

Preference for Auditory Learning Style among University Students: A Comparative Study of Full-Time and Part-time Agricultural Education and Extension Students at Egerton University, Kenya

American Journal of Education and Learning

Vol. 4, No. 1, 1-11, 2019

e-ISSN:2518-6647



Stella J. Kibet¹
Micah C. Chepcheng²
George Makori³
Daniel K. Chesaro⁴

^{1,2,3,4,5} Egerton University, Kenya

¹Email: stacykibet@gmail.com

Corresponding Author

ABSTRACT

Understanding learning styles of students may help implement better teaching strategies resulting in higher quality of education. In Kenya, no conclusive research has been done on the preference of learning styles by university full-time and part-time students undertaking various degree programmes. This study, therefore, examined the preferred learning styles among full time and part time university students at Egerton University, Njoro Campus. The study utilizes the causal-comparative research design where 238 full-time and part-time students were selected through stratified random sampling from the population of 2nd, 3rd and 4th-year Agricultural Education and Extension students within Njoro campus. Purposive sampling was used to select six interview participants who were the class representatives. Data were collected by use of questionnaires which were administered to both full-time and part-time students and interviews were conducted among six class representatives. Data analysis was done by use of descriptive and inferential statistics. Results showed that there was a statistically significant difference in the preference for auditory learning style between the full-time and part-time students, with the full time exhibiting a greater preference for auditory learning style than their counterparts. The full-time student further perceived installation of sound systems, frequent discussion of topical issues, and being given opportunities to ask questions as some of the aspects that were important to their learning. It was therefore concluded that the absence of auditory learning style in university education affects students effective learning especially the full-time ones. The university management in Kenya should, therefore, consider installing sound systems in lecture halls especially those used by full-time students in order to enhance their learning experience. Lecturers should also encourage classroom discussions and give opportunities for students to ask questions during lectures.

Keywords: *Agricultural education, Auditory learning, Extension, Full-time students learning styles, Part-time students and preference.*

DOI: 10.20448/8044.4.1.1.11

Citation | Stella J. Kibet; Micah C. Chepcheng; George Makori; Daniel K. Chesaro (2019). Preference for Auditory Learning Style among University Students: A Comparative Study of Full-Time and Part-time Agricultural Education and Extension Students at Egerton University, Kenya. *American Journal of Education and Learning*, 4(1): 1-11.

Copyright: This work is licensed under a [Creative Commons Attribution 3.0 License](https://creativecommons.org/licenses/by/3.0/)

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

History: Received: 8 November 2018/ Revised: 2 January 2019/ Accepted: 31 January 2019/ Published: 5 March 2019

Publisher: Online Science Publishing

1. INTRODUCTION

Learning styles is a general concept that brings together various schools of thought which share the belief that students learn best when they are given the opportunity to learn, deal with information, and communicate in a manner that they feel most comfortable with [Palloff and Pratt \(2003\)](#). Consequently, diverse models of learning have been developed to explain these individual differences in learning. There are about 13 major models of learning styles existing in the literature ([Coffield et al., 2004](#)). The study was anchored on Fleming's Learning Styles Model. [Fleming \(2001\)](#) classifies learning styles into three-Visual, Auditory and Kinesthetic. The model posits that visual learners mostly depend on visual information; auditory learners mostly understand learning through hearing, while kinesthetic learners learn best through touch and movement. Classification by Fleming is quite clear and there are demarcations between one learning style and the other. Studies conducted in the United States of America showed that different students prefer different styles of learning. For instance, a survey conducted by the [University of Illinois \(2009\)](#) reported that about 65%, 25% and 10% of learners surveyed preferred visual, auditory and kinesthetic learning styles respectively. [William \(2011\)](#) in a study showed that 65%, 5% and 30% of the learners covered preferred visual, auditory and kinesthetic learning styles respectively.

It is clear from the above studies that different learners prefer different learning styles. What remains unclear is whether such preferences also run across disciplines and learners' modes of study. While empirical evidence on the preference of learning styles across disciplines is still limited, a study by [Ogbo and Alade \(2014\)](#) in Lagos, which examined learners' learning style preferences in selected universities, reported that majority of students pursuing chemistry which is a science-oriented subject preferred visual learning style. Visual learning style was also preferred by students pursuing business and engineering disciplines ([Arslan, 2003; Naik, 2003](#)). However, most students pursuing linguistics and related disciplines were reported to prefer the auditory learning style. Although more studies may be necessary to provide a definitive conclusion on the relationship between the field of study and learners' preferred style of learning, it is, however, clear from the available studies that most students pursuing science-based disciplines tend to prefer visual learning style while those pursuing non-science disciplines preferred auditory learning style. With regard to learners' gender, male learners have been reported to prefer visual styles while females tend to prefer the auditory learning style ([Eiszler, 1982](#)). In an examination of students' characteristics and preference for learning styles, [Dunn \(2009\)](#) noted that auditory learning styles were most preferred by high achievers. The author further observed that low achievers tended to have poor auditory memory, which discouraged them from auditory learning style. According to the author, unlike the low achievers, high achievers have greater ability to remember information through lecture, discussion, or reading, which contributes to high achievement especially in a traditional classroom environment where teachers dominate and students mostly listen or read. As suggested here some students may not find it easy to freely participate in the class discussion either because they are shy or simply they have little understanding of the issues under discussion. Some students who participate least in class discussions have performed well in their academics. Similarly, some students who participate highly in discussions may also perform poorly in their academics. Therefore, [Dunn \(2009\)](#) assertion that low achievers tend to have very minimal participation in class discussions, which contributes to their low achievement may not hold in all situation. The fact that auditory learners learn through listening implies that the learning must be conducted in a quiet environment devoid of external noise. While considering classroom as one of the learning resources essential for the execution of learning activities, [Sapna et al. \(2014\)](#) identified acoustic and thermal features as key features of a classroom that support auditory learners. Acoustic features relate to the ability of the classroom to enhance audibility and control disruptive noise from unwarranted quarters. Thermal features relate to the heating and ventilation of the classroom. Thermal features play a fundamental role in making

classroom atmosphere favourable and comfortable for learning. While it is a requirement for institutions of higher learning to have classrooms for their learners, it is exactly not clear how conducive these facilities are for auditory learners hence the current study. Agricultural Education and Extension (AGED) is a science-based discipline with a significant aspect of the program is practically based. Students pursuing AGED through the full-time or part-time program may prefer different modes of learning hence the need for an examination into preferred learning styles. The discipline also deals with diverse fields notably practicing teachers and field extension officers.

2. PROBLEM OF THE RESEARCH

Despite the critical role university education in Kenya, issue of learning styles used by academic staff in these institutions and how it affects the quality of education has been less documented as it is in other developing and developed countries. Good quality university education is an important avenue towards nurturing professionals needed by both the private and public sector in various economies for better private business and better governance. Thus with the use of effective learning styles preferred by students of various modes and programmes of study, institutions of higher learning can ensure the quality of university education. Consequently, there is a need to investigate the preferred learning styles by students in the various modes and programmes of study in order to enhance the quality of education in universities in Kenya.

3. RESEARCH FOCUS

The problem of preferred learning styles by university students is a worldwide issue that is experienced by most institutions of higher learning both in the developing and developed countries. Studies conducted in the United States of America showed that different students prefer different styles of learning. For instance, a survey conducted by the [UoI \(2009\)](#) reported that about 65%, 25% and 10% of learners surveyed preferred visual, auditory and kinesthetic learning styles respectively. An earlier survey by [UoA \(2005\)](#) revealed that 65%, 30% and 5% of the learners surveyed preferred visual, auditory and kinesthetic styles of learning respectively. [William \(2011\)](#) in a study showed that 65%, 5% and 30% of the learners covered preferred visual, auditory and kinesthetic learning styles respectively. A study by [Ogbo and Alade \(2014\)](#) in Nigeria which is a developing country, examined learners' learning style preferences in selected universities. Their study revealed that the majority of students pursuing chemistry which is a science-oriented subject preferred visual learning style. Visual learning style was also preferred by students pursuing business and engineering disciplines ([Arslan, 2003; Naik, 2003](#)). However, most students pursuing linguistics and related disciplines were reported to prefer the auditory learning style. It can therefore be concluded that most students pursuing science-based disciplines tend to prefer visual learning style while those pursuing non-science disciplines preferred auditory learning style. However, what remains unclear is whether such preferences consistently run across disciplines and learners' modes of study. This study therefore, sought to fill this gap of linking preference for learning style to programmes and modes of study in university education.

4. METHODOLOGY OF RESEARCH

4.1. General Background of Research

The design adopted for this study was casual-comparative. This design was used because the researchers had little control over the study variables particularly the students' mode of study thus they only established the auditory learning style preference by examining differences in the learning styles of students who are already engaged in different modes of study. The study was conducted at Egerton University. The study was delimited to

the preference for auditory Learning Style among full-time and part-time Egerton university students enrolled in Agricultural Education and extension programme. This was because it was assumed that the programme and mode of study affected the students' learning style. The respondents were 238 second, third and fourth-year students of AGED at Egerton University Njoro Campus. Second-year, third-year and fourth-year students were selected because they had been in the system much longer, therefore they could easily identify the most preferred learning style.

4.2. Participant (Subject) Characteristics

Appropriate identification of research participants is critical to the science and practice of psychology, particularly for generalizing the findings, making comparisons across replications, and using the evidence in research syntheses and secondary data analyses. If humans participated in the study, report the eligibility and exclusion criteria, including any restrictions based on demographic characteristics.

4.3. Sampling Procedures

The study used purposive and stratified sampling methods. Stratified random sampling was used to select questionnaire respondents. The students' year of study and mode of the study were treated as strata. Purposive sampling was used to select 6 interview participants who were the class representatives. Class representative in the university system officially represents their class acting as a link between students and lecturer at the course level.

4.3.1. Sample Size, Power, and Precision

From this population, a sample of 238 students was selected for purposes of administering the questionnaires. The sample size was spread proportionately across the categories in all subgroups involving students in second, third and fourth year's students. This is to ensure that there is a representative sample from various subgroups. This study used (Kathuri and Pals, 1993) to determine the sample size.

$$n = \frac{X^2 * N * (1 - P)}{(ME^2 * (N - 1) + (X^2 * P * (1 - P)))}$$

Where :

n = Sample size

X² = Chi-square for the specified confidence level at 1 degree of freedom

N = Population Size

P = population proportion (50 in this table

ME = desired Margin of Error (expressed as a proportion

* = multiplication

$$3.841 \times 589 (0.5) (1 - 0.5)$$

$$(0.05)^2 (589 - 1) + (3.841 \times 0.5) (1 - 0.5)$$

$$565.59$$

$$1.425 + 0.954$$

$$565.59 = 238$$

$$2.38$$

4.3.2. Measures and Covariates

The independent variable of the study was the students' mode of study, which was classified into two categories: full time and part-time. The primary outcome variable was students preference for auditory learning. This variable was measured using various indicators including indicators including active listening, preference for the sound system, preference for class discussion, and preference for asking questions. Data on these variables were collected using structured questionnaires. Participants were asked to rate the preference towards the various auditory learning indicators on a five-point scale. Validation of the instruments was done by engaging university supervisors at the Department of Psychology, Counselling and Educational Foundations of Egerton University. To determine reliability of the research, a pilot study was carried out on 24 students (10% of the sample size for the main study) of Bachelor of Science in Agricultural Education and Extension at a university similar to the one used for the actual study. The split-half method was to be used to test for reliability. The Spearman-Brown coefficient, which compares respondents' answers in the first set of questions to the responses in the second set of the questions, was 0.784. Since this coefficient was greater than the set threshold of 0.70, the questionnaire was deemed to be reliable. Interviews with class representatives were used to obtain additional information regarding the preference for learning styles among the two groups of students.

5. RESULTS

5.1. Response Rate

Out of the 238 questionnaires that were distributed to the target sample, a total of 226 were duly completed and return to the researcher. This figure marks a response rate of 95%. A high response rate reduces the risk of nonresponse bias.

5.2. Statistics and Data Analysis

Quantitative data were analyzed both descriptively and inferentially. Descriptive statistics used were frequencies and percentages. Using T-test, the null hypotheses were tested at $\alpha = 0.05$, level of significance. The T-test was used to establish whether there was a statistically significant difference between the preferred learning styles in the two modes of study. Data collected through interviews was analyzed using the thematic technique.

5.3. Baseline Data

The study assessed a number of background information about the respondents including their age and gender. In terms of age, the majority of the surveyed students (58%) were between 22 and 23 years. However, the sample was inclusive of students of other age groups with 23.5% being in 20-21 years' brackets, 16.4% is between 24 and 25 years, and 2.2% being over 25 years. These results reflect the current age composition of universities and most tertiary education institutions in Kenya. Since the current study targeted third and fourth-year students, little representation of individuals who were younger than 20 years of age was expected. In terms of gender, 124 (55%) of the students engaged in this study were females while males were 102 (45%). Expansion of education opportunities to females through affirmative action and the fight against retrogressive cultural practices such as early marriages has seen an improvement in girls' performance at basic education level in Kenya (Kibui and Mwaniki, 2014). This has resulted in not only a higher transition of females to tertiary institutions including universities but also more females attaining grades that permit them to get admitted into science-based courses such as AGED.

5.4. Difference in Auditory Learning Preference

The objective of this study was to establish whether there was difference in auditory learning style preference by students pursuing the AGED degree programme in full time and part-time basis. To achieve this objective, the following issues were analyzed and discussed; significance of active listening by students during lectures, the importance of using sound equipment to enhance lecturers' audibility, the extent to which quality sound systems are installed in large lecture halls, the significance of lecture halls being situated in serene places, the importance of discussions on topical issues to students' learning, the frequency with which class discussions were held on topical issues, the importance of students asking questions during lectures, adequacy of time accorded students to ask questions during lectures, and the adequacy of responses given by lecturers to questions raised by students during lectures.

5.4.1. Significance of Active Listening by Students during Lectures

Active listening is one of the essential characteristics that define auditory learning. The centrality of active listening in learning is what prompted this study to establish the level of significance students attached to it by full time and part time AGED students. Results are presented in Table 1.

Table-1. Significance of active listening based on the mode of study.

Mode of Study	N	Mean	Std. Deviation	Mean Difference	t	Sig
Full time	170	3.9000	.71873	.09643	.877	.382
Part Time	56	3.8036	.69856			

As results in Table 1 illustrates, full-time students perceived active listening to be more significant than part-time students. The full-time students gave active listening a mean rating of 3.9 as compared to the mean rating of 3.8036 given by part-time students. The difference in the mean ratings given by the two groups of students was 0.09643. The independent sample t-test showed that this difference was not statistically significant ($t=.877$, $p>0.05$). This implies that the perception of the two groups regarding the significance of active listening was more or less the same. Students in both groups appeared unanimous in their appreciation of the significance of active listening during lectures given the marginal difference in the mean scores of full time and part time students on this subject. Given that the significance of active listening was measured on five-point scale (1- not significant, 2- least significant, 3-somewhat significant, 4-significant, and 5-very significant) the mean rating by both groups rounds off to 4 suggesting that students in the two groups perceived active listening to be significant.

5.4.2. The Importance of Installing Sound Systems in Lecture Halls

Since auditory learners learn best through hearing, it is natural that they would prefer to be in classes where sound systems have been installed. This is particularly the case where there is a large number of students like in the AGED programme at Egerton University. The difference in the rating of the importance given to the use of the sound system between the two groups of students was analyzed using the independent sample t-test. Results are presented in Table 2.

Table-2. Importance of sound systems based on the mode of study.

Mode of Study	N	Mean	Std. Deviation	Mean Difference	t	Sig
Full time	170	3.9647	.73697	.33971	3.052	.003
Part Time	56	3.6250	.67588			

From the results presented in Table 2, full-time students considered sound system to be more important when compared to part-time student. Full-time student gave the importance of sound system a mean rating of 3.9647 as compared to a mean rating of 3.6250 given by part-time students. The difference in mean ratings by the two groups of students was 0.33971. The independent sample t-test showed that this difference is statistically significant ($t=3.052$, $p < 0.05$). This result implies that there is a significant difference in the appreciation of the importance of having sound systems in lecture halls between the two groups of students with full-time student having a greater appreciation. This result may support the view that full-time student have a higher preference for auditory learning than part-time students. The effect of the difference in the class sizes of the two groups on the importance they have given to sound systems can however not be ignored.

The high population of full-time students attending lectures at any one sitting requires these classes to be held in large lecture halls. Students seated at the back of the large lecture halls may not hear clearly the lecturer stationed in front of the hall. Lecturers taking such large classes may therefore need the help of sound systems so as to enhance their audibility especially to the students seated at the back. The distant proximity between the lecturer and the students at the back in large lecture halls means that students at the back cannot clearly hear the lecturer unless they use a sound system. This explains why more students on full-time program favour the installation of sound systems in their lecture halls. However, given their inferior numbers, part-time programs can be held in small lecture halls where lecturer's audibility is achievable without the aid of sound systems. It is for this reason that very few students on part-time program favored the installation of sound systems in their lecture halls.

5.4.3. The Importance of Discussions on Topical Issues to Students Learning

Another indicator that was used to examine preference for auditory learning is the students' preference for class discussions on specific and general issues. Auditory learners are greater listeners and very social and thus they are likely to show a greater preference for classroom discussion. The difference in the perceived importance of discussion on topical issues between full time and part-time students was assessed using the independent sample t-test. Results are presented in Table 3.

Table-3. The Importance of Discussion based on Mode of Study.

Mode of Study	N	Mean	Std. Deviation	Mean Difference	t	Sig
Full time	170	3.8471	.80686	.00777	.063	.950
Part Time	56	3.8393	.78107			

From the results in Table 3, full-time students had a higher rating of the importance of discussion than part-time students. Full-time students gave the importance of discussion a mean rating of 3.84671 as opposed to the 3.8393 given by part-time students. The difference in the mean ratings of the two groups of students was 0.00777. The independent sample t-test showed that this difference is not statistically significant ($t= .063$, $p > 0.05$). The results here suggest that both full time and part time students appreciated almost in equal measure the critical role of class discussions in their academic and intellectual development.

5.4.4. The Importance of Students Asking Questions During Lectures

Auditory learners are unafraid to speak in class and are able to solve a complex problem by talking out loud. Therefore, auditory learners are likely to show a greater preference for asking questions during lectures. Therefore, this study sought to establish the importance of full time and part time students attached to asking questions during

lectures. Table 4 is a summary of the study results on the importance of asking questions in class during lectures according to students' mode of study.

Table-4. The importance of students asking questions based on the mode of study.

Mode of Study	N	Mean	Std. Deviation	Mean Difference	t	Sig
Full time	170	4.1176	.72832	.13550	1.179	.240
Part Time	56	3.9821	.79752			

Results presented in Table 4 show that full-time students perceived asking questions to be more important when compared to part-time students. Full-time students gave the importance of asking questions a mean rating of 4.1176 while part-time students gave a mean rating of 3.9821. The difference in the mean rating of the two groups was 0.1355. The independent sample t-test indicated that this difference was not statistically significant ($t=1.179$, $p>0.05$). This result suggests that all the students appreciated the importance of asking questions during lectures hence the marginal difference mean score of the two sets of students on this issue.

Interview with a selected full time and part students further supported the above study findings. For example, one full-time student remarked "I like to ask questions while teaching is going on. Asking questions enables me to keep track of what is being taught in addition to understanding better issues that were not clear to me previously". Some students while admitting that it was important for them to seek clarification on issues that are unclear to them regretted that they had never utilized the opportunity offered to them for asking questions.

5.4.5. Overall Difference in the Preference of Auditory Learning between Full Time and Part Time

To test the research hypothesis, it was essential to analyze the overall difference in the preference of auditory learning between full time and part time aged students. The students mean rating of all individual indicators of auditory learning were combine to obtain a cumulative mean. The independent sample t-test was then used to assess the difference in cumulative mean between the two groups of students. Results are presented in Table 5.

Table-5. Difference in the preference of auditory learning.

Mode of Study	N	Mean	Std. Deviation	Mean Difference	t	Sig
Full time	170	3.6876	.27490	.08537	2.024	.044
Part Time	56	3.6023	.2699			

Results in Table 5 indicate that full-time students had greater preference for auditory learning when compared to part-time students. Full-time student had a mean score of 3.6876 in this style of learning as opposed to a mean score of 3.6023 for part-time students. The difference in the mean scores of the two groups was 0.08537. The independent sample t-test showed that this difference was statistically significant ($t= 2.024$, $p>0.05$). The null hypothesis was therefore rejected and the conclusion made that there was a significant difference in the preference of auditory learning style between full-time and part-time Agricultural Education and Extension students at Egerton University.

6. DISCUSSION

The study established that there was a statistically significant difference in preference for auditory learning between full time and part-time students. Results showed that full-time AGED students had a greater preference for auditory learning than part-time AGED students.

The most significant difference was noted in the students' preferences for a sound system where full-time students recorded a high mean rating for this component of auditory learning as compared to part-time students.

There was a statistically significant difference in preference for installation of sound systems in lecture halls between full time and part-time students. Full-time students had greater preference for installation of the sound system when compared to part-time students. This finding is consistent with [Basit \(2005\)](#) who found that large classes need to have acoustic features in order to enhance audibility and control disruptive noise. This study recommends that the University should install appropriate sound systems to enhance instructors' and students' audibility. This study established that full-time classes were really large since the students were being combined with students pursuing other programs for some course units.

This meant that lectures had to be staged in large lecture halls. Unfortunately, students reported that some of the large lecture halls were not installed with sound systems to aid the instructor's audibility. This was disadvantageous to auditory students. Instructors were also forced to talk aloud by students during lectures a situation that was detrimental to their voice. There were no significant differences between full time and part time students with respect to active listening, class discussion, and asking questions. Both groups of students had similar preferences for these aspects of auditory learning.

The two groups of the student gave a relatively higher rating for these learning components suggesting that they are also important to their learning process. For instance, Active listening enables students to critically question the explanations being given by the instructors ([Northey, 2005](#)). Students who listen actively during lectures will most likely prefer lecturers who explain issues in details, provide relevant illustrations verbally. Students who engage in active listening are also likely to prefer lecturers who offer them the opportunity to seek from them further explanations on issues that are not clear to them. These students stand also to benefit in a teaching environment where lecturers offer students the opportunity to contribute to issues raised by their colleagues in form of responses ([Arbuthnott and Kratzig, 2015](#)). Active listening enables students to have a better comprehension of issues being taught because they concentrate fully while in class. Through active participation in class, such students may also develop a good rapport with the instructors as well as a positive attitude towards the subject. Students who listen actively in class also stand a better chance of performing well in the subject ([Heacox, 2002](#)). Active listening and participation may also help students develop their public speaking skills and boost self-esteem.

It is also the position of this study that class discussions have intellectual and social benefits to the students. Intellectually, class discussions offer students the opportunity to have a critical or analytic stand on specific and general issues within their field of study ([Taylor, 2009](#)). Further, discussions enable students to situate and appreciate the role, challenges and opportunities their field of study has within the wide realm of societal development. Discussions also afford students the opportunity to query underlying arguments, assumptions and world views of specific and general issues in their field of study. At the social level, discussions offer students the opportunity to bond and inculcate the culture of intellectual tolerance. It also enables students to nurture their public speaking skills ([Dunn, 2009](#)). Students who participate actively in class discussions also stand a better chance of developing a good rapport with their colleagues and instructors.

This study, therefore, attributes the no significant difference between full time and part students in their appreciation for the importance of class discussions in their training, the intellectual and social benefits of the discussions. According to [Arbuthnott and Kratzig \(2015\)](#) the teacher asking question during class or giving students the opportunity to ask questions enhances the learning experience of auditory learners because it creates an environment where the students can orally converse about the issues learned in class. [Arbuthnott and Kratzig \(2015\)](#) also argue that allowing students to ask questions help them to connect new knowledge that they have

learned in a given lesson with what they knew previously. This approach results in a more meaningful learning experience for the students.

7. ACKNOWLEDGEMENTS

I acknowledge the Almighty God for his grace, the gift of good health and giving us the opportunity to complete the study. Secondly, we acknowledge Egerton University for providing a platform where we were doing the research.

REFERENCES

- Arbuthnott, K. and G. Kratzig, 2015. Effective teaching: Sensory learning styles versus general memory processes. *Comprehensive Psychology*, 27(2): 360- 372.
- Arslan, B., 2003. A descriptive study on learning style preferences of the engineering students at METU. *Education and Science*, 31(141): 83-91.
- Basit, A., 2005. Classroom management techniques at secondary level and developing a model for urban schools for District Peshawar. (M.Phil Thesis, Faculty of Education), Allama Iqbal Open University Islamabad. pp: 16-17.
- Coffield, F., D. Moseley, E. Hall and K. Ecclestone, 2004. Learning styles and pedagogy in post-16 learning: A systematic and critical review. London: Learning and Skills Research Centre.
- Dunn, R., 2009. Impact of learning-style instructional strategies on students' achievement and attitudes: Perceptions of educators in diverse institutions. *The Clearing House: A Journal of educational strategies, issues and ideas*, 82(3): 135-140. Available at: <https://doi.org/10.3200/tchs.82.3.135-140>.
- Eiszler, C.F., 1982. Perceptual preferences as an aspect of adolescent learning styles. *Education Resource Information Center*, 103(3): 231-241.
- Fleming, N., 2001. Teaching and learning styles: VARK strategies. New Zealand: Christchurch.
- Heacox, D., 2002. Differentiating instruction in the regular classroom: How to reach and teach all learners, grades 3-12. Minneapolis, MN: Free Spirit Publishing Inc.
- Kathuri, J.N. and D.A. Pals, 1993. Introduction to educational research. Egerton, Kenya: Egerton University.
- Kibui, A. and B. Mwaniki, 2014. Gender equity in education development in Kenya and the new constitution for vision 2030. *International Journal of Scientific Research and Innovation Technology*, 1(2): 21- 34.
- Naik, B., 2003. Learning styles of business students. *Proceedings of the 34th Annual Meeting of the Decision Sciences Institute*. pp: 22-25.
- Northey, S.S., 2005. Handbook on differentiated instruction for middle and high schools. Larchmont, NY: Eye on Education Inc.
- Ogbo, A. and O. Alade, 2014. A comparative study of chemistry students' learning styles preferences in selected public and private schools in Lagos metropolis. *IOSR Journal of Research & Method in Education*, 4(1): 45-53. Available at: <https://doi.org/10.9790/7388-04114553>.
- Palloff, R.M. and K. Pratt, 2003. The virtual student: A profile and guide to working with online learners. San Francisco: Jossey-Bass.
- Sapna, C., S.A. Ziegler, V.C. Plaut and A.N. Meltzoff, 2014. Designing classrooms to maximize student achievement. *Policy Insights from the Behavioral and Brain Sciences*, 1(1): 4-12.
- Taylor, A., 2009. Linking architecture and education: Sustainable design for learning environments. Albuquerque, NM: UNM Press.
- University of Illinois, 2009. Learning styles: Implications for improving educational practices. Princeton, Illinois: Educational Testing Service.

- UoA, 2005. Individual learning styles and the learning process *Journal of Experiential Learning and Simulation*, 2: 145-152.
- UoI, 2009. Learning styles: Implications for improving educational practices. Princeton, Illinois: Educational Testing Service.
- William, D., 2011. The importance of learning style in end-user training. *Journal of Experiential Learning and Simulation*, 14(1): 101-119. Available at: <https://doi.org/10.2307/249313>.

Online Science Publishing is not responsible or answerable for any loss, damage or liability, etc. caused in relation to/arising out of the use of the content. Any queries should be directed to the corresponding author of the article.