THE MEDIATING ROLE OF ACADEMIC ACHIEVEMENT MOTIVATION AND TECHNOLOGY USE ON PERCEIVED ACADEMIC CLIMATE AND ACADEMIC PERFORMANCE OF POLYTECHNIC STUDENTS

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ABSTRACT

This study sought to determine the mediating role of Academic Achievement Motivation and Technology Use on Perceived Academic Climate and Academic Performance of Polytechnic Students. This study employed the descriptive research design of ex-post facto type. Four hundred and eighty-seven participants selected through the stratified random sampling technique, were used for the study. Three main instruments were used in collecting data, they are: Achievement Motivation Scale (AMS), Perceived Academic Climate Scale (PACS) and Technology Use Scale (TUS). The data collected were analyzed using correlation matrix and hierarchical multiple regression analysis in order to establish the relationship of the independent variables with the dependent variables. The results revealed that all the variables: Academic Achievement Motivation (R^2 = .149, β = .29, $F_{(2,484)}$ = 5.419, P < .05); Perceived Academic Climate (R^2 = .251, β = .57, $F_{(3,483)}$ = 7.003, P < .05); and Students' Academic Performance (R^2 = .156, β = .34, $F_{(4,482)}$ = 2.58, P < .05) separately contributed significantly to the prediction of technological use among the students. Students who reported higher level of academic achievement motivation and perceived the academic climate positively, as well as those with higher level of academic performance showed higher level of technological usage. Based on the findings, recommendation and conclusion were drawn.

Key Words: Technology use, academic achievement motivation, perceived academic climate, academic performance, polytechnic students

Introduction

Information and Communication Technology (ICT) is one of the most important driving forces promoting economic growth in the economy. As ICTs are being increasingly used in education, indicators to monitor their impact and demonstrate accountability to funding sources and the public are ever more needed. Indicators are required to show the relationships between technology use and educational performance. There is also a need to show that education should be seen as using technology not only as an end in itself, but as a means to promote creativity, empowerment and equality and produce efficient learners and problem solvers (Aristovnik, 2012).

Studies in the past have established the impact of technologies on student's achievement and on the returns of education but this study are set out to find out the mediating role of academic achievement motivation and technology use on perceived academic climate and academic performance of polytechnic students.

Technology Use and Academic Performance

Jehanzeb & Bo (2013) assert that with the widespread availability and use of personal microcomputers at homes and schools, a large body of literature has emerged during the last two decades suggesting that computer use can have a positive effect on academic achievement. In this respect academic achievement is usually understood to mean performance on both standardized and non-standardized assessments (such as grade point average [GPA]) in general areas of literacy (House, 2010; Junco, 2012; Wit, Heerwegh, & Verhoeven, 2012). Computer use by both the teachers (computer assisted instruction [CAI]) and students have been shown to have a direct and generally positive effect on academic achievement (Chandra & Lloyd 2008; Kulkarni, 2013; Park, Khan & Petrina, 2009).

In a sample of 130 students from a middle school in Ohio, Lei & Zhao (2007) investigated the effect of quantity and quality of computer use on academic achievement, their analysis of variance results showed that both quantity and quanlity are significant predictors of academic achievement. Also, Jehanzeb & Bo (2013) found that both the quantity and quality of computer usage were found to be significant predictors of achievement.

Barrow et al. (2009) found that technology use had a positive effect on students' test scores. Similarly, Banerjee et al. (2005) found that use of technology improve students' academic performance in computer-assisted mathematics instruction. Other studies have found little or no effect. On the other hand, Leuven et al. (2007), Goolsbee & Guryan (2006), Angrist & Lavy (2002), and Rouse & Krueger (2004) found no evidence that the use of technology (computers and software) had a positive impact on students' achievement. Therefore, additional research is needed to understand the circumstances under which use of technology can have a positive impact on students' learning outcomes.

Academic Achievement Motivation and Academic Performance

The concept of academic achievements motivation can be described as various factors or indices that promote the actualization of ones goals or intention in a scholastic endeavour. In order words, it could be referred to as propelling gravitational force which helps to enhance

the attainment of an individual's objective in academic activities. Such gravitational force or galvanizing impetus could be internally or externally influenced.

Academic achievement motivation affects not only how well a student learns new skills and information, but also how well the student uses existing skills and knowledge in both familiar and novel situations (Lepper, 1983). There is convincing evidence that a variety of achievement deficits, such as those observed in under-prepared students, are the result of motivational problems rather than factors directly attributable to specific cognitive abilities (Resnick & Klopfer, 1989). Therefore, approaches to the design of effective instructional practices should be guided by knowledge of factors that impede or contribute to academic achievement motivation.

Most studies to date have examined the relationship between motivation and academic achievement primarily with regard to intrinsic versus extrinsic motivation orientations Anderman, & Maehr, (1999).; Zimmerman, Bandura, & Martinez-Pons, 1992). Generally, intrinsic orientation refers to motivation associated with internal and personal factors such interests and enjoyment, whereas extrinsic orientation refers to motivation created by external factors such as rewards, punishment, and peer pressures (Deci & Ryan, 1985; Reeve, 1996).

A collection of past findings have shown that students who are intrinsically motivated persist longer, conquer more challenges, and demonstrate accomplishments in their academic endeavors than those who are extrinsically motivated (Ames, 1992). Students with extrinsic goals tend to focus on obtaining rewards, earning higher grades, and winning peer students' approval because they perceive their behaviours as controlled by external rather than internal factors. Researchers (Biehler & Snowman, 1990) believe that extrinsic motivational factors diminish students' intrinsic motivation.

According to Husman and Lens (1999), highly intrinsically motivated students can simultaneously be extrinsic in terms of future goal orientations. Students' extrinsic motivational factors combined with positive future goals can actually facilitate their present value and intrinsic motivation (Van Calster, Lens, & Nuttin, 1987). For example, several ethnographic studies of African American (O'Connor, 1997; Rowley, 2000) found that students, who related extrinsic factors to positive future goals were more engaged in school and received better grades. Understanding the relationship between the utility and importance of future outcomes of tasks may facilitate present value and intrinsic motivation of the tasks. This would imply that high academic performance goals with extrinsic factors do not necessarily diminish the effect of students' intrinsic motivation but operate together with various modes of motivation.

Recent researchers recognize extrinsic orientations related to students' social reasons such as social approval and social concerns (Dowson & McInerney, 1997, 2001; Urdan & Maehr, 1995). Dowson and McInerney (2001) found a positive relationship between students' social goals and effective engagement in learning. Students employed social elements in order to optimize their academic skills. Students' concerns about others, social affiliations, and social

responsibilities were the most salient academic motivation and directly influenced students' academic achievements.

A pilot study by Langley (2002) served to determine if high and low achieving students differed in their levels of achievement motivation for the course, and to indicate whether it was reasonable to expect to find strategy differences between them. Results from the pilot using a sample size of 20 suggested that four of the five motivational factors may be statistically significant. The motivational factor pertaining to time and study environment was not found to be statistically significant.

Perceived Academic Climate and Students' Achievement Motivation

Academic climate or school climate reflects the physical and psychological aspects of the school that are more susceptible to change and that provide the preconditions necessary for teaching and learning to take place (Gonder & Hymes, 1994). Academic climate is evident in the feelings and attitudes about a school expressed by students, teachers, staff and parents— the way students and staff "feel" about being at school each day. School climate is a significant element in discussions about improving academic performance and school reform. It is also mentioned in discussions of potential solutions to problems such as bullying, inter-student conflicts, suicide, character education, and moral education. Studies have shown that academic climate is an important factor in determining students' academic success, and has also been linked to students' achievement motivation (Ryan, et al., 1998; Turner, et al., 2002).

Perceptions of the academic climate are most commonly examined in the context of research on school climate. Previous research regarding this construct has repeatedly demonstrated positive relationship between school climate and academic achievement, as well as decreased instances of misconduct and aggression (Griffith, 1999; Kuperminc, Leadbeater, & Blatt, 2001). Recently however, research has focused increasingly on students' perceptions of climate as it has been shown to influence their academic and behavioral performance (Koth et al., 2008). Griffith (2002) found that individual and school level perceptions of climate were positively associated with GPA.

The study of Turner, Meyer, Anderman, Midgley, Gheen, & Kang (2002) on how classroom structure affects students' propensity to use avoidance strategies when learning maths showed that students with teachers who focused on mastery goals exhibited less avoidance in learning novel concepts in their maths classes. Both of these studies demonstrate ways in which students' perception of their academic climate have been shown to relate to their achievement motivation and academic performance.

Roeser & Eccles (1998) cited in Wikins (2006) examined students who perceived the same academic climate in two different ways. These students reported positive teacher regard and an emphasis on individual improvement. Other students perceived the academic climate to be ability focused (similar to a task-performance climate as described previously), focusing primarily on performance. These students further reported that teachers treated students differentially according to ability and emphasized competition in the classroom. Students who perceived a task-focused school climate also showed increases in academic achievement

(as measured by grades) and academic values, whereas students' who perceived an ability-focused school climate demonstrated significantly lower levels on both academic outcomes. This study shows that students who perceive their academic climate to be more effort-focused demonstrate better academic outcomes than students who perceive their academic climate to be more ability-focused.

Many previous studies examined the influence of academic climate and some individual variables, for example, academic self-efficacy in the educational institutes in order to determine what main factors may affect both students' performance and achievement level. Some of those studies concentrate on examining the relationship between academic climate and students' academic performance (Smith, 2002; Hoy, Tarter and Hoy, 2006; Macneil, Prater and Busch, 2009), while other studies, have shown that academic self-efficacy is positively associated with grades in college (Akomolafe, Ogunmakin & Fasooto, 2013; Zajacova, Lynch, & Espenshade, 2005; Sharm & Silbereisen, 2007). Also, Canpolat (2012) reported a mediating effect of self-efficacy in the relationship between academic climate and goal orientations.

By and large, there is scarcity of research on the mediating role of technology use and academic achievement motivation on perceived academic climate and academic performance of polytechnic students. Therefore, this study is designed to fill such research gaps in in Ogun State, Nigeria.

Research Hypotheses

In order to achieve the purpose of this study, the following hypotheses were tested at the .05 level of significance.

1. Students who report higher level of academic achievement motivation will exhibit higher technological use.
2. Students who experienced higher level of positive academic climate will exhibit higher technological use.
3. Students who report higher level of academic performance will exhibit higher technological use.
4. Perceived academic climate will moderate technological use – academic achievement motivation relationship in a positive direction.
5. Students' academic performance will moderate technological use – academic achievement motivation relationship in a positive direction.

Research Methodology

Sample: This survey study had a research sample consisting of 500 randomly selected students of Federal Polytechnic Ilaro, Ogun State. They were made up of males 203 (40.6%) and 284 females (56.8%). The age range of the students at the time of data collection was 15 to 28 years with a mean age of 22.7 years and standard deviation of 8.6. The participants of this study have spent more than one academic session within the institution. Of the 500 questionnaires distributed 487 were completely filled while 13 were incomplete. This gave a return rate of 97.4%.

Measures: Three validated instruments were used for that collection apart from the personal attributes scale as shown hereunder.

1. Achievement Motivation Scale (AMS) Achievement Motivation was measured using the Academic Achievement Motivation Scale (AMS; Vallerand et al., 1992). The AMS consists of 28 items assessed on a 7-point scale. There are seven subscales on the AMS: A motivation (AMOT), External Regulation (EXTR), Introjected Regulation (INTR), Identified Regulation (IDTR), Intrinsic Motivation to Know (IMTK), Intrinsic Motivation to Experience Stimulation (IMES) and Intrinsic Motivation to Accomplish (IMTA). The items are rated on a scale, ranging from one (does not correspond at all) to seven (corresponds exactly). Each subscale consists of four items each; thus subscale scores can range from four to twenty-eight. A high score on a subscale indicates high endorsement of that particular academic motivation. The internal consistency reliability of the AMS by Cronbach's alpha = .79. The scale was found to be suitable for Nigerian samples.

2. Perceived Academic Climate Scale (PACS) Self-developed questionnaire of a 12-item in Likert's scale, with four given values – 1. Strongly disagree, 2. Disagree, 3. Agree, and 4. Strongly agree - that measures students' perception of academic climate with regard to the physical environment, available facilities (human and non-human), and discipline (course of study). For this study PACS yielded a coefficient alpha of .86.

3. Technology Use Scale (TUS): TUS was used to measure the construct of technology use for academic success in this study. This was measured by 12 items using a 5-point Likert response format. The internal consistency reliability of the TUS by Cronbach's alpha = .81.

To gather information on students' academic performance, the researchers personally went into the various departments that participated in the study and collected data by interacting with the students. Before hand over questionnaire form to students, we approached and make sure that students are not one academic year and had GPA result which is compulsory variable of our study.

Control Variables: Two control variables included in this study were: course of study and gender. These variables were measured as follows:

Course of study: The respondents were requested to report their course of study as either science-oriented course or not, and was coded as follows: science-oriented = 1 and non-science oriented = 2.

Gender: Respondents were asked to report their gender. In the data compilation, gender was coded as follows: male = 1 and female = 2.

Data Analysis: Data collected were analyzed using correlation matrix and hierarchical multiple regression analysis in order to establish the relationship of the independent variables with   the dependent variables.

Research Results

Table 1: Means, standard deviation and correlations for all variables in the study

S/N	Variable	1	2	3	4	5	6
1	Gender	1.00					
2	Discipline	.03	1.00				
3	Technology Use	.11	.26	1.00			
4	Academic Achievement Mot.	.09	.20*	.35**	1.00		
5	Perceived Academic Climate	.05	.16	.31**	.47*	1.00	
6	Academic performance	.07	.25*	.19	.41**	.33**	1.00
	Mean	.37	1.2	28.7	61.3	31.9	3.57
	Standard Deviation	.08	.16	8.96	19.34	8.41	.81

*Note: N =487, *P<.01 (2-tailed), **P<.05 (2-tailed)*

Table 1 portrays the correlation between technology use and academic achievement motivation that was significant and positive (r = .35, P < .05). This result indicated that there is sustenance for a direct relationship between technology use and academic achievement motivation. The first hypothesis was supported because participants that reported higher level of technology use exhibited higher academic achievement motivation as well. As shown hereunder in the results presented on Table 1, academic achievement motivation was found to be positively related to technology use (r = .39, P < .05); perceived academic climate (r = .47, P < .05); and academic performance (r = .33, P < .05). Therefore hypotheses 1, 2 and 3 are supported indicating that students that had higher level of academic achievement motivation, perceived academic climate and academic performance exhibited higher level of the usage technology in enhancing their academic career. Also, this result shows that technology use was found to be positively related to students' discipline (r = 26, P < .01) and gender (r = .17, P < .05).

The hierarchical regression procedure was performed, whereby the use of technology to enhance academic success was regressed on demographic factors (step 1), academic achievement motivation (step 2), perceived academic climate (step 3), students' academic performance (step 4), while step 5 examined the moderator effects of perceived academic climate, students' academic performance in the academic achievement motivation – technology use relationship by testing the significance and form of the main and interaction terms as specified in hypotheses 4 and 5. The results on Table 2 step 1 indicate that the secondary independent variable (demographic factors: discipline and gender) significantly and separately moderated students' use of technology to enhance academic success (Adj. R^2 = .04, df $_{(1, 485)}$ = 3.876, p < .05).

Table 2: Hierarchical Multiple Regression Analysis of Academic Achievement Motivation, Perceived Academic Climate and Academic Performance of Polytechnic Students, and Demographic Factor on Technology Use

S/N Variable	R	R^2	R^2 Adj	F	df	β	t-value
Step 1 (Demographic)	.21	.04	.04	3.876*	1, 485		
Gender						.05	
Discipline						.13	
Step 2							
Acad. Achievement Mot.	.388	.151	.149	5.419*	2, 484	.2	2.93*
Step 3							
Perceived Acad. Climate	.507	.257	.251	7.003*	3, 483	.57	3.72*
Step 4							
Academic Performance	.396	.156	.156	5.660*	4, 482	.34	2.58*
Step 5							
Interactions	.586	.343	.339	9.211*	5, 481		
AAM X PAC						.41	4.41*
AAM X AP						.29	2.39*

Note: N =487, *P<.05 (2-tailed), AAM: Academic Achievement Motivation, PAC: Perceived Academic Climate, AP: Academic Performance

However, in order to determine the joint contributions of the academic achievement motivation and the moderator variables to technology use, academic achievement motivation was entered first into the regression equation, followed by perceived academic climate, and students' academic performance in steps 2, 3 and 4 respectively, while the interaction terms were entered in step 5. As shown in Table 2 above, all the variables: academic achievement motivation (R^2 = .149, β = .29, $F_{(2,484)}$ = 5.419, P < .05); perceived academic climate (R^2 = .251, β = .57, $F_{(3,483)}$ = 7.003, P < .05); and students' academic performance (R^2 = .156, β = .34, $F_{(4,482)}$ = 2.58, P < .05) separately contributed significantly to the prediction of technological use.

Furthermore, it was found that perceived academic climate interacted significantly with academic achievement motivation to predict technological usage among the students in order to improve their academic performance. This means that the relationship between academic achievement motivation and use of technology is affected by the perceived academic climate (β = .41, t = 4.41, P < .05). Students who reported higher level of academic achievement motivation and perceived the academic climate positively showed higher level of technological usage while those with low level of academic achievement motivation and perceived the academic climate negatively showed lower level of the use technology to improve their academic behaviour/success.

Students' academic performance (β = .29, t = 3.39, P < .05) was also found to significantly interact with academic achievement motivation to predict technology use. It can be deduced therefore that students with higher level of academic achievement motivation and academic performance reported higher level of the use technology to improve their academic

behaviour/success. These outcomes show that hypotheses 4 and 5 were buttressed. This is an evidence that perceived academic climate and academic performance moderate the technology use – academic achievement motivation relationship in a positive direction.

Discussion

This study examined the relationship between technology use and academic achievement motivation and the moderating roles played by demographics, perceived academic climate and academic performance in that relationship. Students who report higher level of academic achievement motivation were found to exhibit higher technological use did support hypothesis one. It can be deduced from this finding that students who are academically motivated will take the advantage of technological application to improve their academic career. The result agreed with previous researchers (Chandra & Lloyd 2008; Kulkarni, 2013; Park, Khan & Petrina, 2009) that reported that computer use has been a motivating factor for both the teachers and students, and have been shown to have a direct and generally positive effect on academic achievement.

The hypothesis that stated that students who experienced higher level of positive academic climate will exhibit higher technological use is time-honored by the outcome of the findings. This result is in line with the findings from a number of studies that support a focus on students' perceptions of the environment as opposed to more objective aspects, finding them to be most relevant for understanding students' adjustment and wellbeing (Connell & Wellborn, 1991; Eccles et al., 1993; Way, Reddy, & Rhodes, 2007). Also, the findings of Brockmeir, Sermon, & Hope (2005) and Golden, (2004) that no other educational tool has held the promise for changing our educational culture and enhancing student performance like technology lend a good support to this study.

The finding that students who report higher level of academic performance will exhibit higher technological use was also supported. These results agree with previous studies (Jayson, 2008; Shaheeda et al., 2007; Shaikh, 2009; Yusuf, & Afolabi, 2010) that argued that technology helps to improve the quality of learning and educational outcomes. The findings of this hypothesis sharply contradicts the findings of Fuchs & Woessman (2004), Leuven et al. (2004) or Goolsbee & Guryan (2002) find no real positive effect of the use of ICT on educational results.

Hypothesis 4 and 5 that students who reported higher level of academic achievement motivation, positively perceived the academic climate, and academic performance were found to show higher level of technological usage while those with low level of academic achievement motivation, academic performance and perceived the academic climate negatively showed lower level of the use technology to improve their academic behaviour/success. Students' academic performance will moderate technological use – academic achievement motivation relationship in a positive direction. The finding that perceived academic climate will moderate technological use – academic achievement motivation relationship in a positive direction confirms hypothesis 4 and therefore supported the work of previous researchers who claimed that school climate is an important factor in the academic and behavioral performance. Also, positive individual perceptions of school

safety and students' expectations were consistently associated with better performance on GPA. And that technology helps to improve the quality of learning and educational outcomes (Brockmeir, Sermon, & Hope, 2005; Jayson, 2008; Kulkarni, 2013; Yusuf, & Afolabi, 2010). That students' academic performance will moderate technological use – academic achievement motivation relationship in a positive direction confirms hypothesis 5 and supports the work of Barrow et al. (2009) who found that technology use had a positive effect on students' test scores. Similarly, Banerjee et al. (2005) found that use of technology improve students' academic performance.

Conclusion and Recommendations

The findings of this study however had shown the mediating role of academic achievement motivation and technology use on perceived academic climate and academic performance of polytechnic students.

Perceived academic climate and academic performance were moderators of the relationship between use technology and academic achievement motivation in a positive direction. Also, gender and students' discipline were found to significantly and separately moderated technology usage among polytechnic students.

The use of computer should be encouraged in the polytechnics as computer use has been a motivating factor for both the teachers and students, and have been shown to have a direct and generally positive effect on academic achievement. Technology helps to improve the quality of learning and educational outcomes

Consideration should be given to academic climate as it was found contributing to students' academic success, and has also been linked to students' achievement motivation for understanding students' adjustment and wellbeing.

References

Abd-Elmotaleb, M. & Saha, S. K. (2013). The role of academic self-efficacy as a mediator variable between perceived academic climate and academic performance. Journal of Education and Learning; 2(3), 117-129

Ames, C. (1992). Classrooms: goals, structures, and student motivation. *Journal of Educational Psychology*, *84* (3), 261-271.

Anderman, E. M. & Maehr, M. L. (1999). Declining motivation after the transition to middle school: schools can make a difference. *Journal of Research and Development in Education, 32*, 131-147.

Angrist, J. & V. Lavy. (2002). New evidence on classroom computers and pupil learning. *Economic Journal* 112: 735-765.

Banerjee, A. et al. (2007). Remedying education: evidence from two randomized experiments in India. *Quarterly Journal of Economics* 122(3): 1235-1264.

Barrow, L., L. Markman, & C. Rouse. (2009). Technology's edge: The educational benefits of computer-aided instruction. *American Economic Journal: Economic Policy* 1(1): 52-74.

Bell, R.M., and D.F. McCaffrey. 2002. "Bias Reduction in Standard Errors for Linear Regression with Multi-Stage Samples." *Survey Methodology* 28(2): 169-181.

Biehler, R. F., & Snowman, J. (1990). *Psychology Applied to Teaching* (6th ed.). Boston: Houghton Mifflin.

Brockmeir, L., Sermon, J., & Hope, W. (2005). Principals' relationship with computer technology. *NASSP, 89*, 45-63.

Chandra, V. & Lloyd, M. (2008). "The methodological nettle: ICT and student achievement." *British Journal of Educational Technology,* vol. 39, no. 6, pp. 1087-1098.

Cokley, K. O. (2000). An investigation of academic self-concept and its relationship to academic achievement in African American college students. *Journal of Black Psychology*, *26*, 148-164.

Deci, E. L & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior.* New York: Plenum

Dowson, M., & McInerney, D. M. (1997). *Psychological parameters of students' social and academic goals: a qualitative investigation*. Paper Presented at the Annual Meeting of the American Educational Research Association, Chicago.

Dowson, M., & McInerney, D. M. (2001). Psychological parameters of students' social and work avoidance goals: a qualitative investigation. *Journal of Educational Psychology, 93*(1), 35-42.

Fuchs, T., & Woessmann, L. (2004). Computers and student learning: bivariate and multivariate evidence on the availability and use of computers at home and at school, *CESifo Working Paper*. No. 1321. November. Munich.

Golden, M. (2004). Technology's potential, promise for enhancing student learning. Retrieved September 30, 2013, from http://thejournal.com/articles/16840_2

Gonder, P. O., & Hymes, D. (1994*). Improving school climate and culture* (AASA Critical Issues Report No. 27). Arlington,VA: American Association of School Administrators.

Goolsbee, A., & Guryan, J. (2006). The impact of internet subsidies in public schools. *The Review of Economics and Statistics* 88(2): 336-347.

Goolsbee, A., & Guryan, J. (2002). The impact of internet subsidies in public schools, *NBER Working Papers* 9090, National Bureau of Economic Research, Inc.

Griffith, J. (2002). A multilevel analysis of the relation of school learning and social environments to minority achievement in public elementary schools. *The Elementary School Journal, 102,* 349–366.

Husman, J., & Lens, W. (1999). The role of the future in student motivation. *Educational Psychologist*, 34(2), 113-125.

Jayson, W. R. (2008). ICT in education reform in Cambodia: problems, politics, and policies impacting implementation*. Information Technologies and International Development, 4*(4): 67–82.

Jehanzeb, R. C. & Bo, Z. (2013). Quantity and quality of computer use and academic achievement: Evidence from a large-scale international test program. *International Journal of Education and Development using Information and Communication Technology (IJEDICT),* 9(2), 95-106

Kulkarni, M. (2013). The effect of varied ICT instructional approaches on students' academic achievement towards science in North Goa district." *Golden Research Thoughts*, 2(12), 1-7.

La Shawn, C. B. (2011). *Academic self-concept and academic achievement of African-American students transitioning from urban to rural schools.* A thesis submitted in partial fulfillment of the requirements for the Doctor of

Philosophy degree in Rehabilitation and Counselor Education in the Graduate College of The University of Iowa

Lent, R. W., Brown, S. D., & Gore, P. A. (1997). Discriminant and predictive validity of academic self-concept, academic self-efficacy, and mathematics-specific self-efficacy. *Journal of Counseling Psychology*, *44*, 307-315.

Leuven, E., et al. (2007). The effect of extra funding for disavantaged pupils on achievement. *Review of Economics and Statistics* 89(4): 721-736.

Leuven, E., Lindahl, M., Oosterbeek, H., & Webbink, D. (2004). The effect of extra funding for disadvantaged pupils on achievement. *IZA Discussion Paper*. No. 1122. Bonn:Institute for the Study of Labor.

Park, H., Khan, S., & Petrina, S. (2009). ICT in science education: A quasi-experimental study of achievement, attitudes towards science, and career aspirations of Korean middle school students. *International Journal of Science Education*, 31(8), 993-1012.

Reynolds, W. M. (1988). Measurement of academic self-concept in college students. *Journal of Personality Assessment, 52*, 223-240.

Reynolds, W. M., Ramirez, M. P., Magrina, A., & Allen, J. E. (1980). Initial development and validation of the academic self-concept scale. *Educational and Psychological Measurement*, *40*, 1013-1016.

Rouse, C.E. & Krueger, A. (2004). Putting computerized instruction to the test: a randomized evaluation of a 'scientifically based' reading program. *Economics of Education Review* 23(4), 323-338.

Rowley, S. J. (2000). Profiles of African American College students' Educational Utility and Performance: A Cluster Analysis. *Journal of Black Psychology*, *26* (1), 3-27.

Shaheeda, J., Dick, N., & Laura, C. (2007). The role of ICTs in higher education in South Africa: One strategy for addressing teaching and learning challenges. *International Journal of Education and Development using Information and Communication Technology. 3*(4), 131-142.

Shaikh, Z. A. (2009). Usage, acceptance, adoption, and diffusion of information and communication technologies in higher education: a measurement of critical factors. *Journal of Information Technology Impact (JITI), 9*(2): 63-80.

Way, N., Reddy, R., & Rhodes, J. (2007). Students' perceptions of school climate during the middle school years: Associations with trajectories of psychological and behavioral adjustment. *American Journal of Community Psychology, 40*, 194-213.

Wilkins, N. J. (2006). Why try? Achievement motivation and perceived academic climate among Latino youth. A thesis submitted in partial fulfillment of requirements for the degree of Master of Arts in the College of Arts and Sciences, Georgia State University.

Yusuf, M. O., & Afolabi, A. O. (2010). Effects of computer assisted instruction (cai) on secondary school students' performance in biology. *The Turkish Online Journal of Educational Technology, 9*(1): 62-69.

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation from Academic Attainment: The role of Self-efficacy Beliefs and Personal Goal Setting. *American Educational Research Journal, 29,* 663-676.