Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.4, No.9, 2013

Internal versus External control of reinforcement; where do Nigeria Science students belong?

Dr. Oludipe, B. D. Curriculum Studies and Instructional Technology Dept., Faculty of Education,
Olabisi Onabanjo University, Ago-Iwoye, Ogun State. Nigeria.
E-mail of corresponding author: bimbolaoludipe@yahoo.com

Abstract
This study investigates science students' locus of control orientation in view of the need to redress the present status-quo of abysmal performance in science in the light of substantive claims that students' locus of control orientation is a germane factor contributing to underachievement in science. The study is a descriptive survey type of research. Two research questions were posed. The sample was made of two hundred (200) Junior Secondary School III students (100 Boys and 100 girls, with mean age of 14.2years) in Akwa South Local Government area of Anambra state, Nigeria. Data was collected by means of a Locus Of Control Scale (LOCS, α = 0.84) containing 14 items to which respondents were to indicate their degree of Agreement or otherwise on a 4 – point scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Findings revealed that of the 200 respondents, 126 (63%) have internal locus of control while the remaining 74 (37%) are external. Also, of the 126 Internal Locus of control respondents, 42.9% are boys while the remaining 57.1% are girls. This shows that girls are more internally oriented than boys. It was recommended among others that Science teachers and parents should endeavour to re-orientate students especially boys to believe that they can control the events that affect them, more so since such events result primarily from their own behavior and actions.
Keywords: Internal, External, Control, Reinforcement, Science, Students

Introduction

Science is an activity-based subject that acquires knowledge about the world through a systematic means of experimentation, observation, measurement, hypothesis formulation, predictions, data collection, interpretation of data, drawing valid inferences and conclusion, generalizing and so on. Science education equips students to live in a world that is increasingly scientifically and technologically oriented. Science education plays a key role in promoting a sensitivity to, and a personal sense of responsibility for local and wider environments. It helps to develop an appreciation of the interdependence of all living things and the Earth on which they live. It encourages the adoption of responsible attitudes and patterns of behaviour towards the environment and so fosters the notion of the populace as custodians of the Earth for future generations. The application of scientific ideas, facts, principles, laws and theories have brought about immense benefits to mankind through the invention of various devices that have made life more comfortable for mankind in the areas of agriculture, medicine, transportation, communication, industry and aviation. Nations of the world are so rated based on their advancement in Science and technology. Developing nations of the world of which Nigeria is part, are aspiring to become like the developed ones in this respect. However, reports have shown that science students are underachieving in this subject in public examinations. Infact, WAEC chief examiner in 2012 lamented among other things, the dearth of qualified mathematics and science related teachers as well as inadequate facilities in public and private schools. Many other researchers have identified various factors responsible for students' underachievement in Science. Ajileye (2006) reported that insufficient resources for the teaching and learning of science is a major cause of students' underachievement. These insufficient resources include laboratories, science equipment, and specimens to be used as teaching aids. In same vein, Ojo (2001) found that lack of qualified teachers, lack of facilities and poor teaching methods are factors affecting students' performance in science. Also, Olonade (2000) found that school location and school size influences students' performance in sciences. Furthermore, studies have indicated that student factors such as their attitudes, self-image, study habit, gender, home environmental factors, academic self concept, locus of control, and motivation influence their science achievement. In an earlier study, Cohen, (1982) established a positive relationship between locus of control and students' development of spatial conceptual abilities. Awofala, Awofala, Fatade & Nneji, (2012) reported a significant effect of locus of control on students' achievement in mathematics, physics, chemistry and Biology.

Locus of Control is an individual's belief system regarding the cases of her experiences and factors to which that

person attributes success or failure. It is a multi-dimensional construct that is aimed at capturing the causality of behavior. The construct of Internal versus External control of reinforcement is a part of Rotter's (1966) social learning theory and it refers to the extent to which individuals believe that they can control events that affect them. According to Bothma and Schepers (1997), locus of control refers specifically to beliefs about the source of control over reinforcement. Rotter's (1966) argues that people could be placed along a continuum in respect of the extent to which they typically see what happens to them as dependent on their own control or the control of the external forces. At the one end of the continuum are the internals, who generally maintain that the outcomes in their lives depend largely on their own actions and choices. They believe that outcomes are a consequence of own striving, ability, personal effort, and initiative. They feel responsible for the consequences of their actions. At the other end are externals, who believe that there is little one can do to influence outcomes but that outcomes are due to chance, fate, luck, social structures or powerful other people. They act as though forces beyond their control are important factors in determining the occurrence of reinforcing events (Stone & Jackson, 1995). Internals and externals differ in relation to their cognitive activity and environmental mastery. Internals seem to exert more control over their lives because they are more perceptive of their situations. They will more readily acquire and utilize information that is relevant to their goal situation even when it is seemingly irrelevant (Dollinger, 2000). Furthermore, Leone and Burns, (2000), are of the view that internals are more inclined than externals to perceive their behavior as instrumental in obtaining desired outcomes and avoiding undesirable outcomes. Dollinger, (2000) reported that internals surpass externals on incidentally acquired and seemingly trivial knowledge which nevertheless has relevance for learners' academic success. Also, Lan and Shaffer (2009) concluded that individuals with high internal control were more successful in their careers than those who scored high in external control. Awofala, Awofala, Fatade & Nneji, (2012) stated that internal locus of control is an essential factor for students to have a thorough understanding of science and mathematics. According to them, internals are more likely to develop an intrinsic orientation in which participation in the science and mathematics tasks presents or because participation brings feelings of competence, mastery, control and self determination. In summary, individuals with an internal locus of control are reported to:

*engage in activities that will improve their situation;
*emphasize striving for achievement;
*work hard to develop their knowledge, skills and abilities;
*are inquisitive, and
*try to figure out why things turned out the way they did;
*take note of information that they can use to create positive outcomes in the future;
*have a more participative management style;
*manage the drawbacks of a strong Internal Locus of Control and,
*are generally more successful.

Corroborating these views, Rotter, (1966) was of the opinion that internals tend to exhibit greater efforts and interest in achievement related activities than do externals. Downes, (2008) reported that students with an internal locus of control performed significantly better than those with an external locus of control. Similarly, Grimes, Millea, & Woodruff, (2004) in their study examined the connection between locus of control and student evaluations of teaching The study found that students with an internal locus of control were more likely to complete above-average teacher evaluations, while students with an external locus of control would more likely give teachers average or below-average evaluations.

Going by these submissions, it is imperative to find out the locus of control orientation of science students in Nigeria with a view to improving students' achievement in science. This is the main thrust of this study.

Statement of problem

This study investigates science students' locus of control orientation in view of the need to redress the present status-quo of abysmal performance in science in the light of substantive claims that students' locus of control orientation is a germane factor contributing to underachievement in science.

Research Questions

1. What is the locus of control orientation of the students in this study?
2. Are boys more internally oriented than girls?

Limitations of the study

This study is limited to junior secondary school III (JSS 3) science students in Awka South Local government area of Anambra state, Nigeria. The questionnaire is a self report of the students about their Locus of Control.

The sample consisted of 200 Junior secondary school III students.

Methods

Research design

This study is a descriptive survey type of research. The variables under consideration have already occurred and are therefore not manipulated in any way.

Target Population

All public Junior secondary school III students in Awka South Local government area of Anambra state, Nigeria constitute the target population for this study.

Sample and Sampling Procedure

Of the 23 co-educational secondary schools in Awka South Local government area of Anambra state, 10 were randomly selected. Thereafter, simple random sampling was used to select two hundred (200) Junior Secondary School III students (100 Boys and 100 girls, with mean age of 14.2years).

Instruments

The Locus Of Control Scale (LOCS) was the only instrument used for data collection in this study. It was made of 14 items on a 4 – point scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) to which respondents were to indicate their degree of Agreement or otherwise to the 14-items on the scale. It was originally developed by Rotter, (1966) but adapted to fit Nigeria setting by Onabanjo, (2000) and further adapted for use by this researcher. The instrument was trial-tested on a pilot sample size of 30 Junior senior secondary school II students also in Awka North Local government area of Anambra state. It yielded an internal consistency reliability (α) of 0.84.

Data Collection

The LOCS was administered on the students by the respective Science teachers in the sampled schools after the permission of the school principals in the ten selected schools were sought. The instrument was administered within a week in all the schools. Students' responses were coded and scored thereafter.

Data Analysis Procedure

The data were analyzed using both descriptive statistics. The students' Locus of control was analyzed using descriptive statistics tools of percentage, mean and Standard deviation.

Results

From the analysis on Table 1, 48.0% of respondents agreed that they can anticipate difficulty and take action to avoid them; 54.0% agree that when they make plans, they are almost certain they can make them work; 53.0% believe a person can really be master of his life; 54.5% are confident of being able to deal successfully with future; 62.5% believe their performance in school is as a result of their efforts; 54.5% believe in their efforts at making positive contribution in any situation around them; 51.0% believe they can handle situations no matter how difficult it may be; 58.0% believe that they have control over reinforcing events in their lives; 54.5% prefer learning environments that maximize the degree of control over their learning; 50.5% believe that how hard they study will determine the grades they will get; 51.0% believe they are good at making things work well; 60.0% believe no matter the challenges they face, they will never fail an examination; 70.0% believe that with enough effort, failure in schools can be wiped off and 72.5% believe that becoming successful is a matter of hard work.

Research Question 1: What is the Locus Of Control (LOC) orientation of the students in this study?

From the Locus of control scale scores, the average mean was found to be 2.67 and this is a pointer to the fact that many of the respondents agreed with those items in the Locus of control scale in this study. Invariably, this shows that the respondents are mostly internal in their locus of control orientation. To corroborate this finding, 126 (63.0%) of the 200 respondents were found to be internal while the remaining 74 (37.0%) are external.

Research Question 2: Are boys more internally oriented than girls?

From Table 2, of the 126 Internal Locus of control respondents, analysis on Table 2 reveals that 42.9% of them are boys while the remaining 57.1% are girls.

Discussion of findings

The first finding which revealed that 63% of the respondents are internal with respect to their locus of control

clear shows that majority of them believe that they can take control of their lives and that their actions and behavior are instrumental to achieving desired outcome and avoiding undesirable outcomes. This agrees with the findings of Kirkpatrick, Stant, & Downes (2008); Leorne & Burns (2000); Lawal, (2012). Science is a practical and activity-based subject that acquires information through hands-on and brains-on experiences, Doing science demands the conscious use and coordination of the five senses of perception, hearing, touching, tasting and smelling. An internally-oriented student will put in conscious effort at learning science since she knows her efforts determine her outcome. They are also more likely to assume that their efforts will be successful and are more active in seeking information and knowledge concerning their situation (Rotter, 1966). First-hand information in Science comes through hands-on experiences which students acquire by direct contact with real objects, people, places and situations. Learning it effectively demands deliberate effort on the part of science students to acquire first-hand experiences through exploratory, inquiry, demonstrations, discussions, group learning, direct instruction, guided discovery and problem-solving activities. These activities are all child-centered and they have been advocated (Oludipe, 2008) as the best way to make students learn science maximally. For an internally oriented science student, concerted efforts are geared at reading about science and doing it through the use of scientific processes of experimentation, measurement, observation, formulating and testing hypotheses, drawing inference and valid conclusion. Internals are more likely to work for achievements in science, delay gratification and plan for long-term goals. They are also likely to indicate a greater preference for challenge and problem-solving. They are motivated internally and exhibit such behaviours as persistence, hard work, doggedness, inquisitiveness and intelligence. They may tend to reason critically in order to solve problems and refuse to give up on issues so easily. Externals on the other hand belief fate and significant others determine their outcomes and so, they are likely to put in little or no effort at achieving in science and this attitude must be discouraged so as to witness a turn-around in students' performance in Science. Students with an internal locus of control will demonstrate willingness at carrying out investigations about science facts and ideas and are likely to be motivated to make predictions and test them through experimentations. Externals lack the will to try and are reluctant to carry out experiments talk less of making predictions. They are likely to feel 'what is the point in trying when efforts don't count?'

The second finding that females are more internally oriented than males contradicts the finding of Slagsvold & Sorenson, (2008) who assert that women are less likely to posses an internal locus of control than men. Supporting the view of Slagsvold & Sorenson, (2008), Mamlin, & Harris, (2001) reported that males tend to have more of an internal locus of control orientation than females. This could be so probably because of the masculine nature of men, they are expected to make great decisions, take bold actions and be proactive. Women on the other hand are believed to be external because they are defined by the society in which they live, beginning with their family and parents. They are believed to look outside themselves for the definition/control of their lives since they believe many things are out of their hands and in the control of other people, events, or other things. However, they are of the view that as people get older, they tend to believe more in internal locus of control and that people higher up in organizations tend to have more of an internal locus of control orientation. With civilization and advocacy for gender parity in all spheres of life, many women are taking up carriers in male-dominated fields and many are becoming entrepreneurs, the onus lie on them to make decisions, use their initiatives and demonstrate good leadership prowess. This therefore helps many women to believe in themselves and their ability to succeed. Invariably, they are more internally oriented in their locus of control. Also, many parents particularly in developed and some developing nations of the world are empowering their wards particularly the female-child and providing the right orientation for them to be able to compete favourably with the male-child in the society. It is commonly said that 'what a man can do, a woman can do better'. With this type of orientation given to female children from cradle, many more are taking up the challenges of studying science and science-related courses in order to make up for the human capacity needed in the area of science and technology.

Conclusion

This study investigates science students' locus of control orientation in view of the need to redress the present status-quo of abysmal performance in science in the light of substantive claims that students' locus of control orientation is a germane factor contributing to underachievement in science. Findings revealed that of the 200 respondents, 126 (63%) have internal locus of control while the remaining 74 (37%) are external. Also, of the 126 Internal Locus of control respondents, 42.9% are boys while the remaining 57.1% are girls. This shows that girls are more internally oriented than boys.

Recommendations

Students with internal locus of control are more likely to process information with profound or tactical learning strategies and are likely to achieve more in science than those with external locus of control. Therefore, interventions should be put in place to help foster science students' internal locus of control. It is important for parents and teachers to re-orient students especially boys so that they can become more internally oriented as regards their locus of control. They should be able to identify effort and ability as causes of their success so they can obtain high scores in science instead of abrogating their performance to fate, bad luck and other external forces beyond their control.

Scholars have given the hope that it is possible to change an individual's perception of control. Therefore, school managers should endeavour to investigate individual student's locus of control at the point of entry and seek the assistance of school counselors to counsel those externally oriented.

References

Ajileye, O.O (2006).Towards Effective Science Education: Issues in Universal Basic Education Programme. *Journal of Sports Management and Educational Research.* 1 (2), 337.

Arogundade, O. (2010). Locus Of Control And Self-Esteem As Predictors Of Teachers' Frustration In Lagos State Secondary Schools. *Ife psychologia 6(5)*

Awofala, A.O.A; Awofala, A.A.; Fatade, A.O. & Nneji, L.M.(2012). Determinants of students' achievement in senior secondary school mathematics and sciences: What is the role of Test

Response Mode and Locus of control? *International Journal of Mathematics Trends and Technology*, 3(3), 125-130

Bothma, A.C. & Schepers, J.M. (1997). The role of locus of control and achievement motivation in the work performance of black managers. *Journal of industrial psychology,* 23(3), 44-52

Cohen, H.G. (1982). Relationship between locus of control and development of spatial conceptual abilities. *Science Education, 66(4), 635-642*

Dollinger, S.J.(2000). Locus of control and incidental Learning. An application to college success. *College student Journal, 34(4), 537*

Grimes, P.W., Millea, M.J., & Woodruff, T.W. (2004, Spring). Grades- who's to blame? Student evaluation of teaching and locus of control. *The Journal of Economic Education*, vol. 35(2), 129-47

Kirkpatrick, M.A., Stant, K., & Downes, S. (2008). Perceived locus of control and academic performance: broadening the construct's applicability. *Journal of College Student Development*, Vol. 49 (5), 486-496.

Lawal, A.T. (2012). Study habit and Locus of control as determinants of students' achievement in Accounting. *Unpublished B.Ed. project.* Olabisi Onabanjo University, Ago lwoye.

Leorne R. & Burns T. E. (2000). Improved Reading through Counseling. Prentice Hall. Pp. 19

Mamlin, N., Harris, K. R., Case, L. P. (2001). A Methodological Analysis of Research on Locus of Control and Learning Disabilities: Rethinking a Common Assumption. *Journal of Special Education, Winter3(4), 28*

Ojo M. O (2001). Problems of teaching Science and Mathematics in Nigeria.A paper presented at the

Train- the Trainers workshop for Science and Mathematics teachers in Colleges of Education in Six Geo – political zone of Nigeria.

Olonade, G.B(2000). Influence of School Location, School Size, Sex DifferenceAnd Teachers Variables on

Mathematics Achievement of Secondary Student In Kwara State. (*Unpublished Master's thesis*). University of Ilorin, Ilorin.

Oludipe, B.D. (2008): Impact of Reciprocal Peer-Tutoring on Secondary School Students' Achievement in Large Physics Classes in Nigeria. *Ubiquitous Learning, An International Journal.* A publication of the University of Illinois, USA *vol.1(2), pp.13-18*

Omotayo Y.E. (2012). Academic self concept and locus of control as predictors of students' academic achievement in Economics in Ijebu North Local Government area of Ogun State. *Unpublished B.Ed. project.* Olabisi Onabanjo University, Ago lwoye.

Rotter, O. (1966). A scale to measure Locus of control of behavior. *British Journal of Medical psychology, 57, 173-180*

Slagsvold, B. & Sorensen, A. (2008). Age, education, and the gender gap in the sense of control. *International Aging and Human Development*, Vol. 67(1), 25-42.

WAEC releases 2012/2013 results. Downloaded from http://nigerianuniversitynews.com/2012/08/breaking-waec-releases-20122013-wassce-results.html on 2nd April, 2013

Table 1: Descriptive statistics showing responses of Respondents on the Locus Of Control Scale

S/N	Item	SA	A	D	SD	x	SD
1	I can anticipate difficulty and take action to avoid them	48(24.0%)	48(24.0%)	64(32.0%)	40(20.0%)	2.52	1.07
2	When l make plans, l am almost certain l can make them work	52(26.0%)	56(28.0%)	68(34.0%)	24(12.0%)	2.68	0.99
3	I believe a person can really be master of his life	60(30.0%)	47(23.5%)	66(33.0%)	27(13.5%)	2.70	1.04
4	I am confident of being able to deal successfully with future	50(25.0%)	59(29.5%)	65(32.5%)	26(13.0%)	2.67	0.99
5	My performance in school is as a result of my efforts	56(28.0%)	69(34.5%)	47(23.5%)	28(14.0%)	2.77	1.01
6	I believe in my efforts at making positive contribution in any situation around me	62(31.0%)	47(23.5%)	46(23.0%)	45(22.5%)	2.75	0.99
7	I can handle situation no matter how difficult it may be	49(24.5%)	53(26.5%)	64(32.0%)	34(17.0%)	2.63	1.14
8	I believe that l have control over reinforcing events in my life	46(23.0%)	70(35.0%)	65(32.5%)	19(19.5%)	2.59	1.03
9	I prefer learning environments that maximize the degree of control over my learning	43(21.5%)	66(33.0%)	61(30.5%)	30(15.0%)	2.72	0.93
10	How hard l study will determine the grades I will get	41(20.5%)	60(30.0%)	62(31.0%)	37(18.5%)	2.61	0.99
11	I am good at making things work well	45(22.5%)	57(28.5%)	59(29.5%)	39(19.5%)	2.52	1.02
12	No matter the challenges l face, l will never fail an examination	61(30.5%)	59(29.5%)	49(24.5%)	31(15.5%)	2.54	1.05
13	With enough effort, failure in schools can be wiped off	65(32.5%)	75(37.5%)	42(21.0%)	18(9.0%)	2.75	1.06
14	I believe that becoming successful is a matter of hard work	73(36.5%)	72(36.0%)	35(17.5%)	20(10.0%)	2.93	0.95

Table 2: Descriptive statistics showing distribution of internal LOC respondents by gender

		N	X	SD
Internal	Boys	54(42.9%)	2.55	1.04
	Girls	72(57.1%)	2.63	1.14