
2	Gum diseases	2.05	2.01
3	Toothache	2.6	2.49
4	Tooth sensitivity	2.43	2.44
5	Tooth brushing	3.49	3.35
6	Fluoride toothpaste	2.5	2.81
7	Oral cancer	1.64	1.71
Mean		2.45 (SD=0.57)	2.44 (SD=0.53)

P<0.05

The results on the sources of oral health information presented in Table 3 showed that television(as one of the product of disruptive technologies) had the highest score followed by medical doctors, newspapers/magazines/journals, and radio programmes respectively. This was corroborated in the study of Schweitzer carried out in 2004 when it was reported that many people get most of their health news and information from television. Other sources from where the students obtained oral health information are dentists, internet browsing, chemist/pharmacist, posters, government agencies and health talks/seminars were all very low. Similar findings was obtained with respect to the gender distribution for various oral health information sources. However a critical appraisal of other studies from the advanced countries revealed that dentists constitute the main source of oral health information. (O'Neil, 1984). Coming down to Nigeria, the results revealed that dental personnel were underutilized. It was also gathered that the Dental personnel had not been pro-active enough to provide adequate oral health information for the students. What obtains is that there has been over dependent on the new social media as the primary source of oral health information. These findings have serious implications for continuing education and promotion of oral health education. Not only this, the fact that students do not patronize the dental centre has implication for their well being and development. The Dental Association should take a holistic look at how best to use consultation as an opportunity to provide not only treatment but oral health related counseling in addition to other sensitization and intervention programmes.

Table 3: Different sources of oral health information received by the students

S/N	Oral health related conditions	Very Much (5)	Much (4)	Fair (3)	Poor (2)	None at all (1)	Total	Information Received (IS)	(IR - IS)
1	Medical Doctors/Other Hospital workers	225	264	123	16	51	659	3.11	0.26
2	Dentists/OtherDental workers	120	168	168	34	66	556	2.62	-0.23
3	Television shows	230	284	144	24	27	709	3.34	0.49
4	Internet browsing	190	172	117	48	58	585	2.76	-0.09
5	Radio programs Newspapers/ Magazines	170	248	138	40	41	647	3.0	0.15
6	Chemists/ Pharmacists	140	288	153	36	34	651	3.07	0.22
7	Pharmacists	85	176	129	70	63	523	2.47	-0.38
8	Posters displayed in public places	80	160	168	70	54	532	2.51	-0.34
9	Government/ National agencies	120	176	150	58	56	560	2.64	-0.21
10	NAFDAC Health talks/seminars	155	268	120	40	47	630	2.97	0.12
Total								28.49	

With respect to the main focus of the study on the perceived effectiveness of the disruptive technologies, television was rated as the highest source of oral health information. Other findings showed that age was a factor, as revealed among age group 16-25 years. Undergraduates who were above 25 years of age indicated radio programmes as their major source of oral health information. According to Larson (1994), age is a determining factor in utilizing either television or radio. To Larson he argued that part of the reasons for the decline of viewing is that television viewing is far less satisfying to older youths as far as their developmental needs are concerned. In this respect, effort should be made to upgrade the information the students obtained. The fact that the students rated the usefulness of the information received from medical and dental personnel very high should not surprise any one. It could be explained in terms of the possible and direct contacts that these students had with these personnel compared with internet browsing, radio, newspapers and posters. This direct contact allows a two-way interaction and a question and answers session which could have made a great impact on them more than the ordinary information received from internet or other sources. This is why there is need for an integrated approach to the type of information that students are exposed to. The human touch and continuous follow-up is very essential which the disruptive technologies can not do.

Table 4: The perceived usefulness of oral health information received from the different sources

S/N	Oral health related conditions	Very Much (5)	Much (4)	Fair (3)	Poor (2)	None at all (1)	Total	Information Received (PU)	($\bar{I}_R - \bar{P}\bar{U}$)
1	Medical Doctors/Other Hospital workers	520	268	54	12	7	861	4.06	0.44
2	Dentists/Other Dental workers	445	300	66	10	8	829	3.91	0.29
		335	376	87	10	6	814	3.84	0.22
3	Television shows	2.45	304	153	14	14	730	3.44	-0.18
4	Internet browsing	220	376	117	22	10	745	3.51	-0.11
5	Radio programs								
6	Newspapers/ Magazines	230	376	117	20	8	751	3.54	-0.08
7	Chemists/ Pharmacists	220	316	141	28	14	719	3.39	-0.23
8	Disruptive technologies	215	236	177	46	12	686	3.24	-0.36
9	Government/ agencies	295	296	93	32	12	728	3.43	-0.19
10	National i.e. NAFDAC Health talks/seminars	425	280	75	20	14	814	3.84	0.22
	Total							36.2	
	Mean							3.62	

Finding from the study showed that the disruptive technologies had enhanced students' overall oral health risks awareness with a statistical value of 74% (Table 5 refers). This can be traced to the students rating (Ref. Table 1) that disruptive technologies have enhanced the information they received about toothache; tooth- brushing and fluoride toothpaste. It was however shown that students also received relatively low rating with respect to plaque and viruses which are responsible for gum diseases. This lack of adequate oral health information from the right source with the human angle may partly be responsible for the present lack of adequate information about viral effect and danger of gum diseases. The misconception might also have contributed to the students' knowledge of the dangers and consumption of acidic drinks that are largely responsible for tooth diseases and sensitivity (Ref. Table 5).

Table 5: Effectiveness of the Disruptive Technology in Enhancing Oral Health Risks Awareness

S/N	Oral health related conditions	Correct (3)	incorrect (2)	Don't know (1)	Total	Risks Awareness (RA)	($\bar{I}_R - \bar{R}\bar{A}$)
1	Use of Sugar and sugary products can cause tooth decay	510	24	17	551	2.60	0.38
2	Bacteria in the mouth causes tooth decay	525	26	9	560	2.64	0.42
3	Tooth decay occur on susceptible teeth	306	52	69	427	2.01	-0.21
4	Gum diseases occur when teeth are not brushed	414	42	32	488	2.30	0.08
5	Plaque and Calculus cause gum disease	219	36	105	360	1.70	-0.52
6	Use of acidic drinks causes tooth sensitivity	324	36	71	431	2.03	-0.19
7	Use of tobacco might contribute to development of oral cancer	432	18	45	495	2.33	0.11
8	Use of non-fluoride toothpastes accelerate tooth decay	363	28	63	454	2.14	-0.08
	Total					17.75	

It is important to note that even though the findings reported a no difference in gender with respect to different sources of oral health information, but there was a difference in the overall risks awareness of female and male students (Table 6 Refers). However, after subjecting the result to a test of significance, it was not statistically significant ($p > 0.05$).

Table 6: Gender Distribution of Oral Health Risk Awareness

S/N		Female	Male
1	Use of Sugar and sugary products can cause tooth decay	2.78	2.76
2	Bacteria in the mouth causes tooth decay	2.9	2.86
3	Tooth decay occur on susceptible teeth	2.13	2.19
4	Gum diseases occur when teeth are not brushed	2.3	2.55
5	Plaque and Calculus cause gum disease	1.72	1.91
6	Use of acidic drinks causes tooth sensitivity	2.13	2.23
7	Use of tobacco might contribute to development of oral cancer	2.51	2.52
8	Use of non-fluoride toothpastes accelerate tooth decay	2.34	2.26
Mean		2.35 (SD=0.38)	2.41 (SD=0.32)

A comparison of the present study with that of Addy conducted in 1990 revealed that females have better overall healthcare and oral hygiene awareness than males.

4. Conclusion

Based on the findings the following conclusions are drawn. The new social/ disruptive technologies have been effective source of oral health information to the students. Though, its usage is very low especially for the health risk awareness and behaviours. The reasons are not far fetched; it is because more students actually use the new technology more for entertainment than for information. Notwithstanding, oral health risks awareness was above average. There is need for an integrated approach and holistic view when designing the type of information for intervention and continuing education on oral health. The Age of the users are also very important in selecting the types of information channel. The packaging of the information is also very important, the humanistic approach with its social impact is also very important. It is therefore recommended that Oral Health workers should harness the importance and the power of these innovative technologies in enhancing effective oral health education at the grass root. This is with the ultimate aim of ensuring that the people live healthy lives.

References

- Addy, M. (1990). Etiology and clinical implications of dentine hypersensitivity. *Dent Clinical North America* 34: 503-514
- Christensen, C. M., Bohmer, R., & Kenagy, J.(2000). "Will Disruptive Innovations Cure Health Care?" *Harvard Business Review*.
- Danneels, E. (2004). "Disruptive Technology Reconsidered: A Critique and Research Agenda". *Journal of Product Innovation Management* 21 (4): 246–258. <http://tourism.wu-wien.ac.at/lehrv/ivenosw5/iv4/danneelsdisruptive.pdf>
- Gann, R. (1986). *The Health Information Handbook: Resources for Self Care, Alders hot*, England: Gower.
- Ibiyemi, O. (2009) Oral health education: strategies relevant to the Nigerian situation. *Dentiscope Surgery Edition* Vol.16.; dentiscopeonline.com/documents/symp2008.pdf Retrieved: 20/12/2010
- Kaniki, A. M. (1989). Agricultural information needs in Zambia: a study of a two-way information flow. Ph.D. Thesis. Pittsburgh: University of Pittsburgh.

- Kaniki, A. M. (2001). Community profiling and needs assessment. In C. A. Stilwell Leach & S. Burton. *Knowledge, information and development: an African perspective.* (pp 187-199). Pietermaritzburg: University of Natal, School of Human and Social Studies.
- Klein, J.D. & Wilson, K. M. (2002). Delivering quality care: adolescents' discussion of health risks with their providers. *Journal of Adolescent Health* 30(3)(pp 190-195).
- Larson, R. (1994). Youth organizations, hobbies, and sports as developmental contexts. In R. K. Silberiesen, & E.Todt (Eds.), *Adolescence in context* (pp. 46—65). NY, Teachers College Press.
- Mabawonku, I. (1998). Health information provision to semi-urban people in Oyo-state, Nigeria: What role for library and information centers. *African. Journal of. Library. Archive. and Information Science .* 8(2): 127-128.
- Mchombu, K. (2001). Research on measuring the impact of information on rural development. In C. A. L.Stilwell & S. Burton. *Knowledge, information and development: an African perspective.* (pp 229-238) Pietermaritzburg: University of Natal, School of Human and Social Studies.
- Mounts, N. (ND). Gateway Newsletter, University of Illinois Cooperative Extension Service. Issue 12. Retrieved from <http://web.aces.uiuc.edu/vista/pdf.,pubs/GW12.pdf>.
- O'Neil, H.W. (1984). Opinion study comparing attitudes about dental health. *American Journal of Dental Association.* 1984: 109: 910-915.
- Olusile, A.O. (2010). Improving low awareness and inadequate access to oral health care in Nigeria: the role of dentists, the government and nongovernment agencies. *Nigerian Medical Journal.*51(3) 134-136.
- Rohide N. F. (1906). "Information Needs" W. Simonton (ed). Advance in Librarianship. Orlando
- Sandstrom C,G(2010) "A revised perspective on Disruptive Innovation – Exploring Value, Networks and Business models (Thesis submitted to Chalmers University of Technology, Goteborg,Sweden)". <http://www.chritiandstrom.org/contentphdchristiandstrom.pdf> Retrieved 2010-11-22.:
- Schweitzer, G. (2004). Ten troublesome trends in TV health news. *BMJ* 329, pp. 1352.
- The Punch, (2011). Oral health awareness low in Nigeria. Retrieved from: (<http://www.punchng.com/Articl.aspx?theartic=Art201108170435768>).