The Effect of Teaching Using Preferred Learning Styles on Students' Performance, in Biology and Geography in Secondary Schools in Nairobi County, Kenya

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Abstract

In Nairobi County, students in both private and public schools have not been performing satisfactorily in sciences. A study therefore was done to establish the effect of matching of teaching styles with preferred leaning styles of students' performance in biology and geography. Multivariate analysis of variance in geography $F (1, 1315) = 2870.1$, $p = .000$) and in biology $F (1, 1315) = 2994.1$, $p = .000$), and linear regression in geography, $F (1, 1315) = 2870.056$, $p = .000$, and in biology, $F (1, 1315) = 2994.137$, $p = .000$ analysis showed statistically significant effect on performance of students taught using preferred learning styles. The findings lead to a conclusion that there is a need to inform teachers to identify, and teach their learners according to the learners' preferred learning styles to enhance their performance in sciences.

Key terms: Preferred Learning Styles, Biology, Geography, Teaching

Introduction

An analysis of repeated difficulty areas in performance of sciences, which refers to biology, chemistry, physics, and geography in Kenyan Education System in the last few years, indicates possible teacher-learner style mismatches in their learning process. In Biology Examination Reports of years 2006 to 2011 by Kenya National Examination Council (KNEC) on candidates' responses across the three Biology papers out of 84 difficulty items, 21 (25%) indicated common use of wrong spelling of biological terms, 14 (16.66%) incorrect use of biological terms, and 14 (16.66%) inadequate application of practical skills. A higher percentage, 35 (41.67%) indicated inadequate knowledge of the subject content (KNEC, 2007, 2008, 2010, 2011, 2012). In Chemistry and Geography, the situation was not different. An analysis of Chemistry Examination Reports of years 2006 to 2011 by KNEC on candidates' responses across the three Chemistry papers, out of 52 difficulty items 18 (34.62%), indicated inadequate exposure to practical procedures, 7 (13.46%) inability to write correct equations and symbols of reactants, and 6 (11.54%) weakness in stating accurately observation made. A higher percentage 21 (40.38 %) were on inadequate knowledge of content (KNEC, 2007, 2008, 2010, 2011, 2012).

Objective of the Study

The Objective of the Study was to determine the effect of teaching using to preferred learning styles on students' performance, in biology and geography in secondary schools in Nairobi County.

LITERATURE REVIEW

The Concept of Preferred Learning Styles and Creation of Mismatch among Students

The concept of preferred learning styles is the combination of characteristics of cognitive, affective, and psychological elements (Abidin, Rezaee, Abdullah & Singh, 2011). According to Bayrak (2012) learning styles are collections of personal characteristics, strengths, and preferences, describing how individuals acquire, store, and process information. The different factors that influence personal qualities include information processing modes, environmental and instructional preferences, cognitive capabilities, gender and personality features. The cognitive capabilities involve meta-learning which is the awareness of learning styles one possesses, which creates the need for high levels of meaningful learning to enhance creativity and new knowledge creation. It consists of a product (knowledge), thought process, (the routes to new learning), and a behavioural process, (the regulation of behaviours that enhance learning) (Alharbi, Paul, Henskens, & Hannaford, 2011). These elements determine the way of perceiving, interacting with, and responding to the learning environment. They determine how one particular individual will react to a specific situation and how he or she will behave in a unique or common learning situation (Abidin et al., 2011).

Most high school students are not aware of how they learn and why certain ways of learning resonate with them. Seifert (2016) noted that students do not tend to reflect on the learning processes that are most productive for them. They simply learn and produce outcomes with little thought of the process itself. However, students who are aware of their own learning styles easily adapt to varied teachers' instructions, which enhance performance in sciences. This also creates self-regulated learning, which does not completely rely on the teachers' participation. Furthermore, Hendry et al. (2005) have found that awareness of learning styles and choice of study strategy options are positively correlated to students' achievement. Hendry investigated how offering students different instructional options based on their learning styles affected learning outcomes in a positive way. It was observed that such offering had a significant effect on students' overall achievement. Conversely, Gilakjani (2012) examined how students cope with the experience of having to learn when their learning style does not match that of the teachers' style of teaching. Gilakjani (2012) found that students had lower achievement when teaching approaches did not match their learning styles and he advocated for adaptive instruction within their learning perception. Students who endure incongruent learning experiences suffer from diminished self-efficacy for tackling novel learning experiences in the future (Luedtke, 2016).

In a study in South Africa by Pather, Norodien-Fataar, Cupido, and Mkonto, (2017) to determine whether students awareness of their learning styles enhanced academic performance it was observed that students coming from the previously disadvantaged educational backgrounds were not aware of their own learning styles which could otherwise empower them to understand how to adequately be prepared for tertiary learning. In Kenya according to Musamali (2014), the

best performing schools have the practice of training their candidates on study skills, which articulate their learning styles, nevertheless, a gap remains in the literature of effect of matching of teaching styles with preferred learning styles and performance of students in biology and geography. In-depth research revealed three models that display what teachers should consider in their style of presentation of content to enhance performance of students. The three models include personality patterns model, perceptual model, and information-processing model.

Traditional Teaching Styles and Students' Performance, in Biology and Geography
Teaching at any level of education and type of school, private, or public has the sole purpose of ensuring that all learners can acquire information and apply those skills (Guirguis, & Pankowski, 2017). Therefore, it is incumbent upon all educators, to not only know their teaching style so that teaching has a two-fold purpose where teachers teach and students learn. Consequently, knowing how your students learn, and what strategies best fit your classroom and school are fundamental in the process of learning. The skill of teachers' perception in recognising and accommodating for diverse learning styles, in private and public secondary schools students need enhancement for better performance in sciences. However, just as people possess individual learning styles, teachers also have teaching styles that seem to works best for them. According to Neuro-Linguistic Programming (NLP) which is the science and art of communicating, to ourselves and others (Bandler, 2008), we communicate in almost the same way we receive, perceive and process information. Christenson (2010) defines teaching styles as a set of attitudes and actions that open a formal and informal world of learning to students. Teaching style is a pervasive quality in behaviour of an individual, way of approaching the learners, a quality that persists though the content may change and might be consistent with several methods of teaching (Felder, & Brent, 2017). These styles are founded on traditional teaching methods lectures, discussions, demonstrations, laboratories, projects, inquiry problem solving, and activities (Akhtar, & Saeed, 2017). The traditional teaching styles are either teacher centred or student centred who believe students have definite and fixed perceptions and ideas of their own roles and those of their teachers and includes the expert, formal authority and personal model styles, facilitator and delegator teaching styles (Mohanty, 2015). Mwangu and Sibanda (2017) observed that teachers used both teacher-centred and student-centred methods in teaching Biology practical lessons and various factors constrained the teaching of practical lessons inZimbabwe**.** In Kenyan Secondary Schools, the prescribed traditional teaching style is ASEI-PDSI (Activity-focused Student–centred learning Experiment Improvisation - Plan, Do, See, Improve) approach in teaching which have not yielded the expected high performance in the recent past (Makewa, Role, & Beigo, 2011).

Personality Patterns Model
As stated by Keirsey (2013) and Longchamp (2017), personality patterns model views learning styles as personal qualities that influence a student's ability to acquire information, to interact with peers and the teachers, and otherwise participate in learning experiences. This implies that there are personalities a teacher must demonstrate and practice during learning process in order to activate the innate qualities for learning to take place. In this sense, personality model seems to articulate aspects of learning that are motivational and critically influence learning. However, mismatch occurs in the event where teachers cannot accurately identify the preferred personality learning styles of the learners. Personality learning styles refers to distinctive behaviours, which serve as indicators of how a person learns from and adapts to his environment, and provide clues

as to how a person's mind operates (Al-Sarem, Bellafkih, & Ramdani, 2014).This implies that to match and sustain personality learning styles of different learners in a class teachers must develop emotional intelligence.

Methodology

The study employed quasi-experimental research design, which utilised a pre-test, treatment of experimental group and a post-test to estimate impact of an intervention of mismatch due to traditional teaching styles to preferred leaning styles on target population of 69,634 in 146 secondary schools in Nairobi County. Questionnaires and pre-test and post-test were used to collect quantitative data. A full disclosure of the nature of the study was given to subjects with an extended opportunity to ask questions and get their free consent to participate. The content and face validity of the two instruments were examined by experts and which were used to improve the tools before they were used to gather data. The reliability of treatment questionnaire and achievement test in pilot study were estimated using the Pearson's Correlation method and yielded a reliability coefficient of .723 and .955 respectively which were high enough to judge the instruments as reliable. The collected data was analysed with the aid of the Statistical Package for Social Sciences (SPSS) version 22. Data was described and summarized using, percentages, and means.

RESULTS

Determination of the Differences in Effect of Traditional Teaching and Teaching According to Preferred Learning Styles on Students' Performance, in Biology and Geography in Secondary Schools in Nairobi County. The first objective of this study was to determine the differences in effect of traditional teaching and teaching according to preferred learning styles, on students' performance, in biology and geography in secondary schools in Nairobi County. Determination of interaction effects of gender and school preceded the analysis of the main effect of treatment using MANOVA (multivariate analysis of variance) in SPSS windows version 22.The researcher wanted to find the differences in main effect of traditional teaching and teaching according to preferred learning styles on performance in biology and geography of students in private and public secondary schools in Nairobi County. The data used to compare, main effect traditional and preferred teaching styles was arranged in stacked format. Multivariate analysis of variance (MANOVA) of stacked data in SPSS windows was analysed using the command'Analyse' > 'General Linear Model' > 'Multivariate' > 'Model' > 'Custom' > 'Main effect' > 'Option' >' Descriptive statistcs', > 'Esimate of effects' > 'Observe power' > Ok .

Table 1*: Descriptive Statistics of Students Taught According to Traditional and Preferred Learning Styles.*

Sciences				
	Teaching style	**N**	**Mean**	**Std. Deviation**
Post-test Geography	Traditional	659	52.5296	8.50926
	Preferred	658	73.9559	5.73538
	Total	1317	63.2346	12.94161
Post-test Biology	Traditional	659	52.6222	8.30268
	Preferred	658	73.6307	5.30117
	Total	1317	63.1185	12.60637

Descriptive statistics (Table 1) revealed that students taught according to preferred learning styles had higher means scores in geography ($M = 74.0$, $SD = 5.74$) and biology ($M = 73.6$, $SD = 5.30$) compared to students taught according to traditional teaching styles in geography ($M = 52.5$, $SD = 8.51$) and biology ($M = 52.6$, $SD = 8.30$).Using general linear model (GLM) multivariate analysis of variance (MANOVA) of performance of students that taught according to traditional and preferred learning styles (Table 1) indicated that main effect of teaching according to preferred learning style on performance on performances of sciences was significant($p < .001$).

Table 2: *Multivariate Analysis of Variance of Performance Students Taught According to Traditional and Preferred Learning Styles*

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[c]
Corrected Model	Post-test Geography	151154.606[a]	1	151154.606	2870.056	.000	2870.056	1.000
	Post-test Biology	145317.345[b]	1	145317.345	2994.137	.000	2994.137	1.000
Intercept	Post-test Geography	5267531.435	1	5267531.435	100017.534	.000	100017.534	1.000
	Post-test Biology	5248170.563	1	5248170.563	108133.954	.000	108133.954	1.000
Teaching style	Post-test Geography	151154.606	1	151154.606	2870.056	.000	2870.056	1.000
	Post-test Biology	145317.345	1	145317.345	2994.137	.000	2994.137	1.000
Error	Post-test Geography	69255.895	1315	52.666				
	Post-test Biology	63822.176	1315	48.534				
Total	Post-test Geography	5486590.000	1317					
	Post-test Biology	5455987.000	1317					
Corrected Total	Post-test Geography	220410.501	1316					
	Post-test Biology	209139.522	1316					

a. R Squared = .686 (Adjusted R Squared = .686)
b. R Squared = .695 (Adjusted R Squared = .695)
c. Computed using alpha = .05

Students taught according to preferred learning styles had significantly higher mean scores compared to students taught according traditional styles in geography $F (1, 1315) = 2870.1$, $p = .000$) and in biology $F (1, 1315) = 2994.1$, $p = .000$).

Regression analysis to determine how the teaching styles influenced performance in geography (Table 3).

Table 3: *Linear Regression Model Summary for Geography*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828[a]	.686	.686	7.25714

a. Predictors: (Constant), Teaching styles

The adjusted r square (r2= .686) revealed that 68.6% of variation in performance in geography is determined by model. Teaching according to preferred learning styles explains 68.6% of the performance in geography. The ANOVA results (Table 3) shows that-

Table 4: *ANOVA of Significance between Teaching Styles and Performance in Geography*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	151154.606	1	151154.606	2870.056	.000[b]
	Residual	69255.895	1315	52.666		
	Total	220410.501	1316			

a. Dependent Variable: Post-test Geography
b. Predictors: (Constant), Teaching styles

The model was a significant predictor of performance in geography F (1, 1315) = 2870.056, p = .000.The unstandardized beta coefficients for the model (the β values) (Table 4) indicated the relationships between the outcome and predictor variables.

Table 5: *Coefficients of Determination of Effect of Teaching Using Preferred Learning Styles on Performance in Geography*.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.103	.632		49.196	.000
	Teaching style	21.426	.400	.828	53.573	.000

a. Dependent Variable: Post-test Geography

The β coefficient (Table 5) is 21.426, which indicate there is a positive effect of teaching using preferred leaning styles. In addition, this indicated that performance of students taught using preferred learning styles is 21.426 higher among those taught using preferred leaning styles compared to those taught using traditional teaching styles. The results of the regression indicated that the model explained 68.6% of the variance and that the model was a significant predictor of performance in geography, F (1, 1315) = 2870.056, p = .000. While teaching using preferred learning styles contributed significantly to the model (β = 21.426, p = .000). The final predictive model was: Geography score = 31.103+ (21.426* Teaching using preferred learning styles). Linear regression analysis to determine how the teaching styles influenced performance in biology (Table 43) indicted that: -

Table 6: *Linear Regression Model Summary for Biology*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

1	.834[a]	.695	.695	6.96663

a. Predictors: (Constant), Teaching style

The adjusted r square (r^2= .695) revealed that 69.5% of variation in performance in biology is determined by the model (teaching according to preferred learning styles). Teaching according to preferred learning styles explains 69.5% of the performance in biology. The ANOVA results (Table 7)

Table 7: *ANOVA of Significance between Teaching Styles and Performance in Biology*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	145317.345	1	145317.345	2994.137	.000[b]
	Residual	63822.176	1315	48.534		
	Total	209139.522	1316			

a. Dependent Variable: Post-test Biology
b. Predictors: (Constant), Teaching style

The model was a significant predictor of performance in biology F (1, 1315) = 2994.137, p = .000. The unstandardized beta coefficients for the model (the β values) (Table 8) indicated the relationships between the outcome and predictor variables.

Table 8: *Coefficients of Determination of Effect of Teaching Using Preferred Learning Styles on Performance in Biology*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.614	.607		52.089	.000
	Teaching style	21.009	.384	.834	54.719	.000

a. Dependent Variable: Post-test Biology

The β coefficient (Table 8) is 21.009, which indicate there is a positive effect of teaching biology using preferred leaning styles. In addition, this indicated that performance of students taught biology using preferred learning styles is 21.009 higher among those taught using preferred leaning styles compared to those taught using traditional teaching styles. The results of the regression indicated that the model explained 69.5% of the variance and that the model was a significant predictor of performance in biology, F (1, 1315) = 2994.137, p = .000. While teaching using preferred learning styles contributed significantly to the model (β = 21.009, p = .000). The final predictive model was Biology score = 31.614+ (21.009* Teaching using preferred learning styles).

In conclusion, both multivariate analysis of variance and linear regression analysis showed statistically significant effect on performance of students taught using preferred learning styles in geography and biology. Given multivariate analysis of variance in geography F (1, 1315) = 2870.1, p = .000) and in biology F (1, 1315) = 2994.1, p = .000), and in addition linear regression analysis in geography, F (1, 1315) = 2870.056, p = .000, and in biology, F (1, 1315) = 2994.137, p = .000. Thus, the null hypotheses were rejected there are no statistically significant effects in performance in biology and geography between students taught in their preferred

learning styles and those taught using traditional teaching styles in secondary schools in Nairobi County.

This study shows that teaching students according to their preferred learning styles enhances their performance while teaching students in the traditional styles without considering their preferred learning styles creates mismatch, which lowers their performance in sciences. The finding of this study implies that when teachers establish the preferred learning styles of students and match their styles of teaching to these preferences it improves significantly the performance of their students in sciences. This study supports the findings of Akbarzadeh and Fatemipour (2014) when students' learning styles match with appropriate teaching approaches, then their motivation, performances, and achievement will increase. The study likewise was in agreement with findings of Bastable (2008) that matching teaching pedagogy with learning styles of students enhances their academic performance. On the other hand, the gap between matching students' learning styles and teachers' instructional styles lead to low retention rates and affect students' academic performance.

SUMMARY
The first objective of this study was to determine the differences in effect of traditional teaching and teaching according to preferred learning styles, on students' performance, in biology and geography in secondary schools in Nairobi County.

i) The main effect of traditional teaching and teaching using preferred learning styles on students' performance, in biology and geography in secondary schools in Nairobi County.
The finding of this study revealed that, both multivariate analysis of variance and linear regression analysis showed statistically significant effect on performance of students taught using preferred learning styles in geography and biology. Given multivariate analysis of variance in geography $F (1, 1315) = 2870.1, p = .000$) and in biology $F (1, 1315) = 2994.1, p = .000$), and in addition linear regression analysis in geography, $F (1, 1315) = 2870.056, p = .000$, and in biology, $F (1, 1315) = 2994.137, p = .000$. Thus, the null hypotheses were rejected there are no statistically significant effects in performance in biology and geography between students taught in their preferred learning styles and those taught using traditional teaching styles in secondary schools in Nairobi County.

Conclusion
In conclusion, both multivariate analysis of variance and linear regression analysis showed statistically significant effect on performance of students taught using preferred learning styles in geography and biology. Given multivariate analysis of variance in geography $F (1, 1315) = 2870.1, p = .000$) and in biology $F (1, 1315) = 2994.1, p = .000$), and in addition linear regression analysis in geography, $F (1, 1315) = 2870.056, p = .000$, and in biology, $F (1, 1315) = 2994.137, p = .000$. The students taught according to their preferred leaning styles performed statistically higher compared to the students taught according to traditional teaching styles without considering their preferred learning styles. This implies mismatch of teaching styles to preferred leaning styles, affects negatively performance of students in biology and geography in secondary schools in Nairobi County. Based on the findings and conclusions of this study, the following recommendation ismade. Every teacher and instructor should endeavour to assess and identify the preferred learning styles their learners before commencement of instructions and

teach their learners according to their preferred learning styles in order to enhance their academic performance in biology and geography. In the course of this study, the researcher realized that many learners were insensitive of their own learning styles and suggests further research on sensitisation of the learners to exploit the hidden treasure, which could otherwise empower them to understand how to adequately be prepared for continuous learning.

References

Abidin, M., Rezaee, A., Abdullah, H., & Singh, K. (2011). Learning styles and overall academic achievement in a specific educational system. *International Journal of Humanities and Social Science, 1*(10).

Akbarzadeh, M., & Fatemipour, H. (2014). Examining the match or mismatch between teaching style preferences and upper-intermediate EFL learners' learning style preferences. *Procedia - Social and Behavioral Sciences,98*, 137–142.

Akhtar, M., & Saeed, M. (2017). Applying activity-based learning (ABL) in improving quality of teaching at secondary school level, PJERE*, 2(2), 37-47.

Alharbi, A., Paul, D., Henskens, F., & Hannaford, M. (2011). 'An investigation into the learning styles and self-regulated learning strategies for computer science students.' In Williams, G., Statham, P., Brown, N., & Cleland B. (Eds.) *Changing Demands, Changing Directions. Proceedings ascilite Hobart*. (pp. 36-46).

Al-Sarem, M., Bellafkih, M. & Ramdani, M. (2014). *Adaptation Patterns with respect to Learning Styles.* Conference Paper · May 2014

Bandler, R. (2008 A). The *secrets to quick & lasting life change.* London: HarperCollins Publishers.

Bastable, S. B. (2008). *Nurse aseducator: Principles of teaching and learning for nursing practice* (3rd Ed.). Boston: Jones and Bartlett Publishers.

Bayrak, B. K. (2012). A study on learning styles of secondary school students according to gender and class level a study on learning styles of according to gender and class level. *Procedia - Social and Behavioural Sciences.46,* 843 – 847.

Christenson, R. S. (2010). The spectrum of teaching styles: Style F–Guided-Discovery. *OAHPERD Journal, XLVI, (2),* 14-16.

Felder, R. M., & Brent, R. (2017). *Effective teaching: A workshop*. Department of Chemical & Biomolecular Engineering North Carolina State University. Retrieved from https://engineering.purdue.edu/Engr/AboutUs/Administration/AcademicAffairs/Resources/Teaching/effective-teaching.pdf

Gilakjani, A. P. (2012). A match or mismatch between learning styles of the learners and teaching styles of the teachers. *International Journal of Modern Education and Computer Science,11,* 51-60.

Guirguis, R., Pankowski, J. (2017). Potential effects of teaching strategies on students' academic performance under a Trump administration. *Journal of Education and Training Studies 5*(4), 2324-8068.

Hendry, G. D., Heinrich, P., Lyon, P. M., Barratt, A. L., Simpson, J. M., Hyde, S. J., Gonsalkorale, S., Hyde, M., & Mgaieth, S. (2005). Helping students understand their learning styles: Effects on study self-efficacy, preference for group work, and group climate. *Educational Psychology*, *25*(4), 395-407.

Keirsey, D. (2013). *Keirsey types and learning styles*. Retrieve from http://iws.collin.edu/mbrooks/learning_styles/keirsey_types.pdf

Longchamp, J. C. (2017). The effect of student learning objectives on teachers and teaching as part of the teacher evaluation process: A grounded theory study. *Graduate College Dissertations and Theses*. 734. Retrieved from http://scholarworks.uvm.edu/graddis/734

Luedtke, T. (2016). Undergraduate nursing student perceptions of developing confidence through clinical learning experiences (Master's Thesis: University of Manitoba, Winnipeg). Retrieved from https://mspace.lib.umanitoba.ca/bitstream/handle/1993/31824/luedtke_tracy.pdf?sequence=3Accessed

Makewa, L. N., Role, E., & Beigo, S. (2011). Teachers' attitude towards strengthening mathematics and science in secondary education through in-service education and training (SMASSE-INSET) Project in Nandi Central District, Kenya. *International Journal of Education and Social Sciences (IJESS)*, *1*(4).

Mohanty, A. (2015). Information processing and creative thinking abilities of residential and non-residential school children: A pilot study. Sage Open October-December 2015: 1– 12. Retrieved from http://journals.sagepub.com/doi/pdf/10.1177/2158244015611452

Musamali, O. W. (2014, April). *Adventist education in Kenya: The Segero model*. Paper presentend in East Kenya Union Coference Adventist Teachers Convention. Karura Adventist School, Nairobi.

Mwangu, E.C., & Sibanda, L. (2017). Teaching biology practical lessons in secondary schools: A case study of five Mzilikazi District Secondary Schools in Bulawayo Metropolitan Province, Zimbabwe. *Academic Journal of Interdisciplinary Studies, 6*(3), 2281-3993.

Pather, S. Norodien-Fataar, N. Cupido, X., & Mkonto, N. (2017). First year students' experience of access and engagement at a University of Technology. *Journal of Education,* Issue 69, Retrieved on 11/04/2018 21:18 from http://www.scielo.org.za/pdf/jed/n69/08.pdf

Seifert, H. E. (2016). Gender differences, learning styles, and participation in higher mathematics (Doctoral thesis: Walden University). Retrieved from http://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=3337&context=dissertationAccessed