

# Changing Faculty members' attitude towards the use of ICTs in teaching and research: the SIDS model

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## Abstract

The introduction of National Research and Education Networks (NRENs) has provided opportunities for Universities in Africa for research through increased Internet bandwidth, collaborative research and availability of resources through e-libraries. However, some Universities have not taken advantage of these opportunities because of barriers to integrating Information Communication Technologies (ICTs) in teaching and research. This paper presents the Sensitize Incentive Demand and Support (SIDS) model, a framework for changing faculty members' attitude to encourage them to use ICT for teaching and research. It discusses some variables and tools that African Universities can apply to encourage faculty members to integrate ICTs in teaching and research.

**Keywords:** Changing faculty member's attitude; integration of ICTs in teaching and research, barriers to use of ICTs; model for integration of ICTs;

## 1. Introduction

A lot of efforts have been made to encourage faculty members and students in African Universities to use ICT tools for teaching and research but with very little result. This is demonstrated by little research outputs from African University and ranking of these Universities compared to others in the world. The introduction of National Research and Education Networks (NRENs) has provided opportunities for research through increased Internet bandwidth, collaborative research and availability of resources through e-libraries. Furthermore, NRENs have installed and are providing to their members Education Roaming (eduroam), federated identity service as well as cloud computing and high performance computing (Mkandawire, 2013). The eduroam service provides connectivity to Internet based services wherever the service is deployed within the country and outside the country at no cost to the user of the network. However, some Universities have not taken advantage of these opportunities and are using Internet for personal reasons such as purchasing second hand vehicles and spare parts from abroad, watch movies on YouTube and for general gossip through social sites such as Facebook.

A study was conducted at one of the African Universities, Mulungushi University in Zambia to assess the variables that can assist faculty members to change attitude towards the use of ICT for teaching and research. The survey approach was used for this study through administration of self-administered questionnaires. Descriptive analysis was used to analyse the data for this study. Frequency distributions were used as a standard to compare the relative importance of the variables. The paper outlines the variables assessed for this study. The variables assessed include the software packages used most by faculty members; their

level of satisfaction with Internet access and what they use most for Internet; their use and level of satisfaction with software available for teaching and research; their use of innovative ICT tools such as eduroam and e-library; obstacles to use of ICT and methods for motivating faculty members to use ICT in teaching and research.

The paper then presents the SIDS model, a framework for changing faculty members' attitude to encourage them to use ICTs for teaching and research. It discusses some variables and tools that African Universities can apply to encourage faculty members to use ICTs in teaching and research. The variables in the model include direct sensitization of faculty members on advantages of ICTs in research, teaching and learning and the use of incentives to motivate faculty members to use ICT for research purposes. The model elucidates how these variables can be used both directly and indirectly to enhance the change of attitudes on faculty members. The paper discusses the preliminary results of applying this model at one of the Zambian Universities and presents the lessons learned. The preliminary results show that applying this model can have significant impact on the attitudes of faculty members regarding their demand and use of ICTs for teaching and learning.

## **2. Integration of ICTs in teaching and research**

In developed countries ICTs have been integrated in teaching and research while developing countries are still lagging behind. In developing countries, new approaches have been developed including the introduction of National Research and Education Networks and investment in ICTs infrastructure (Mkandawire, 2013, Yuksel et al, 2013). The introduction of NREN has provided opportunities for research through increased Internet bandwidth, collaborative research and availability of resources through e-libraries. In terms of infrastructure, for example in Zambia, optic fibre has been installed by ZESCO and CEC Liquid covering the most parts of the country. Open source software is available for teaching and research, for example learning management systems (eg Moodle), lecture capture/podcasting (Camstudion), online lecture/ webinars and remote participation (OpenMeetings), eBook authoring and word processing (LibreOffice), interactive whiteboard, integrated library systems (Koha) and referencing (Zotero). However, effective integration and use of ICT in teaching and research is still problematic (Keengwe et al, 2008, Wachira and Keengwe, 2011, Yuksel et al, 2013).

Researchers have identified the common barriers to integration of ICTs into teaching and research. Yuksel et al (2013) has categorized these barriers into external and internal barriers. The external barriers encompass hardware and software inadequacies, and lack of technical support and time. The internal barriers include attitudes and beliefs toward the uses of technology in education, and the teaching approaches used. The common barriers for integrating ICTs in teaching and research include:

- Lack of in-service and re-training in ICTs is barrier (Akbaba -Altun, 2006; Ertmer, et al, 2012). New and cheaper technologies for teaching and research are being introduced on the market regularly and therefore lecturers and teachers require training and re-training to integrate these new technologies.
- Lack of technical and appropriate administrative support (Bingimlas, 2009). Lecturers and teachers get frustrated when they are trying to integrate new technology in teaching and observe that things are not working as they expected. Therefore, lecturers and teachers require on going technical support.
- Lack of adequate hardware/software and insufficient number of computers to be used by teachers and students (Pelgrum, 2001; Dionys, 2012). This is a problem

especially in developing countries where little investments have been made in hardware and software due to lack of financial resources. Some Universities have adopted “bring your own device” approach where they ask students to come with their own laptops and iPads to be used in class and connect to University network.

- Lack of basic knowledge/skills for ICT as well as knowledge/skills for ICT integration in teaching and research (Bingimlas, 2009; Dionys, 2012). Some lecturers and teachers lack basic ICT skills while others may have the ICT skills but face challenges on how to integrate ICTs in teaching and research.
- Lack of appropriate physical environment and ICT infrastructure (Pelgrum, 2001; Bingimlas, 2009; Dionys, 2012). New technologies are bandwidth hungry and require a lot of bandwidth, for example application for capturing high quality videos of lectures and podcasting require large bandwidth. Therefore, this requires investment in ICT infrastructure and this can be a challenge in some Universities in developing countries.
- Lack of appropriate course content and instructional programs (Pelgrum, 2001; Akbaba -Altun, 2006; Usluel et al., 2007). Developing and packaging appropriate course content is a challenge to lecturers and teachers because this requires other ICT skills such as graphic design which they need to learn.
- Insufficient lecturer/ teacher time (Bingimlas, 2009; Yuksel et al, 2013). Lack of time for lecturers and teachers to learn ICT skills, design appropriate content and integrate ICT in teaching and research is a major barrier because teachers are already busy preparing lesson materials using the traditional way; they are busy teaching and marking scripts.

To overcome these barriers a number of initiatives have been proposed by researchers that specifically target the barriers, for example offering higher quality and more quantity of in-service training and pre-service training for ICT (Goktas, 2006; Yildirim, 2007; Bingimlas, 2009). Other initiatives include: designing appropriate course content and instructional programs (Cuban et al., 2001; Goktas, 2006; Yildirim, 2007), supporting teachers to use ICT effectively and allocating specific units and personnel for peer support (Goktas, 2006; Yildirim, 2007; Mueller et al., 2008; Bingimlas, 2009), decreasing the course load of the teachers (Goktas, 2006; Hew and Brush, 2007; Bingimlas, 2009). However, literature does not provide a framework that can be adopted and used to change faculty members’ attitude towards use of ICT for learning and research.

### **3. Goal and Objectives of study**

The overall goal of the study was to elicit and synthesize variables that can be used to change faculty member's attitude towards the use of ICT for teaching and research in Zambia. The following were the research questions:

- What ICT tools are available to assist faculty members to use ICT in teaching and research and what barriers deter them to use these tools?
- What are the important variables that influence faculty members to encourage them to use ICTs in teaching and research?
- What are the relationships between the important variables that influence faculty members to adopt ICTs in teaching and research?

- What are the possible enablers or drivers that can change faculty members' attitude to encourage them to use ICTs for teaching and research?

The outcome of this survey would be to document and develop a framework for changing African University faculty members' attitude to motivate them to use ICTs in teaching and research.

## **4. Methodology**

### **4.1 Data collection instruments**

Data was collected through the administration of self-completion questionnaires to a sample of faculty members at one of the public Universities in Zambia. This method was adopted because questionnaires provide wide access to geographically dispersed samples at low cost i.e., a large population can be surveyed relatively cheaply (Nachmias and Nachmias, 1996). In addition, questionnaires provide a high degree of anonymity, which can encourage frankness when sensitive areas are involved (Robson, 1993). The questionnaire was organized under four main themes, 1) Access to ICT for teaching and research, 2) Integrating ICT in teaching and research, 3) Barriers to the use of ICTs in teaching and research, and 4) Methods to encourage integration of ICT in teaching and research.

The sources of data were faculty members responsible for teaching and research at a public University in Zambia. The University was purposively selected because it possessed variety of ICT tools for teaching and research. Cooper and Schindler (2011) argue that purposive sampling is appropriate when used in the early stages of an exploratory study.

### **4.2 Data analysis**

Descriptive analysis was used to analyse the data for this study. Eleven (11) responses were received out of 30 questionnaire sent out representing a response rate of 36.7%. The data collected were coded and analysed in LibreOffice Calc. The descriptive statistics were calculated as frequencies, means and percentages.

## **5. Survey Results**

The respondents were asked to rate what variables they perceived to be the most important among the available options provided.

### **5.1 Access to ICTs for teaching and research**

This section presents survey findings related to faculty member's access to ICT for teaching and research. The survey results shows that most respondents (64%) indicated that they use laptops for teaching and research in comparison to other devices (see Figure 1). It was observed that fewer respondents indicated use smartphones and iPad for teaching and research despite the abundance of open source educational software and also considering that the prices of these items have significantly reduced in the recent years.

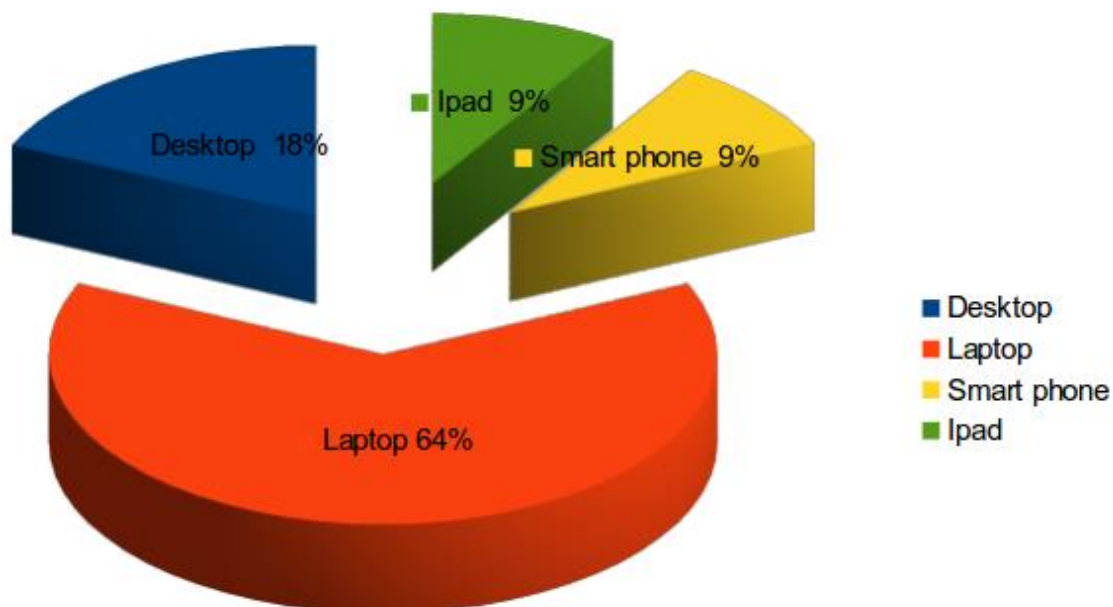


Figure 1. Computing Devices Used

The respondents were asked to indicate which method they use most to access the Internet and other educational resources. Most of the respondents (54.5%) indicated that they use a network cable to access the Internet even though wireless network (Wi-Fi) is available on the University campus (see Table 1). This suggests that ICT awareness and basic skills among the faculty members is lacking and agrees with observation made by a number of researchers (Bingimlas, 2009; Dionys, 2012).

**Table 1. Access methods to Internet**

Access method description	No of respondents (%)
a) Network cable	54.5
b) Wireless Access (Wi-Fi___33)	27.3
c) Internet Cafe	0.0
d) MTN/Airtel/Zamtel Dongle	9.1
e) Mobile Phone Internet	9.1
f) Other (please specify)	0.0

## 5.2 Integrating ICTs in teaching and research

Respondents were asked to indicate areas where they had integrated ICTs in teaching and research. The focus of the questions was on the use of internet, ICT resources and educational software packages available at the University.

Majority of respondents (45.5%) indicated that they use Internet mainly for research and learning, 36.4% indicated that they use internet for google search while the remaining 18.2% indicated that they use the Internet mainly for personal reasons such as procurement of personal goods eg cars. Although Wikipedia and social networks such as Facebook provide a

lot of resources for students, faculty members indicated that they do use these resources for teaching and research (see Table 2).

**Table 2. Internet Usage**

Areas used for Internet	No of respondents (%)
a) google search	36.4
b) Wikipedia	0.0
c) Facebook or twitter or other social sites	0.0
d) research and learning	45.5
e) torrents or ftp sites	0.0
f) procurement of goods eg cars	9.1
g) personal reasons	9.1
h) Other (please specify)	0

The study assessed usage of available ICT resources at the University to help faculty member in teaching and research. The ICT resources assessed include: electronic learning management system (Moodle), eduroam, library management system, electronic journal and access regional and international resources. Majority of the respondents indicated they use learning management system (Moodle) and use resources from international Universities and research centres (see Figure 2). However, the majority also indicated that they do not use eduroam, library management system (Koha) and online journals though these resources are available at the University.

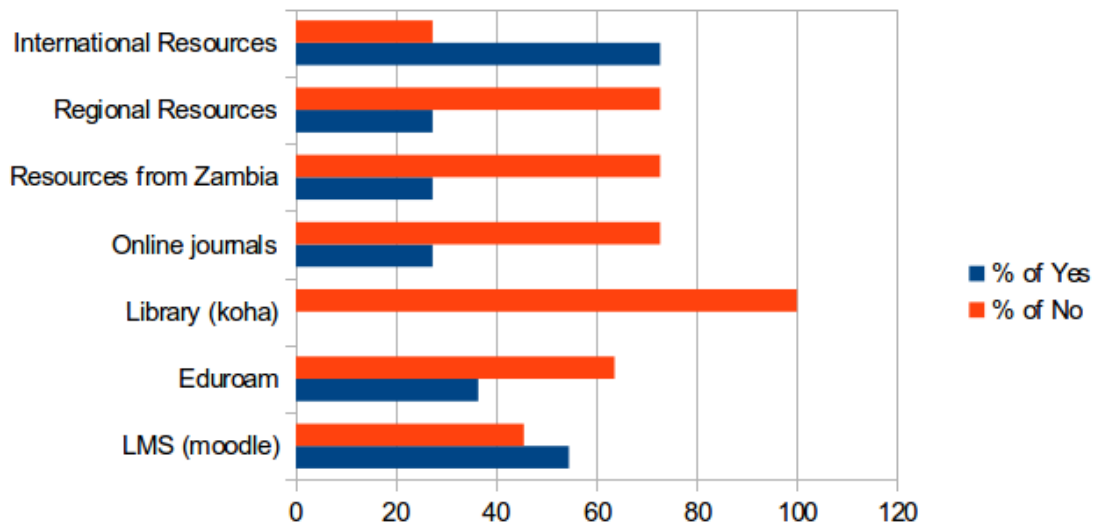


Figure 2. Usage of ICT resources

The software packages mostly used by faculty members were assessed. It was anticipated that most faculty members would indicate the use presentations (PowerPoint), statistical packages software, referencing management and modelling/ simulation software. However, the survey results indicate that the majority of faculty members use computers for browsing the Internet

and databases. This suggests that more needs to be done at this University to encourage faculty members to use the available ICT resources for teaching and research such as simulation and referencing management software.

**Table 3. Mostly used software packages**

<b>Software Packages</b>	<b>No of respondents (%)</b>
a) Word processing (e.g. Microsoft Word, Open Office, etc.)	0
b) Spreadsheets (e.g. Microsoft Excel, Open Office, etc.)	10
c) Database management (e.g. Microsoft Access, File Maker, etc.)	30
d) Presentations (e.g. Microsoft PowerPoint, Page, etc.)	10
e) Statistical packages (e.g. SPSS, R, Stata, etc.)	10
f) Browsers (e.g. Internet Explorer, Firefox, Chrome, Opera, etc.)	40
g) Calendaring (e.g. Microsoft Outlook, Mozilla Sunbird, etc.)	0
h) Reference management (e.g. Endnote, Bibus, Refworks, Zotero, etc.)	0
i) Modeling and simulation (e.g. Mathematica, etc.)	0

### 5.3 Barriers to the use of ICTs in teaching and research

Although Pelgrum (2001) identified insufficient number of computers and lack of knowledge/skills by teachers as the top barriers for integrating ICT in teaching and research, this survey indicates that lack of time and lack of incentives as the leading barriers for integrating ICTs in teaching and research. This is in agreement with more recent research findings (Bingimlas, 2009; Yuksel et al, 2013). Most of the faculty members are overloaded with lectures, tutorials and marking assignments and test/examination scripts so that they have little time to prepare and package appropriate course content to upload on the learning management system. The poor quality of ICT services was also identified as a barrier by respondents and this is in agreement with literature that lack of technical and appropriate administrative support is a major barrier to integrating ICT in teaching and research (Bingimlas, 2009).

**Table 4. Barriers to integrate ICT in teaching and research**

<b>Assessed barriers</b>	<b>No of respondents (%)</b>
a) No incentive to use it	22.2
b) No time to use ICT or Internet	0.0
c) Inadequate research facilities/ laboratories	0.0
d) Too busy or too much work pressure	33.3
e) Lack of ICT skills	11.1
f) Other (please specify) poor quality of ICT service	33.3

#### 5.4 Methods to encourage integration of ICT in teaching and research

Most of the respondents (54.5%) indicated that the best method to encourage faculty members to integrate ICT in teaching and research is by increasing the Internet bandwidth. This is because slow connections discourage teachers and researchers who want to use ICT in their work, for example if it takes one hour to download an article from an online journal while it takes 10 minutes to walk to the library to get a hard copy of the journal, then the faculty member would prefer to walk to the library. The introduction of NRENs provides opportunities for increased Internet bandwidth at lower prices and therefore Universities should take advantage of opportunities created by NRENs.

The second ranked method for encouraging integration of ICTs in teaching and learning was sensitization of faculty members on the advantages of using ICT in their work. The work of faculty members can be categorized into three areas teaching (lecturing, tutorials, assessment of assignments, tests and examinations); research and publications (publications in refereed journals and conferences) and public service (outreach and community services). Therefore, faculty members should be sensitized on how ICTs can help them efficiently do their work. Sensitization on ICT benefits should not just focus on faculty members but also on students because if students are well sensitized then they can act as agents of change and can lobby faculty members to use ICTs in teaching and research. For example, if students are aware that they can submit an assignment online through a learning management system and yet their lecturer requires that they print a copy and travel to the office to submit a copy, the students can lobby with the lecturer to accept online submission thus forcing the lecturer to use the learning management system.

**Table 5. Drivers for integration of ICT in teaching and research**

Assessed drivers of change	No of respondents (%)
a) Sensitization seminars on advantages of using ICT and Internet	27.3
b) University Management directive to students and staff to use ICT and Internet	9.1
c) Provide incentives to users of ICT and Internet	9.1
d) Improve internet connectivity	54.5
e) Other (please specify)	0.0

Some respondents also indicated that management directives as well as providing incentives to users of ICT can motivate faculty members to integrate ICT in teaching and research.

#### 6. Lessons learnt from survey

Although the survey sample was not large enough to draw statistically valid generalizations, from the analysis of the data, nevertheless, the exercise proved to be useful and brought out a number of lessons. These lessons as well as other measures not reported here will guide our future work. The study shows that there are still barriers faced by some faculty members to integrate ICT in teaching and research.

The lessons learnt include:



### ***Lesson 1***

*Provide ongoing support services to faculty members and assist them to integrate ICTs in teaching and research.*

It is important to provide support services to faculty members and assist them to integrate ICT in teaching and research. Support services can be in form of help desk through emails, web sites, discussion groups. Support services can include technical support for academic systems that are used in the faculties such the learning management system, online journal and library, eduroam and ongoing training in use of ICT tools for teaching and research. Support services can include assistance on how to connect their computing devices to the network and advise on procurement of ICT hardware and software.

### ***Lesson 2***

*Sensitize faculty members on the advantages of integrating ICTs in teaching and research.*

Faculty members need to be sensitized on advantages of integrating ICTs in teaching and research. For example, lecturers can record tutorials on video on some difficult topics and make it available to students who will play it and learn at their own pace and this will free up time for lecturers to conduct research and perform other duties. Lecturers can be sensitized on the advantages of using a learning management system in that it improves lecturer and student collaboration as well as can help in assessments such as marking quizzes and tests for the lecturer.

### ***Lesson 3***

*Sensitize students on the advantages of integrating ICTs in learning and research.*

Students should be sensitized on the advantages of integrating ICTs in learning and research. The Universities should demonstrate to the students that using ICT for example can enhance independent and active learning, and students' responsibility for their own learning as well as promote collaborative learning and research. Students then can act as catalysts to encourage and demand faculty members to use ICTs in teaching and research. For example, if one of the lecturers is using ICTs in teaching and students observe benefits then they can request other lecturers to do the same.

### ***Lesson 4***

*Provide incentives to faculty members that encourage them to use ICTs in teaching and research.*

The survey indicated that provision of incentives is one of the motivations for faculty members to change their attitude towards the use of ICTs in teaching and research. Some of the incentives that management can provide to faculty members include: provide more Internet bandwidth because slow Internet can demotivate them; fit all lecture rooms with state of the art ICT equipment such as Wi-Fi, laptop and projector, TV screens, interactive white boards; assist lecturers and students to purchase personal laptops; ensure 100% coverage of Wi-Fi and eduroam on campus and student hostels; and provide financial incentives in form of prizes to lecturers who integrate ICTs in teaching and research.

### ***Lesson 5***

*Identify barriers for integrating ICTs in teaching and research in your institutions and use appropriate tools (drivers) to overcome the barriers.*

Barriers for integrating ICTs in teaching and research cannot completely be eliminated and therefore it is important that these barriers are identified and specifically addressed. Methods for identifying barriers include conducting interviews with lecturers and students; online questionnaire; monitoring use of available resources and specifically targeting faculty members not using them. Once barriers have been identified, for example lack of skills on packaging course materials for learning management system, then training that target, this deficiency can be conducted.

### **Lesson 6**

*Start with a small core group of faculty members and use incremental approach to motivate faculty member to integrate ICTs in teaching and research.*

Use the incremental approach to sensitize or motivate faculty members to integrate ICTs in teaching and research. First, begin with a small core group and once they are sensitized and see the benefits of ICT then employ them as champions of change. Involvement of those who may be affected by a change (in this case faculty members) usually minimizes resistance to change (participative or collaborative planned change).

## **7. Development and preliminary validation of SIDS model**

The lessons learnt from this study as well as literature were used to develop the SIDS (Sensitize, Incentives, Demand, Support) model, a framework for changing faculty member's attitude to integration of ICT in teaching and research (Figure 3).

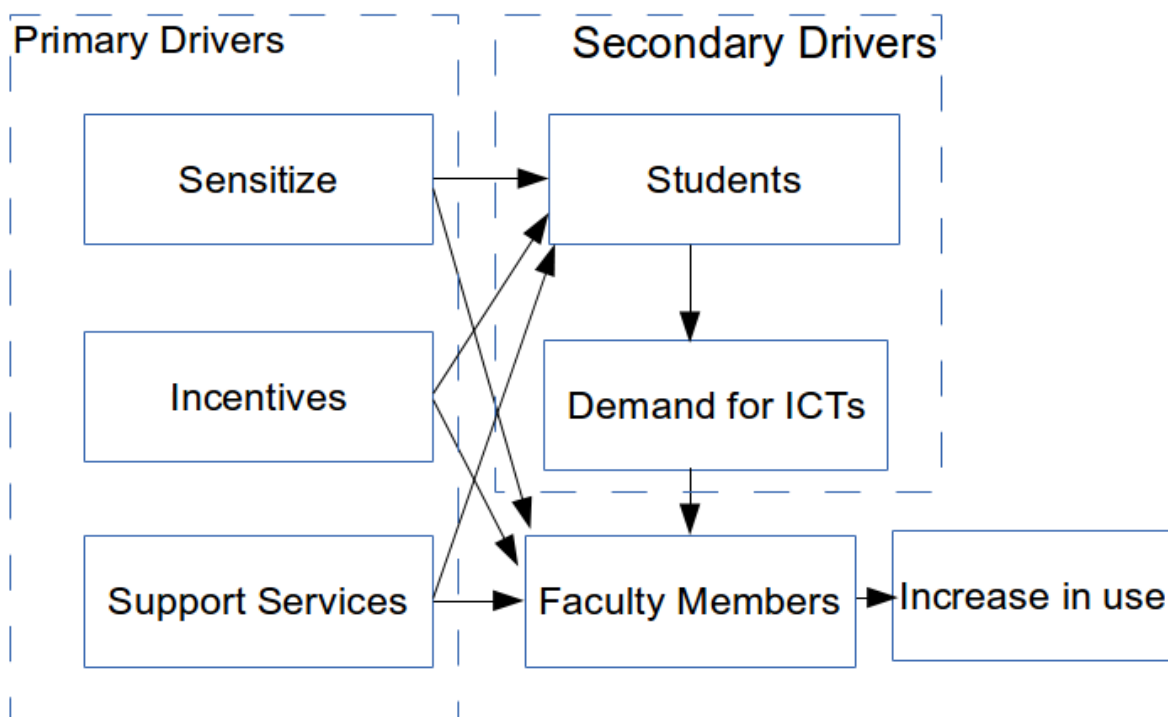


Figure 3. SIDS Model

The SIDS model was applied at Mulungushi University, Zambia by the following activities:

- Sensitize (lecturers were sensitized on the advantages of email, eduroam, Moodle learning management system, Koha library and electronic journals)
- Provide Incentives (Internet bandwidth was increased by 100% through Zambia Research and Education Network (ZAMREN), selected lecture rooms were fitted with PowerPoint projectors)
- Create Demand (students were sensitized on the advantages of using ICT in learning and research, Wi-Fi with eduroam was installed in some hostels and around campus)
- Support services (a dedicated 24/7 mobile phone was purchased for help desk and email for support was created for both staff and students)

The result of applying SIDS model at Mulungushi University indicated that the number of lecturers using eduroam, library management system, PowerPoint presentations, online journals and the learning management system (Moodle) increased. For example, the number of lecturers using learning management system on regular basis increased from 4 to 16. These preliminary results suggest that the SIDS model can be useful to change faculty members' attitude and encourage them to integrate ICT in teaching and research.

## 8. Conclusion and future plans

Although introduction of NRENs has provided opportunities for Universities in Africa for research through increased Internet bandwidth, collaborative research and availability of resources through e-libraries,, some Universities have not taken advantage of these opportunities because of barriers to integrating ICTs in teaching and research. The barriers include lack of time for lecturers; lack of technical and appropriate administrative support; lack of adequate hardware/software and insufficient number of computers to be used by teachers and students; lack of basic knowledge/skills for ICT as well as knowledge/skills for ICT integration in teaching and research; lack of appropriate physical environment and ICT infrastructure; lack of appropriate course content and instructional programs.

In order to promote and encourage faculty members to integrate ICT in teaching and research, the SIDS model has been developed. The model encourages sensitization of faculty members and students; promote the provision of incentives for faculty members and students; create demand for integration of ICTs in teaching and research through students as catalyst for change; provision of support services; and incremental implementation through champions as agents of change. There is need to develop frameworks for changing faculty members attitude to using ICT in teaching and research. The limitation of this study was that data was collected from one University. Future work will focus on further elaboration and validation of the SIDS model at more Universities in Zambia. Future work will also involve development of workbook for the SIDS framework that Universities can use to motivate faculty members to integrate ICT in education and research.

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## Biography

**Dr Douglas Kunda** is currently the Director for the Centre for ICT Education at Mulungushi University in Kabwe, Zambia. He holds a Doctorate degree in Computer Science from the University of York, UK. He is Fellow of the Computer Society of Zambia and Member of Association for Computing Machinery. He worked as the Project Manager for the Integrated Financial Management Information System (IFMIS) project for the Ministry of Finance. He has presented papers at International Conferences and published in journals. He is certified SAP ERP Solution Manager Consultant with experience in Java, C++, PHP/ MySQL web platforms, Microsoft products including SQL Server databases, Oracle and PostgreSQL databases, Linux, CISCO networking, PRINCE2 and Moodle.

