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Investigating the Mediation Effect of Satisfaction and Health Issues on the Relationship between Ergonomics and Intention to Use Information Communication and Technology

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Abstract

The focus of this study is to explore how ergonomics factors mediated by health issues and satisfaction influenced intention to use ICT by students for learning and research. A cross-sectional survey designed was used to gather data for the study. Though 1500 questionnaire were distributed to students in six (6) universities in Ghana, only 955 were usable. Purposive sampling method was used for the data collection. The analysis was carried out with multivariate technique -Structural equation modeling. The researchers employed SPSS version 16 and AMOS version 20 for the analysis. Findings of the study suggest that health issues do no mediate the relationship between ergonomic factors and behavioral intentions of ICT use for learning and research. On the other hand, satisfaction completely explained Ghanaian students' intention to use ICT for learning and research. It is therefore imperative for administrators of higher educational institutions to ensure that, ergonomic interventions instituted get students satisfied. Otherwise, their intentions to use ICT provided for learning and research would not be influenced.

Keywords: Behavioral Intention, Ergonomics factors, Health Issues and Satisfaction

1 Introduction

Many theories and models have been applied to study intentions to use technology and use behaviour. For example, (Davids 1989) used perceived usefulness and perceived ease of use while Venkatesh et al (2003) suggested performance expectancy, effort expectancy and social influence as the main predictors of intention to use technology. Although myriad of variables have been used by researchers to investigate intention to use technology and usage behaviour, none of the literature reviewed had explored how ergonomics factors, health issues and satisfaction affect intention to use technology. Hence the researcher seeks to explore how ergonomics factors mediated by healt1h issues and satisfaction influence intention to use ICT by Ghanaian students for learning and research.

Ergonomics is recognized as: a scientific discipline that studies human interaction with other elements of the productive system, applying theory, principles and project methods with the objective of improving human comfort and system's performance in general Dul and Weerdmeester(2008). According to Smith (2007) ergonomics and human factors have been applied and implemented in many areas and has "achieved proven success in improving performance, productivity, competitiveness, and safety and health in most occupational sectors". Ergonomics is also concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human safety and overall system performance,(International Ergonomics Association, 2000).

Application of ergonomics to school learning environment addresses issues such as physical factors, equipment and work area; teaching factors – instructional material, technologies, and curriculum; environmental factors – temperature and lighting; and temporal factors – schedule and length of the school day and breaks (Legg , 2007 and Smith, 2007).

Literature cited has classified ergonomics into four categories, which include physical, cognitive, psychological and work organizations. It is worth noting that the presence of these factors in organizations varies. In educational institutions, the cognitive and physical ergonomics may be present. Physical risk factors include such work characteristics as noise, excessive force, awkward postures, long durations, repetition, and cold temperatures are believed to be a major source of musculoskeletal disease Westgaard & Winkel (1997). Research has it that disorders through musculoskeletal has financial implications on individual and organizations. MSD can lead to a severe decline in worker performance (Shackleton, Harburn & Noh, 1997). In

2001 National Research council and Institute of medicine, reported that one million workers make use of sick leave due to musculoskeletal disorders which cost between fifteen and twenty billion dollars as quantified by Dudley & Delong (2001) .

Cognitive and psychosocial risk factors are related in that they can often be found in the same work environments. Cognitive risk factors include memory demands, while psychosocial risk factors include characteristics such as job autonomy, time pressure, and task demands. Hagberg et al. (1995) defined these factors as "the individual subjective perceptions of work organization factors" that "have the ability to carry 'emotional' value for the worker". For example, if the cognitive work interface is not compatible (e.g. too many memory demands, too much distraction causing focused attention problems) an employee may fall behind in their work and feel the strain of time pressures or excess task demands (Schwerha et al., 2011).

Psychosocial work factors are defined as aspects of the work environment (such as work roles, work pressure, relationships at work) that can contribute to the experience of stress in individuals (Lim and Carayon 1994). A number of different psychosocial factors have been proposed as risk factors for musculoskeletal symptoms in the neck/shoulder region (Toomingas, Theorell, Michalsen, and Nordemar , 1997), for example: high job demands, low decision latitude, time pressure, mental stress, job dissatisfaction, high workload and lack of social support from colleagues and superiors Muniamuthu and Raju (2010). Psychosocial risk factors have the potential to lead to both adverse mental and physical health outcomes (Schwerha et al., 2011). Psychosocial risk factors lead to psychological strain, which heighten the effects of various physical risk factors and could play an important role in the development of work related musculoskeletal disorders (Schmitt, Colligan, & Fitzgerald, 1980; Landsbergis, Schnall, Warren, Pickering, & Schwartz, 1994; Carayon, Smith, & Haims, 1999).

According to Schwerha D. et al., (2011) work organization is the way a job is defined, processed, and supervised. It can include such elements as management structures (e.g., alternative employment arrangements, restructuring, and work life programs) job and task characteristics (e.g., scheduling, telework, teamwork, shifts, and task complexity; Hagberg et al., 1995).

Improvements in work organization can lead to improved job satisfaction (Schwerha et al., 2011). For example, according to the need satisfaction model developed by Salancik and Pfeffer (1977), when the needs of the individual are well matched with the job's characteristics, it is presumed that the person is satisfied and more motivated to perform the job (DeStefano, Clark, Gavin, & Potter, 2006). The Person-Environment Fit model, premise on the foundation that when individuals are match to environments, in such a way as to reduce overall stress, there is increase in job satisfaction, (Schwartz, Pickering, & Landsbergis, 1996). Additionally, earlier research works had demonstrated that more job control and flexibility led to increased job satisfaction, which could eventually improve the performance and output of employees (Lee & Brand, 2005). Also, developing many pleased satisfied customers, whether they are students, parents of students, alumni, or industry employer, should be a main goal of higher education administrators (Seymour, 1972). Thus, focusing on enhancing the customer satisfaction at colleges and universities is crucial in developing customer value. Using this theoretical support, the student satisfaction and retention model assumes that student satisfaction predicts intentions to stay which in turn leads to student retention (Keaveney and Young, 1997).

2.0 Methodology

To explore how ergonomics factors mediated by health issues and satisfaction influenced intention to use ICT by Ghanaian tertiary student for learning and research, the researcher formulated the following research questions to help address it

- Does awareness of ergonomics influence the intention to use ICT for learning and research?
- Does awareness of ergonomics influence students' satisfaction?
- Does awareness of ergonomics predicts health issues influence in the use of ICT?
- Does awareness of ergonomics mediated by satisfaction and health issues influence the intention to use ICT for learning and research?

The researchers employed a cross-sectional survey designed instrument to collect data from the target population. The population for this study is students of higher educational institutions with a sampling frame of students in both public and private universities in Ghana. In addition, the researchers used the questionnaire method to glean data from a large number of students from three (3) private universities and three(3) public universities in Ghana. The public universities include University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST) and University of Cape Coast (UCC). The private universities include

Methodist University College, Ghana (MUCG), Accra Institute of technology (AIT) and Central University College (CUC). The researchers and a representative administered the questionnaires from each institution. The representatives were trained by the researcher on how to administer the questionnaire.

Out of one thousand five hundred (1500) questionnaires administered, only 950 were useful responses. The response rate from the institutions exceeded the 30% response rate suggested by (Sekaran 2003). Statistical Package for Social Sciences (SPSS) version 16 and AMOS version 20 were the two main statistical software packages used for the analysis. The researchers checked for errors and inconsistencies in the responses and entered those certified as error free into SPSS. Furthermore, to ensure elimination of data entry errors, they computed descriptive statistics such as minimum and maximum on each variable to determine responses, which were out of range. The researchers examined the variance on each case to determine cases were respondents provided the same response to all variables per a case.

The proposed model for this research hypothesized ergonomic factors, health issues and satisfaction as second order factors. Ergonomic factors are accountable to the variance and covariance related to the first order factors (body posture, working chair, lecture hall design, humidity, noise level, lighting and learning hours). Health issues explain the variance and covariance of the first order factors (bodily complaints and other related health complaints) while satisfaction explains stdsat (satisfaction with ICTs) and quit (intention to quit institution). The hypothesized model posits that health issues and satisfaction as shown in figure 1 mediate the relationship between ergonomic factors and behavioural intention of students' to adopt ICT for learning and research.

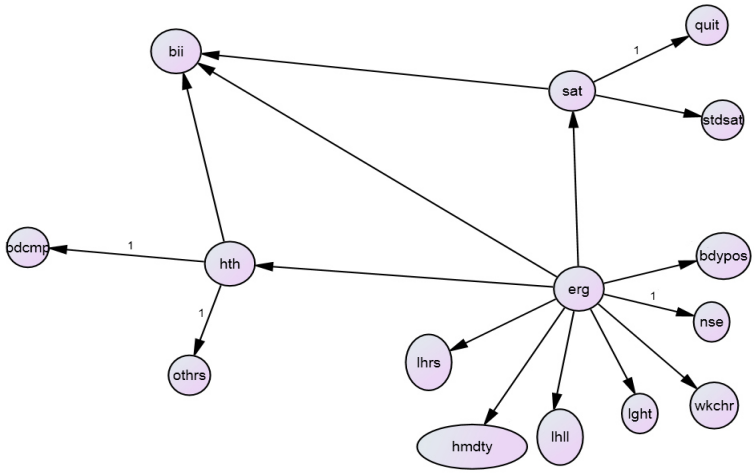


Figure 1. The Hypothesized Model

2.1 Specification Search

According to (Schumacker and Lomax, 2004), if the fit of an implied theoretical model is not as strong as one would like (which is typically the case with an initial model), then the next step is to modify the model and subsequently evaluate the new modified model. In general, specification search is the procedure for detection of specification error so that more properly specified subsequent models may be evaluated during respecification (Learner, 1978). The purpose of a specification search is to alter the original model in the search for a model that is better fitting in some sense and yields parameters having practical significance and substantive meaning (Schumacker and Lomax, 2004)

The following eight-step procedure for a specification search were suggested by (Schumacker and Lomax, 2004)

1. Let substantive theory and prior research guide your model specification.
2. When you are satisfied that Rule 1 has been met, test your implied theoretical model and move to Rule 3
3. Conduct a specification search, first on the measurement model and then on the structural model.
4. For each model tested, look to see if the parameters are of the expected magnitude and direction, and examine several appropriate goodness-of-fit indices.

Follow Steps 5 through 7 in an iterative fashion. For example, you might go from Step 5 to Step 6, and successively on to Steps 7, 6, 5, and so on.

5. Examine the statistical significance of the nonfixed parameters, and possibly the Wald statistic. Look to see if any nonfixed parameters should be fixed in a subsequent model.
6. Examine the modification indices, expected parameter change statistics, and possibly the Lagrange multiplier statistic. Look to see if any fixed parameters should be freed in a subsequent model.
7. Consider examining the standardized residual matrix to see if anything suspicious is occurring (e.g., larger values for a particular observed variable).
8. Once you test a final acceptable model, cross-validate it with a new sample, or use half of the sample to find a properly specified model and the other half to check it (cross-validation index, CVI), or report a single-sample cross-validation index (ECVI) for alternative models (Cudeck & Browne, 1983; Kroonenberg & Lewis, 1982).

Modification indexes (MI) offer suggested remedies to discrepancies between the proposed and estimated model. In a CFA, there is not much we can do by way of adding regression lines to fix model fit, as all regression lines between latent and observed variables are already in place. Therefore, in a CFA, we look to the modification indices for the covariances. Generally, we should not add covariance between error terms with observed or latent variables, or with other error terms that are not part of the same factor. Thus, the most appropriate modification available to us is to add covariance error terms that is part of the same factor. Usually, the largest modification index is address before more minor ones.

In building models where univariate approach was used in arriving at modification index(MI), it is prudent to add only one parameter at a time to the model, as the MI values can change substantially from one tested parameter to another (Byrne, 2009). AMOS applies univariate approach to arrive at the MIs. Hence, in this study the researcher added a parameter at a time to arrive at the final model.

The use of SEM as a multivariate analysis technique was due to its ability to analyse relationship between latent and observed variables. It also helps measure each latent variable by multiple indicators (Bollen, 1989). The structural part of SEM specifies the relationship between the exogenous and endogenous variables. The researchers deleted many first order factors during the specification search. For example, the following first order variables were deleted hmdty, lhrs, lhll, wkchr, bdypos during the specification search. Factor loadings of items below the cutoff value of .05 (Hair et al., 2010) or the error terms matching a different error term of another item with lager MI values were deleted. Figure 1 portrays the final structural model obtained after specification search.

To determine a match between the research model and the data, the following measures of fit and the corresponding cutoffs were used as recommended by earlier researchers. Absolute fit indices applied include chi square, ($\chi 2$), Normed Chi square ($\chi 2/df$) < 3 (Bagozzi, R.P., & Yi., 1988), root mean square error of approximation (RMSEA)<.05 Browne and Cudeck (1993). Incremental fit indices are Normed fit index (NFI) > 0.9 (Chin and Todd, 1995, Hair et al., 1998), Tuckler Lewis Index (TLI) >.95 (Hu and Bentler, 1999) and Comparative Fit Index (CFI) >0.95 (Hu and Bentler, 1999). Lastly, a Parsimony-adjusted Index used was Adjusted Goodness of Fit Index (AGFI) > 0.8 (Chau, P.Y. K &Hu P.J.H 2001).

2.2 Mediation

Mediation is the influence of an intervening variable in the relationship between two other variables. To examine mediation effect Hair et al (2010) suggested two steps approach.

1. Establish that all the direct relationships are statistically significant.

2. Estimate the initial model with only the direct relationships. Estimate the model again by adding the mediating variables and path estimates.

To assess the extent of mediation, Hair et al. (2010) also suggested the following:

a. If the relationship between the direct effects remains significant and unchanged when mediating variables are introduced then mediation is not supported.
b. If the direct effect remains significant but reduces when the mediation variables are introduced then partial mediation supported

c. If the direct effect is reduced to a point where it is not statistically significant after mediation variable is introduced, then full mediation is supported

2.3 Assessment of the Mediation Effect

To assess the mediation effect, the researchers used AMOS software. The researchers investigated the significance of the direct relationships and established that the relationship between health issues and behavioural intention is not significant at .05 level. In addition, the relationship between erg and bii is insignificant. However, the direct relationships between erg and sat, sat and bii and erg and hth were significant at .05 level. The path from erg->hth->bii was not investigated for mediating effect of hth in the relationship between erg and bii to use ICT

On the path erg->sat->bii, where significance was established, we estimated the model without and with the relationship between erg and bii. Figure 1 and figure 2 respectively portray the models without the direct relationship and with the direct relationship. The revised model with the direct relationship shows significant reduction in the $\chi 2$ estimate, which means, there is substantive improvement in model fit and insignificant path estimate between erg and bii. This esults suggest that full mediation is supported

3. Presentation of Results

Figure 2 presents the final model with the corresponding fit indices. The model's chi square ($\chi 2$) =108.366, degrees of freedom df=80 and p-value=.019 which suggest model is significant at .05 degree, however, other fit indices were within the acceptable range, which suggest a good model fit. The other fit indices are $\chi 2/df$ =1.355, RMSEA=.019, CFI=.995, TLI= .994 and AGFI=.978 all suggesting good model fit

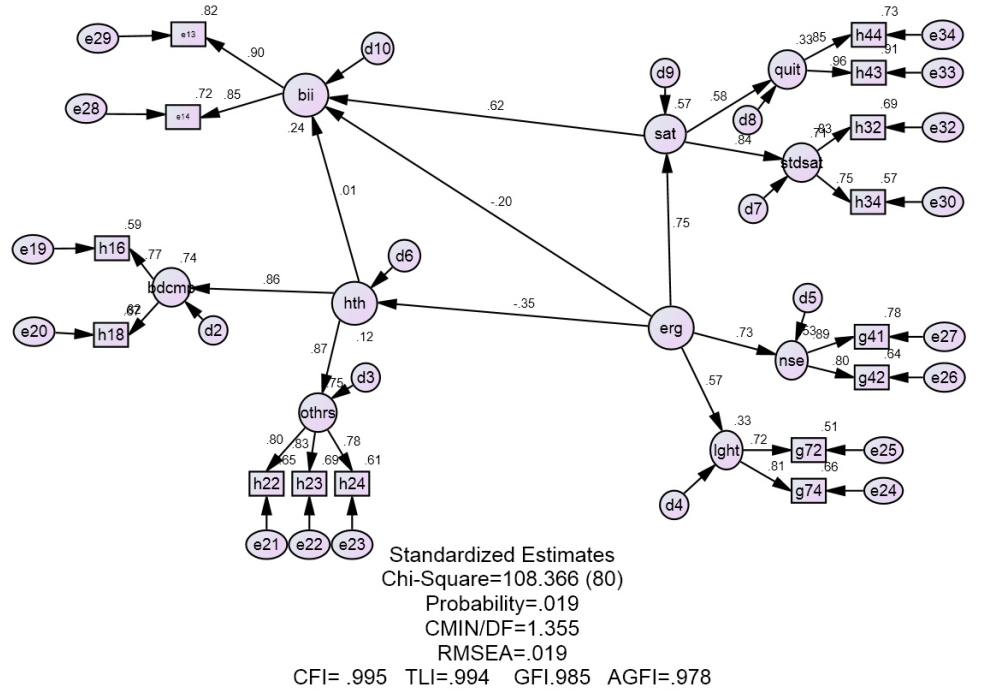


Figure 2. Final Structural model

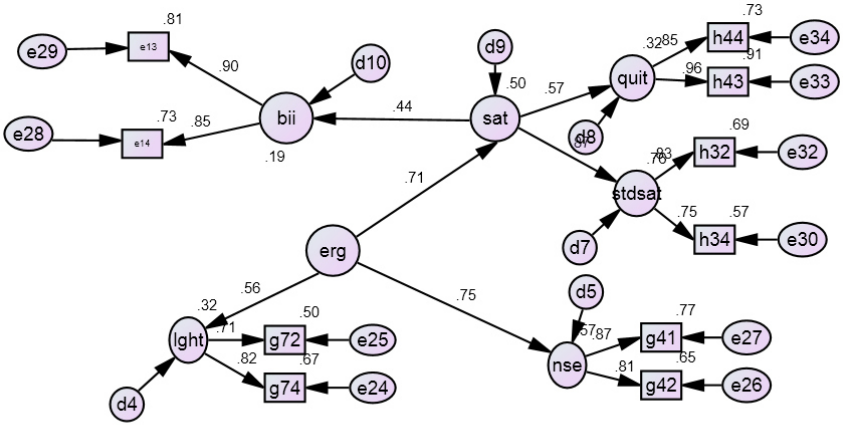
Table 1 and Table 2 present results from the mediation effect of the two variables health issues and satisfaction. In Table 1 are the standardized regression estimates of all the direct relationships. The results show that the relationships erg->sat, erg->hth and sat->bii are significant at .05 while the relationships hth->bii and erg-> bii are insignificant at .05. Therefore, the path from erg -> hth-> bii was not investigated for mediating effect of hth in the relationship between ergonomics and behavioural intention to use ICT

The direct effect of ergonomics on satisfaction and health issues are statistically significant. However, the relationship between ergonomics and satisfaction is direct while the relationship with health issue is indirect. The effect of the mediating variable (satisfaction) on behavioural intention is direct and statistically significant. On the other hand, the effect of the other intermediate variable (health issues) on behavioural intention is direct but statistically insignificant.

Table 1. Standardized regression estimate for all direct and without direct relationship

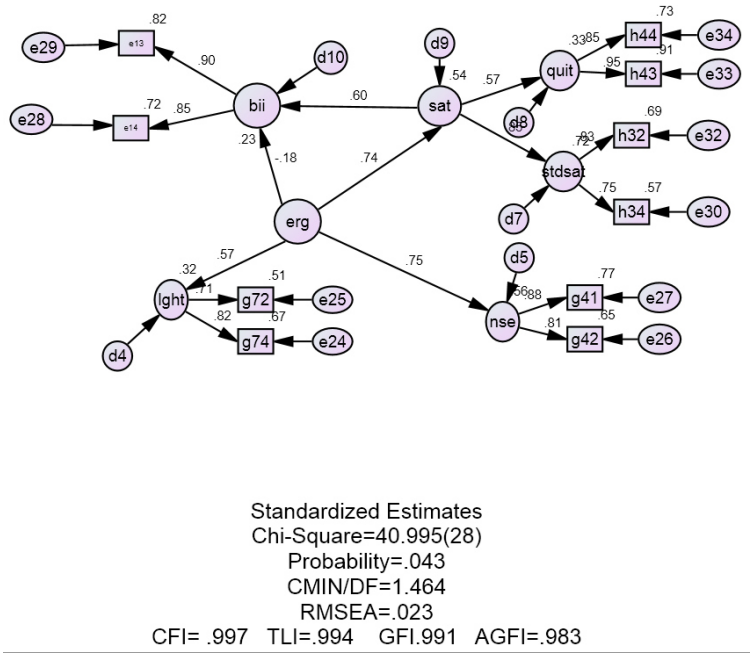
All direct relationship				Without the direct relationship			
			Estimate				Estimate
sat	<---	erg	.753*	sat	<---	Erg	.709*
hth	<---	erg	-.346*	bii	<---	Sat	.438*
bii	<---	sat	.625*				
bii	<---	hth	.008				
bii	<---	erg	-.204				

Table 1 also displays the results of Standardized regression estimate for revised model without the direct relationship. The estimates between the relationship erg->sat and sat->bii are significant at .05. Figure 3 depicts the model without the direct relationship between erg-> bii, however, the fit indices, $\chi 2$= 45.195, df=29 and p-value=.028, $\chi 2$/df=1.558, RMSEA=.024, CFI=.996, TLI=.994, GFI=.991 and AGFI=.982 suggest good fit. The revised model with the direct relationship, portrayed in figure 4 with fit indices, $\chi 2$= 40.995, df=28 p-value=.043, $\chi 2$/df=1.464, RMSEA=.023, CFI=.997, TLI=.994, GFI=.991 and AGFI=.983 also suggests good model fit. There is also a substantive improvement in the model fit ($\Delta\chi 2$= 4.2, df=1, p=.040 see Table 3 for details), however, the direct effect of erg->bii is not significant. Hence, these results suggest complete mediation



Standardized Estimates
Chi-Square=45.195 (29)
Probability=.028
CMIN/DF=1.558
RMSEA=.024
CFI= .996 TLI=.994 GFI.991 AGFI=.982

Figure 3. Model without the direct relationship



Standardized Estimates
Chi-Square=40.995(28)
Probability=.043
CMIN/DF=1.464
RMSEA=.023
CFI= .997 TLI=.994 GFI.991 AGFI=.983

Figure 4 Model with the direct relationship

Table 3. Testing of Mediation

Model Elements	Model Without Direct	Revised Model With direct	Difference
$\chi 2$ (Chi Square)	45.195	40.995	4.2
Degrees of freedom (*df*)	29	28	1
Probability	0.028	.043	.040
RMSEA	.024	0.023	
CFI	.996	0.997	
Standardized Parameter Estimates			
erg -> sat	0.709*	0.736*	
sat->bii	0.438*	0.601*	
erg->bii	not estimated	-0.182	
Erg->hth	not estimated	-.346*	

* Statistically significant at .05 level

4. Discussion

The findings from the study reveal that the effect of ergonomics on satisfaction and health issues are statistically significant. However, the relationship between ergonomics and satisfaction is direct while the relationship between ergonomics with health issue is indirect. The effect of satisfaction on behavioural intention is direct and statistically significant. Nonetheless, the effect of health issues on behavioural intention is direct but statistically insignificant. The findings of the research also show that, ergonomic factors have direct influence on behavioural intentions of students to use ICT but the effect is statistically insignificant. These results suggest that satisfaction mediate the relationship between ergonomics and behavioural intention, but health issues do not mediate the relationship. The results imply that satisfaction explains the relationship between ergonomics and behavioural intention to use ICTs for learning and research. In other words, for ergonomics interventions to influence students' intention to use ICTS, then students must be completely satisfied with them.

The findings from the research establish that satisfaction completely mediates the relationship between ergonomic factors and behavioural intention to use ICT for learning and research by students. However, health issues do not mediate the relationship between ergonomics factors and intention to use ICTs for learning and research by students in higher education. It presupposes that, students must be satisfied with the ergonomics interventions before intentions to use ICTs for learning and research would be influenced. It is also evident from the result that ergonomic factors have indirect relationship with health issues. This suggests that carefully thought out ergonomic interventions would minimize health related issues with the use of ICT.

5. Conclusion

Having established that satisfaction explains or mediates the relationship between ergonomics factors and intention to use ICT for learning and research by student but health issues do not explain. It implies that for congenial environment to affect students' behavioural intention to use ICT for learning and research, then students must be satisfied with the ergonomic factors in place otherwise, there will be no effect on intention. With respect to health issues such as somatic complaints, fatigue, burnout that do not mediate the relationship between ergonomics and behavioural intention to use ICT, improvement in ergonomics factors would minimize health problems associated with the use of ICT.

It is prudent for administrators to ensure that congenial environment is maintained for students to use ICTs, however, students must be satisfied with the environment, both internally and externally otherwise the congenial environment would have no effect on intentions of students to use ICT. Again, it is imperative for administrators to ensure that health related issues be minimized by providing good ergonomic intervention

The results from this research reveal theoretical and practical applications valuable of future study. It is imperative to examine how students of higher educational institutions adopt ICTs for learning and research in future. The findings of this research suggest that satisfaction mediates the relationship between ergonomics and behavioural intention, but health issues do not mediate the relationship between ergonomics and behavioural intention. The researchers therefore strongly argue for the incorporation of the three variables ergonomics factors, satisfaction and health in technology acceptance model when investigating behavioural intentions of students to use ICT for learning and research.

Administrators must carefully design lecture halls to ensure acceptable and comfortable environment for ICT usage for learning and research by ensuring adequate noise and temperature levels and adjustable chairs within the lecture halls. In addition, they must ensure that the noise level outside the lecture halls are monitored and controlled. Access to the institutions internet services and other servers should be uninterrupted. Lastly, the administrators must facilitate the purchase of laptops for students to minimize dependence on the computers provided by the institutions.

6. References

Browne, M. W, & Cudeck R. (1993). Alternative ways of assessing model fit. In K.A Bollen & JS Long (Eds.), *Testing structural equation models* (pp.136-162) Newbury Park, CA: Sage

Chau, P.Y.K. and Hu, P.J.-H. (2001), "Information technology acceptance by professionals: A model comparison approach," *Decision Sciences*, 32(4), 699-719.

Chin, W. W. and Todd, P. A. (1995), "On the Use, Usefulness, and Ease of Use of Structural Equation Modeling in MIS Research: A Note of Caution," *MISQuarterly* (19) 2 (June), pp. 237-246.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3) 319-340.

DeStefano, TJ., Clark, H., Gavin, M. & Potter, T. (2006). The Relationship between Work Environment Factors and Job Satisfaction Among Rural Behavioral Health Professionals. Journal *of Rural Community Psychology*, E9(2) Retrieved from: http://www.marshall.edu/jrcp/DeStefano.pdf.

Dudley, S.E. and W.B. DeLong. (2001), OSHA's Ergonomics Program Standard and Musculoskeletal Disorders: An Introduction. Journal of Labor Research 22(1): 1-14.

Dul J and Weerdmeester B. Ergonomics for Beginners, (3rd edition)**.** London, Taylor & Francis, 2008. ISBN: 9781420077513.

Hagberg M, Silverstein B, Wells R, Smith M, Hendrick H, Cararyon P, Perusse M (1995): Chapter 4 Identification, measurement and evaluation of risk pp 139–212. In Kuorinka, Forcier (eds): Work-Related Musculoskeletal Disorders—A Manual for Prevention. Taylor & Francis, London.

Hair, J.F., Black, W.C., Babin, B.J., & Anderson, R.E. (2010). Multivariate Data Analysis. Seventh Edition. Prentice Hall, Upper Saddle River, New Jersey.

Hoelter, J.W. (1983). The analysis of covariance structures: Goodness-of-fit indices. Sociological Methods and Research, 11, 325-344.

Hu, L.T. and Bentler, P.M. (1999), "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives," Structural Equation Modeling, 6 (1), 1-55.

IEA - International Ergonomics Association. (2000). *In the discipline of ergonomics*. Retrieved from http://www.iea.cc

Karasek R and Theorell T. Healthy Work: Stress, Productivity, and the Reconstruction of Working Life**.** New York, NY: Basic Books, 1990. ISBN: 9780465028979.

Keaveney, Susan M. and Clifford E. Young (1997), "The Student Satisfaction and Retention Model (SSRM)," *working paper*, University of Colorado at Denver.

Lee S. Y & Brand J.L (2005). "Effects of control over office workspace on perceptions of the work environment and work outcomes", Journal of Environmental Psychology, Volume 25, Issue 3, September 2005, Pages 323–333

Legg S. (2007) Ergonomics in schools, Ergonomics, 50:10, 1523-1529, DOI:10.1080/00140130701584878, http://www.tandfonline.com/doi/pdf/10.1080/00140130701584878

Lim, S.Y. and Carayon, P. (1994) An integrated approach to cumulative trauma disorders in computerized offices: The role of psychosocial work factors, psychological stress and ergonomic risk factors, in SMITH, M.J. and SALVENDY, G. (Eds), Human Computer Interaction: Applications and Case Studies, Amsterdam:Elsevier, 880–885.

Muniamuthu, S. & Raju, R. (2010). The Influence of Psychosocial Factors on the Occurrence of Musculoskeletal Disorders Regarding VDT Users, European Journal of Scientific Research, 43(2), 291-293

Salancik, G., & Pfeffer, J. (1977) An examination of need satisfaction models of job attitudes. Administrative Science Quarterly, 22, 427-456.

Schwartz JE, Pickering TG, Landsbergis PA.(1996) Work-related stress and blood pressure: Current theoretical models and considerations from a behavioral medicine perspective. *Journal of Occupational Health Psychology* ;1:287-310.

Schwerha D. et al.,(2011) Integrating ergonomic factors into the decision to retire. *Human Resource Management Review*.

Seymour, Daniel T. (1993), On Q: Causing Quality in Higher Education, Phoenix, AZ: Orxy Press, 42.

Shackleton, T. L., Harburn, K. L., & Noh, S. (1997). Pilot study of upper-extremity work and power in chronic cumulative trauma disorders. Occupational Therapy Journal of Research, 17(1), 3-24.

Smith, T.J. (2007). The ergonomics of learning: Educational design and learning performance. Ergonomics, 50, 1530-1546. - See more at : http://www.thehumanfactorblog.com/2009/04/24/human-factors-and-k-12-education/#sthash.3MJg63Rq.dpuf

Toomingas, A., Theorell, T., Michalsen, H., & Nordemar, R. (1997). Associations between self related psychosocial work conditions and musculoskeletal symptoms and signs. Scandinavian Journal of Work, Environment and Health, 23, 130-139.

Westgaard & Winkel (1997), Ergonomic Intervention Research for Improved Musculoskeletal Health: A Critical Review, Human Factors and Ergonomics Society Annual Meeting Proceedings 12/1997; 20(6):463-500. DOI: 10.1016/S0169-8141(96)00076-5

APPENDIX A: ABBREVIATIONS

AGFI	Adjusted goodness of Fit Index
AIT	Accra Institute of Technology
AMOS	Analysis of Moments Structures
CFA	Confirmation Factor Analysis
CFI	Comparative Fit Index
CUC	Central University College
CVI	Cross-Validation Index
BII	Behavioral intentions
ERG	Ergonomics factors
HTH	Health Issues
ICT	Information Communication and Technology
KNUST	Kwame Nkrumah Science and Technology
MI	Modification Index

MUCG	Methodist University College Ghana
NFI	Normed Fit Index
RMSEA	Root Mean Square Error of Approximation
SAT	Satisfaction
SEM	Structural Equation Modeling
SPSS	Statistical Package for the Social Science
TLI	Tuckler Lewis Index
UCC	University of Cape Coast
UG	University of Ghana