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A Comparative Analysis of Ict Use with Training versus Ict Use without Training to Increase Research Productivity of University Academics

Sujit K. Basak, Desmond W. Govender *

ABSTRACT

This paper aimed to compare Information and Communication Technology (ICT) (SPSS, AMOS, Turnitin, EndNote and NVivo) use with training versus ICT (SPSS, AMOS, Turnitin, EndNote and NVivo) use without training to increase the research productivity of university academics. The aim of this study was achieved by comparing models using ICT with training versus using ICT without training to increase the research productivity of university academics. This study was experimental, and the target population for the experiment consisted of academic staff from a university. The data was analysed using WarpPLS 4.0 software. The main results of this study is models, derived from the experiment, and the findings of the results will help universities to realise that ICT use with training has the potential to significantly increase research productivity of university academics.

Keywords: Models, ICT Use with Training, ICT Use without Training, Research Productivity, University Academics.

Introduction

"Research is the one of the core functions of universities, dating back to the establishment of the University of Berlin by Wilhelm von Humboldt in the early 19th century" (Ben-David and Zloczower, 1962). In higher education, research missions are classified under four categories namely teaching, community outreach, 'blowing the whistle' to the world, and research. Several researchers indicated as cited in Soliman and Soliman (1977), research is more prestigious than teaching (Alfred and Weisman, 1987; Garvin, 1980; Trow, 1984) and it is more valued across the world in most higher education institutions (Fairweather, 1993). According to the Australian Research Council (2010: 17), research is the creation of new knowledge that can be used with the existing knowledge to generate new concepts, methodologies and understandings. A study conducted by Harris and Kaine (1994) indicated that research productivity is seen more about a function of the individual rather than of the resource support it can provide. Many researchers who have studied research productivity have indicated that research productivity is measured in terms of the research publications, research grants, and citation rates (Adkins and Budd, 2006; Australian Research Council, 2010; Inglis, 1999; Ito and Brotheridge, 2007; Ramsden, 1994; Zamarripa, 1994). Unfortunately, research productivity in higher institutions is still considered as low and measures must be sought to remedy this. In this study we focus on the low research productivity by university academics and how one could possible enhance their productivity.

Problem Statement

In Australia, Ramsden (1994) as cited in Bentley (2009) conducted a study in eighteen higher institutions on 890 academic staff for a period of five years and the results of the study clearly indicated that the average output of the university academics are very low and "heavily skewed". On the other hand, in Norway, Kyvik

* Department of Information Technology, Durban University of Technology, South Africa (1). Discipline of Computer Science Education, University of KwaZulu-Natal, South Africa (2). Received on 19/04/2015 and Accepted for Publication on 07/10/2015.

(2003) as cited in Bentley (2009) conducted a study where his or her results indicated that research productivity of university academics seem high but there still exists "inequalities in research output". Similarly, in Nigeria, a study conducted by the National Universities Commission (2005) revealed that only twenty universities had acceptable research output, whereas the remaining fifty universities had no acceptable research output. According to Pomfret and Wang (2003), in Australian economics departments, high quality of research output is very low for the Australian academic economists. Their study further indicated that research output was highly skewed both at the national and the international level. Moreover, another study conducted by Okiki and Iyabo (2013) in Nigeria, indicated that research productivity was low for university academics in terms of textbook publications, monographs, patents and certified inventions.

Aim, Objective and Research Question

The aim of this study is to design models to show the impact of ICT use with training and ICT use without training to increase the research productivity of university academics.

In order to achieve the aim of this study, the following research objective will be addressed:

- To examine research productivity using ICT (EndNote, NVivo, AMOS, SPSS and Turnitin) with training and using ICT without training.

In order to achieve the research objective, the above can be translated into the following research question:

- To what extent does ICT use with training and ICT use without training affect research productivity?

Literature Review

Turnitin:

According to Turnitin.com (2010) as cited in Penketh and Beaumont (2014:95), "Turnitin, described as plagiarism detection software, allows for similarities to be identified between submitted work and a range of databases including the internet, student work and other electronic sources including 'billions of pages of web content". Turnitin.com (2010) indicated that it is a powerful educational tool for teaching to cite properly and it is a formative tool that creates opportunities for the teachable moments. A study was conducted by Bailey and Challen (2015) at the University of Wolverhampton on 748 students and the study revealed that most of the participants thought that despite certain limitations the Turnitin software was very helpful in terms of learning for the appropriate source use, and wished that it had been introduced earlier in their degree course. However, their study also further indicated that high number expressed anxiety among students with regard to the risk of unintentional plagiarism. Studies conducted by Holi Ali (2013) and Zwagerman (2008) argued that using Turnitin®, instructors unfairly presumes students are guilty until software (Turnitin) proves them innocent.

According to Jones (2008), Turnitin is a global leader for detecting plagiarism by the researchers around the world. Study by Jocoy and DiBiase (2006) indicated that a manual system could only detect plagiarism in 3% of the assignments on the other hand, Turnitin.com can detect plagiarism in 13%. They also indicated that Turnitin software could increase the performance to detect infraction. A study by O'Hara et al. (2007) indicated that Turnitin is a formative tool that can be used to support student's progress, can be very effective, particularly in relation to building confidence and competencies.

Analysis of Moment Structure (AMOS):

According to Wu et al. (2014:325), Analysis of moment structure (AMOS) implements a general approach to data analysis known as analysis of covariance structure, analysis of linear structure relations, structural equation modelling, or casual modelling". According to Lin et al. (2011), in AMOS, the multivariate considers all the available data simultaneously that can extract the key information about the relationships and combined effects of the

environmental pollutants. The study further stated that multivariate monitoring can improve signal-to-noise ratio through the average that resulted in the more realistic evaluation of environmental context. AMOS is a statistical software that can be used for the Structural Equation Modelling (SEM), path analysis and confirmatory factor analysis, analysis of covariance or causal modelling (StatisticsSolution, n. d). AMOS is frequently used at the postgraduate level for the SEM and it utilises graphical interfaces that can be considered as a teaching tool to enhance the communication and understanding of the statistical concepts at the undergraduate level. According to Bollen (1989), Byrne (2012), in four aspects, SEM excels, firstly, SEM adopts a confirmatory, hypothesis-testing approach to data. Secondly, SEM enables an explicit modelling of measurement error to obtained unbiased estimates of the relationships between variables. Thirdly, SEM can include unobserved and observed variables. Fourthly, SEM enables modelling for the complex multivariate relations or indirect effects that are not easily implemented elsewhere.

NVivo:

NVivo software was developed by QSR International. Nvivo software is used by academic, government, health and commercial researchers across various research fields. Nvivo software is used for two purposes, firstly for the qualitative data analysis and secondly for the literature review analysis.

Qualitative Data Analysis Using Nvivo:

NVivo is a qualitative data analysis package and it has many advantages to improve the quality of research. Using NVivo, analysis becomes easier and yields the more professional results (Wong, 2008). A study was conducted by Hoover and Koerber (2011) indicated that the qualitative data analysis using NVivo software increases research efficiency, multiplicity, and transparency. Another study conducted by Richards (1999) indicated that NVivo software can help researchers to manipulate their data records, browsing them, coding them, annotating and gaining access to data records quickly and accurately. On the other hand, according to Cretchley et al. (2010), NVivo software requires researchers to derive a list of codes and rules for attaching these to data, and there is a lot of bias involved in this process.

Literature Review Analysis Using NVivo

According to QSR International (1999-2010) cited in Markham (2015:112), "Field notes and memos were maintained throughout the analysis process. The software package NVivo (V9) was used to organise, sort, retrieve and compare data during open, axial and selective coding," NVivo is a computer program that can be used for the literature review analysis to import and code textual data, edit text, retrieve, review and recode coded data, search for combinations of words in the text or patters in the coding, import from or export data to other quantitative analysis software (Bandara, 2006). Literature review is a common feature in all dissertations or thesis, regardless of discipline or subject and the NVivo software can be used to analyse literature review. NVivo software has a particular set of tools that is appropriate to do analysis for the literature review.

Statistical Package for the Social Sciences (SPSS):

"Statistics is the science of the planning studies and experiments, obtaining data and the organizing, summarizing, presenting, analysing, interpreting, and drawing conclusions based on the data" (Triola, 2011). According to Learning SPSS: Data and EDA (n. d), SPSS is popularly known as PASW and it can be used to enter data, creating new variables, performing EDA and performing formal statistical analysis. Other studies conducted by Mills (2003) and Landau and Everitt (2004), indicated that in many fields (education, behavioural, social sciences, etc.) SPSS is more popular to analyse data because it is a very user friendly statistical software tool and it is windows-driven and offers users a point-and-click way to generate the output.

EndNote

EndNote is a reference management software and it is well established among the researchers and students as a time saving tool for writing their academic papers (Fitzgibbons and Meert, 2010). In a study by Harrison et al. (2005) indicated that there are many benefits in using EndNote such as improved references, use of those references within the citations and the list of references, increases the confidence of the academic work. Hensley (2011) indicated using EndNote reference management software metadata can be extracted from the PDF's, search the full text of PDF's and side by side records can be compared.

Methodology

This study was experimental based and a total of ±15 academic staff participated in the ICT use with training and a total of ±15 academic staff participated in the ICT use without training. A questionnaire was developed based on the existing literature. Training was validated using training needs assessment models (Barbazette, 2006) and the questionnaire was validated using the Technology Acceptance Model (Davis, 1989). Experimental data was collected during the first week and second week of October 2014. Training was conducted on five software namely AMOS, EndNote, SPSS, Turnitin, NVivo (for data analysis and for literature review analysis) at the Durban University of Technology, South Africa. Professional trainers were hired to facilitate academics on the above software. The researcher facilitated one of the software. Number of participants is given in Table 1.

Table 1

Sampling of the Academic Staff Members Who Participated in the Study for the Experiment

Name of the Software	Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) training participated	Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training participated
SPSS	18	12
Turnitin	13	13
EndNote	13	12
AMOS	14	15
NVivo for data analysis	14	12
NVivo for literature review	13	11

Research strategy using ICT with training experiment

The design of the experiment conducted in this research study was grounded within two theoretical frameworks: a training needs assessment framework and Technology Acceptance Model (TAM). The role of these two frameworks was respectively to guide the design of the ICT training experiment and the approach adopted by this study was to measure research performance or productivity in terms of references, in terms of structural equation model, in terms of quantitative and qualitative data analysis, and in terms of plagiarism. Finally, questionnaires used by this section of the study are described below. A total of ±15 academics participated for each software and a total of 85 questionnaires (SPSS 18 questionnaires to 18 participants, AMOS 14 questionnaires to 14 participants, NVivo for qualitative data analysis 14 questionnaires to 14 participants, NVivo for literature review 13 questionnaires to 13 participants, EndNote 13 questionnaires to 13 participants, and Turnitin 13 questionnaires to 13 participants) were distributed. All academics were from the Durban University of Technology. Sometimes the number (15) had changed because of the availability of academic staff. Data was analysed using the WarpPLS 4.0 version

software.

Research strategy using ICT without training:

The purpose of the experiment conducted by this study was the inclusion of a research variable using ICT without training. ± 15 Academic staff participated in this section of the study from the University and a total of 75 questionnaires (SPSS 12 questionnaires to 12 participants, AMOS 15 questionnaires to 15 participants, NVivo for qualitative data analysis 12 questionnaires to 12 participants, Nvivo for literature review 11 questionnaires to 11 participants, EndNote 12 questionnaires to 12 participants, and Turnitin 13 questionnaires to 13 participants) were distributed.

Questionnaire design using ICT with training

Section A: Perceived Usefulness:

Section A of the training evaluation questionnaire consisted of four items that were extracted from the existing literature. Each item was a statement on the perceived usefulness of the software before and after the training experiment. The two questions (doubled by the 'before' and 'after' modes) were based on the perceived usefulness of the: How useful did you perceive the EndNote/AMOS/NVivo/SPSS/Turnitin software for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? How useful did you perceive the EndNote/AMOS/NVivo/SPSS/Turnitin software training for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? For each statement, a participant was requested to make an assessment using a 7-point Likert scale ranging from 'Totally useless' (1) to 'Extremely useful' (7). The questionnaire was designed in such a way that the respondents could put a tick in an appropriate block to indicate their choice.

Section B: Perceived Ease of Use:

Section B of the training evaluation questionnaire consisted of four items that were extracted from the existing literature. Each item was a statement on the perceived ease of use of the software before and after the training experiment. The two questions (doubled by the 'before' and 'after' modes) were based on the perceived ease of use of the EndNote/AMOS/NVivo/SPSS/Turnitin software: How easy to use did you perceive the EndNote/AMOS/Nvivo/SPSS/Turnitin Software for the referencing/modelling/qualitative data analysis and literature review analysis/plagiarism of your research work? How easy did you perceive the EndNote/AMOS/Nvivo/SPSS/Turnitin software training for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? For each statement, another participant was requested to make his assessment using a 7-point Likert scale ranging from 'Totally useless' (1), to 'Extremely useful' (7). The questionnaire was designed in a way that the respondents could put a tick in an appropriate block to indicate their choice.

Section C: Acceptance Level:

Section C of the training evaluation questionnaire consisted of four items that were extracted from the existing literature. Each item was a statement on the acceptance level of the software before and after the training experiment. Here are the two questions (doubled by the 'before' and 'after' modes) asked the respondents on the acceptance level of the EndNote/AMOS/Nvivo/SPSS/Turnitin software: What is your level of acceptance of the EndNote/AMOS/Nvivo/SPSS/Turnitin software for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? What is your level of acceptance of the EndNote/AMOS/Nvivo/SPSS/Turnitin software training for the referencing/modelling/qualitative data analysis and literature review analysis/quantitative data analysis/plagiarism of your research work? For each

statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from ‘‘Extremely low’ (1) to ‘Extremely high’ (7). The questionnaire was designed in such a way that the respondents could put a tick in an appropriate block to indicate their choice.

Questionnaire Design Using ICT without Training

Section A: Perceived Usefulness:

Section A of the training evaluation questionnaire consisted of two items and was extracted from existing literature. Each item was a statement on the perceived usefulness, perceived ease of use, and acceptance level of the EndNote/AMOS/NVivo/SPSS/Turnitin Software on the software and software experiment training. Here are the two questions were: Using ICT (EndNote/AMOS/NVivo/SPSS/Turnitin software) without training, i.e., how useful did you perceive/how easy to use/what was your perceived acceptance level of the EndNote/AMOS/NVivo/SPSS/Turnitin software for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? Using ICT (EndNote/AMOS/NVivo/SPSS/Turnitin software) without training, how useful did you perceive/how easy to use/what was your perceived acceptance level of the EndNote/AMOS/NVivo/SPSS/Turnitin software training for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from ‘Totally useless’ (1) to ‘Extremely useful’ (7). The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice.

Section B: Perceived Ease of Use:

Section B of the training evaluation questionnaire consisted of two items and were extracted from the existing literature. Each item was a statement on the perceived ease of use of the EndNote/AMOS/NVivo/SPSS/Turnitin Software on the software and software experiment training. Here, the two questions were (doubled by the ‘software’ and ‘software training’ modes) asked to the respondents on the perceived ease on use of the EndNote/AMOS/NVivo/SPSS/Turnitin software: Using ICT (EndNote/AMOS/NVivo/SPSS/Turnitin software) without training, how easy was it to to use the EndNote/AMOS/NVivo/SPSS/Turnitin software for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? Using ICT (EndNote/AMOS/NVivo/SPSS/Turnitin software) without training, how easy was it to use the EndNote/AMOS/NVivo/SPSS/Turnitin software training for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from ‘Totally useless’ (1) to ‘Extremely useful’ (7). The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice.

Section C: Acceptance Level:

Section C of the training evaluation questionnaire consisted of two items that were extracted from the existing literature. Each item was a statement on the acceptance level of use of the EndNote/AMOS/NVivo/SPSS/Turnitin software on the software and software experiment training. The two questions were: Using ICT (EndNote/AMOS/NVivo/SPSS/Turnitin software) without training, what was your acceptance level on the EndNote/AMOS/NVivo/SPSS/Turnitin software for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? Using ICT (EndNote/AMOS/NVivo/SPSS/Turnitin software)

without training, what was your acceptance level on the use of the EndNote/AMOS/NVivo/SPSS/Turnitin software training for the referencing/modelling/qualitative data analysis, literature review analysis and quantitative data analysis/plagiarism of your research work? For each statement, each participant was requested to make his assessment using a 7-point Likert scale ranging from 'Totally useless' (1) to 'Extremely useful' (7). The questionnaire was designed in such a way that the respondents could just put a tick in an appropriate block to indicate their choice.

RESULTS

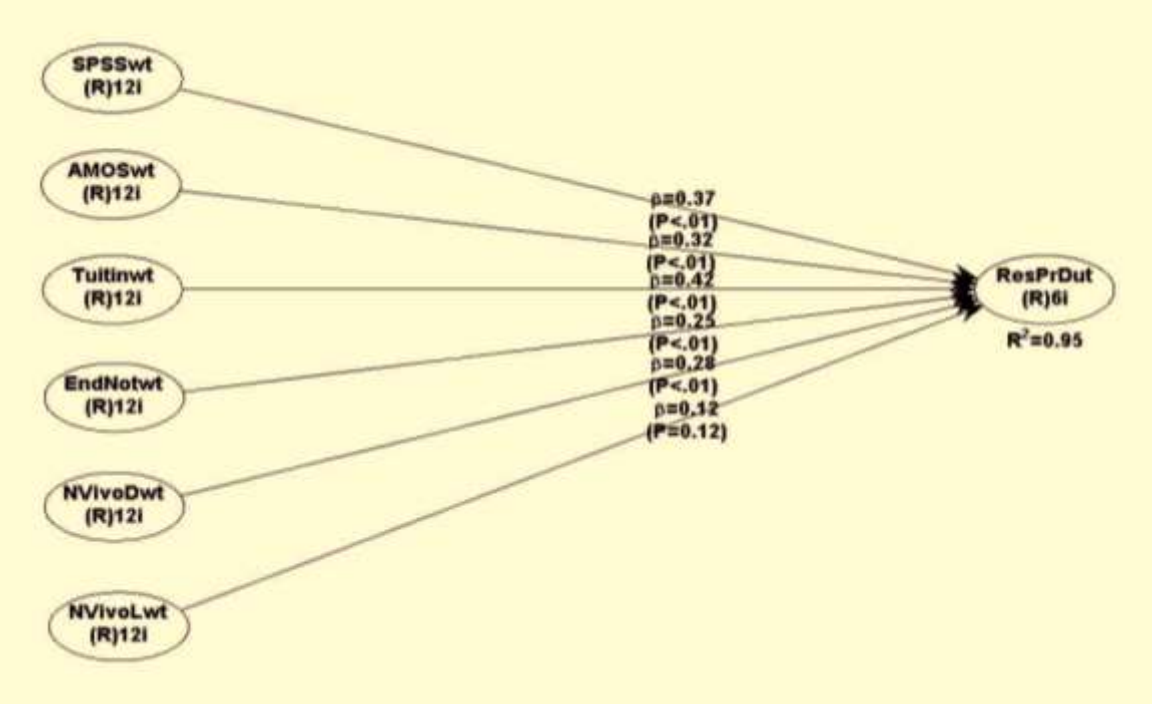

Figure 1: Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) with training on research productivity

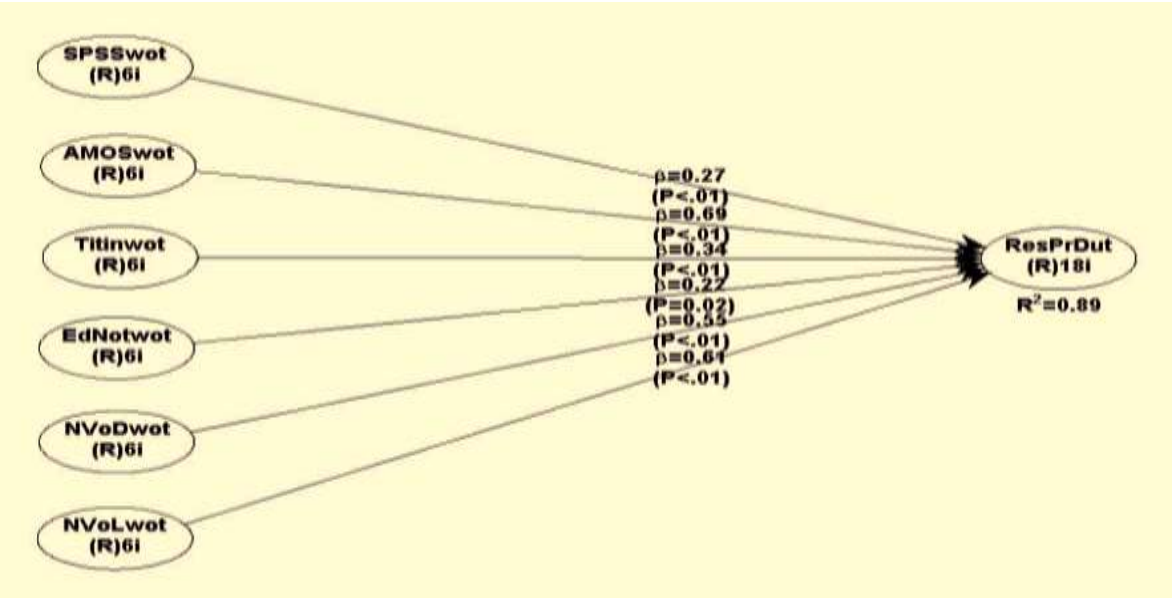

Figure 2: Using ICT (EndNote, NVivo, AMOS, SPSS, and Turnitin) without training on research productivity

Having analysed the Figures 1 and 2 shows that each of the software has an impact on the research productivity. ICT with training has high significance ($R^2 = 0.95$) on research productivity whereas using ICT without training ($R^2 = 0.89$) does not have high influence on research productivity as compared to ICT use with training ($R^2 = 0.95$). However, it may attract the attention of researchers to the importance of probabilistic aspects of model fit in structural equation modelling as an indicator of significance for models as a whole.

Case comparison and evaluation of ICT with training and ICT without training

Table 3, Table 4, Table 5, Table 6, Table 7, and Table 8 represent the comparison of each software using ICT with training, using ICT without training. Although research productivity for ICT use with training and ICT use without training was different from each other.

Table 3

Comparison of SPSS with training and
Without training to increase research productivity

Software	Significance	Research Productivity
Using SPSS with training	$\beta = 0.37$	$R^2 = 0.95$
Using SPSS without training	$\beta = 0.27$	$R^2 = 0.89$

Table 3 shows that SPSS for the quantitative data analysis with training has a higher significance on the research productivity as compared to the SPSS without training because their research productivity was respectively $R^2 = 0.95$ and $R^2 = 0.89$.

Table 4 shows that AMOS for the modelling with training has a higher significance on the research productivity as compared to the AMOS without training because their research productivity was respectively $R^2 = 0.95$ and $R^2 = 0.89$.

Table 4

Comparison of AMOS with training
And without training to increase research productivity

Software	Significance	Research Productivity
Using AMOS with training	$\beta = 0.32$	$R^2 = 0.95$
Using AMOS without training	$\beta = 0.69$	$R^2 = 0.89$

Table 5

Comparison of Turnitin with training
And without training to increase research productivity

Software	Significance	Research Productivity
Using Turnitin with training	$\beta = 0.42$	$R^2 = 0.95$
Using Turnitin without training	$\beta = 0.34$	$R^2 = 0.89$

Table 5 shows that Turnitin for the plagiarism with training has a higher significance on the research productivity as compared to the Turnitin without training because their research productivity was respectively $R^2 = 0.95$ and $R^2 = 0.89$.

Table 6

Comparison of EndNote with training
And without training to increase research productivity

Software	Significance	Research Productivity
Using EndNote with training	$\beta = 0.25$	$R^2 = 0.95$
Using EndNote without training	$\beta = 0.22$	$R^2 = 0.89$

Table 6 shows that EndNote for the reference management with training has a higher significance on the research productivity as compared to the EndNote without training because their research productivity was respectively $R^2 = 0.95$ and $R^2 = 0.89$.

Table 7 shows that NVivo for the qualitative data analysis with training has a higher significance on the research productivity as compared to the NVivo without training because their research productivity was respectively $R^2 = 0.95$ and $R^2 = 0.89$.

Table 8 shows that NVivo for the literature review analysis with training has a higher significance on the research productivity as compared to the NVivo for literature review analysis without training because their research productivity was respectively $R^2 = 0.95$ and $R^2 = 0.89$.

Correlations using ICT with training and using ICT without training

Table 9, Table 10 show the results of the p values correlations for the indicators of all latent variables between ICT use with training and ICT use without training for the software namely, SPSS, AMOS, Turnitin, EndNote, and NVivo increase research productivity.

Table 7

Comparison of NVivo (for data analysis) with training and without training to increase research productivity

Software	Significance	Research Productivity
Using NVivo (for data analysis) with training	$\beta = 0.28$	$R^2 = 0.95$
Using NVivo (for data analysis) without training	$\beta = 0.55$	$R^2 = 0.89$

Table 8

Comparison of NVivo (for literature review) with training and without training to increase research productivity

Software	Significance	Research Productivity
Using NVivo (for literature review) with training	$\beta = 0.12$	$R^2 = 0.95$
Using NVivo (for literature review) without training	$\beta = 0.61$	$R^2 = 0.89$

Table 9

P values correlations using ICT with training

	SPSSwt	AMOSwt	TuitinW	EndNotW	NvivoDW	NvivoLW
SPSSwt	**1.000**					
AMOSwt	0.217	**1.000**				
TuitinW	0.341	0.882	**1.000**			
EndNotW	0.761	0.526	0.027	**1.000**		
NvivoDW	0.435	0.718	0.550	0.380	**1.000**	
NvivoLW	0.182	0.846	0.277	0.536	0.123	**1.000**

Table 10

P values correlations using ICT without training

	SPSSwot	AMOSwo	TitinWo	EdNotWo	NVoDWoT	NVoLWoT
SPSSwot	**1.000**					
AMOSwo	0.321	**1.000**				
TitinWo	0.280	0.352	**1.000**			
EdNotWo	0.520	0.114	0.625	**1.000**		
NVoDWoT	0.189	0.037	0.331	0.731	**1.000**	
NVoLWoT	0.827	0.200	0.507	0.120	0.681	**1.000**

Table 11

Mean and the standard deviation for the AMOS, EndNote, NVivo, SPSS, and Turnitin,

Software	Mean	Standard Deviation	Variable	Mean	Standard Deviation
AMOS with training	3.36	1.44	Research Productivity	15.05	2.81
AMOS without training	5.20	1.08	Research Productivity	3.96	0.81
EndNote with training	4.77	1.47	Research Productivity	15.05	2.81
EndNote without training	2.18	0.74	Research Productivity	3.96	0.81
NVivo for data analysis with training	5.00	1.00	Research Productivity	15.05	2.81
NVivo for data analysis without training	5.08	1.28	Research Productivity	3.96	0.81
NVivo for literature review with training	3.67	1.27	Research Productivity	15.05	2.81
NVivo for literature review without training	5.73	0.93	Research Productivity	3.96	0.81
SPSS with training	3.87	1.46	Research Productivity	15.05	2.81
SPSS without training	5.58	0.70	Research Productivity	3.96	0.81
Turnitin with training	4.15	1.73	Research Productivity	15.05	2.81
Turnitin without training	2.85	0.74	Research Productivity	3.96	0.81

Mean and standard deviation for ICT use with training and ICT use without training

Table 11. Mean and Standard Deviation with training and without training of AMOS, EndNote, NVivo (for data analysis and for literature review), SPSS, Turnitin, and for the Research Productivity. Table clearly shows that mean values are higher in the case of ICT with training namely EndNote for referencing and NVivo for literature review. On the other hand, mean values are lower in the case of ICT use without training namely AMOS for modelling, NVivo for qualitative data analysis, SPSS for quantitative data analysis, NVivo for qualitative data analysis, and Turnitin for plagiarism.

Discussion

The originality of the study is that we examined research productivity using ICT (SPSS, AMOS, Turnitin, EndNote and NVivo) with training and without training. In the context of this research, it was found that ICT with training has high significance ($R^2 = 0.95$) on research productivity. Using ICT without training ($R^2 = 0.89$) does not have high influence on research productivity as compared to ICT use with training ($R^2 = 0.95$). However, it may attract the attention of researchers to the importance of probabilistic aspects of model fit in structural equation modelling as an indicator of significance for models as a whole.

The final results of this study show, ICT use with

training has high significance on the research productivity as compared to ICT use without training. This study identified that ICT training positively influences research productivity. It means that the better the application of ICT with training, the higher the research productivity (Adogbeji and Akporhonor, 2005; Azad and Seyyed, 2007). This study's findings may also have implications for changes and interventions demanding to move away from current practice of using ICT without training for research productivity.

Conclusion And Recommendation

This study has revealed that the role of ICT (EndNote, AMOS, Turnitin, SPSS, and NVivo) training has been recognised worldwide as key to academic researchers. According to respondents in this study, ICT with training does increases research productivity. The findings indicated that ICT with training has a high significant impact ($R^2 = 0.95$) on research productivity as compared to using ICT without training ($R^2 = 0.89$). In this regard, universities need to formulate strategies on ICT with training for researchers to use each software package in relation to improve their research productivity. On the other hand, the role of using ICT (EndNote, AMOS, Turnitin, SPSS, and NVivo) without training has also been recognised worldwide as key to academic research. However, according to respondents, it has less effect ($R^2 = 0.89$) on research productivity as compared to the ICT use with training ($R^2 = 0.95$). The findings indicated that, when using ICT without training, the significance was low for research productivity. Universities, therefore, need to formulate strategies to motivate researchers to be trained in each software package, instead of using ICT without training.

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تحليل مقارن لاستخدام تكنولوجيا المعلومات والاتصالات في التدريب (VERSUS) استخدام تكنولوجيا المعلومات والاتصالات من دون تدريب لزيادة الإنتاجية البحوث في جامعة الأكاديميين (دراسة مقارنة)

سوجيت كومار باساك، ديسموند ويسلي جوفيندر*

ملخص

هذه الورقة تهدف إلى مقارنة تكنولوجيا المعلومات والاتصالات ((SPSS (ICT، AMOS، تورنيتين، الحاشية و(NVivo تستخدم مع التدريب مقابل تكنولوجيا المعلومات والاتصالات (SPSS، AMOS، تورنيتين، الحاشية و(NVivo استخدام دون تدريب لزيادة إنتاجية البحثية للجامعيين. تم تحقيق الهدف من هذه الدراسة بمقارنة النماذج باستخدام تكنولوجيا المعلومات والاتصالات مع التدريب مقابل استخدام تكنولوجيا المعلومات والاتصالات من دون تدريب لزيادة إنتاجية البحثية للأكاديميين الجامعة. وكانت هذه الدراسة التجريبية، ويتألف السكان المستهدفين للتجربة أعضاء هيئة التدريس من الجامعة، تم تحليل البيانات باستخدام (WarpPLS 4.0) البرمجيات، وأهم نتائج هذه الدراسة نماذج مستمدة من التجربة، ونتائج نتائج تساعد الجامعات لندرك أنَّ استخدام تكنولوجيا المعلومات والاتصالات مع التدريب لديه القدرة على زيادة كبيرة في الإنتاجية البحثية من الأكاديميين بالجامعة.

الكلمات الدالة: استخدام تكنولوجيا المعلومات والاتصالات والتدريب، واستخدام تكنولوجيا المعلومات والاتصالات من دون تدريب والبحوث الإنتاجية والأكاديميين في الجامعة.

* قسم تكنولوجيا المعلومات، جامعة دوربان التكنولوجية، جنوب أفريقيا (1). قسم علوم الحاسب الآلي، جامعة كوازولو ناتال، جنوب أفريقيا (2). الأردن. تاريخ استلام البحث 2015/04/19، وتاريخ قبوله 2015/10/07.