Influence of Students' Goal Orientation on Senior Secondary School Students' Interest in Chemistry in Ibadan Metropolis, Nigeria

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Abstract
The purpose of this study was to determine if student goal orientation had any significant connections with students' interest in chemistry. This study adopted the survey design of the ex-post facto type. Data were collected from 250 chemistry students from six senior secondary schools in Ibadan metropolis using two well-validated and reliable instruments. Results showed that 28% of the students were mastery-oriented while 72% were performance-oriented. The findings also showed that even though a slight difference in interest means scores was observed, in favour of mastery-oriented, it was not significant. Therefore, students' goal orientation and interest are closely related and students' interest in chemistry is regardless of their goal orientations.
Keywords: mastery-oriented, performance-oriented, goal orientation, students' interest in chemistry
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1. Introduction
The knowledge of chemistry is visible in almost all sectors of human endeavour. It is applied in the areas of food and agriculture, manufacturing industries, health/ pharmaceuticals, power, works and housing, transportation, mineral exploration, space exploration, textiles, oil and gas, water treatment and almost all forms of engineering. By studying chemistry, students acquire scientific awareness and knowledge of their environment as well as information about the world around them. As an academic human endeavor, chemistry relies on basic qualities like creativity, insights and reasoning. To study chemistry at any level, an individual's capacity to integrate his or her cognitive, affective and psycho-motor skills is required (Woldeamanuel, Atagana and Engida, 2013).

In learning science generally and particularly chemistry, a large range of factors come into play. Such factors may be related to teacher, instructional materials or students. One student factor that deserves research attention is Interest. The Nigerian senior secondary school curriculum for chemistry clearly states that the foremost objective of teaching and learning chemistry should be to develop the interest of students in chemistry as a subject (FME, 2009). Interest is an emotion that causes an individual to pay attention to or focus on an object, event or process. The concept of interest has also been linked to other concepts such as curiosity, attraction and surprise. With respect to learning, interest promotes understanding and retention since it makes people to process any given texts more deeply. Interest also encourages good meta-cognitive strategies (Silvia, 2007). In science education, one critical goal is to encourage students' continued interest and engagement in science (Richards, Colin, Gupta, and Elby, 2013). Though inconclusive, the findings of the study by Edeh and Vikoo (2013) indicated that students may not do well in chemistry if factors such as interest are defective.

However, based on personal interactions with a good number of teachers and students, I gathered that students' enrolment in chemistry is going down tremendously. Chemistry seems to have lost its appeal to many students in Nigeria (Sirhan, 2007; Otor and Achor, 2013, Nnoli, 2015). In a recent study, Nbina (2012) identified students' lack of interest in Chemistry as one of the prominent factors responsible for poor academic performance in the subject. Okoye, Okongwu and Nweke (2015) stated that an individual's interest in something or an event is not unconnected to whether he views it as beneficial or not.

Lamb, Annetta, Meldrum and Vallett (2012) measured students' interest in science by basically taking into consideration intrinsic and extrinsic factors such as school, family, and peers. This considers the student's attitude which is affected by factors such as peer, parent, and teacher influences (including how a teacher presents a concept). These factors also help to indicate the success of a student in science by influencing his/her interest (Lamb, et al, 2012). Furthermore, Ainley, Hidi, And Berndorff (2002) averred that interest propels or spurs an individual to seek and obtain new information, to demonstrate commitment to know about new objects, events, and ideas without prejudice to any narrow domain. In another study, Wigfield and Cambria (2010) suggested that goal orientations and interest may have similar influence on learning outcomes especially since both represent the purposes individuals have for doing activities Both goal orientation and interest have been termed as "motivation-related".

Student goal orientation is the term that denotes the purposes underlying students' participation in a given task. For instance, in deciding what 'approach to learning' they would adopt. 'Approach to learning' refers to the learners' different ways of relating to the learning task- 'how' and 'why' a learner learns'. Students' goal

orientations have been categorised in various dimensions. There are the dichotomous, trichotomous and 2x2 goal frameworks (Asuquo and Kalu (2016), Musa, Dauda and Umar (2016), Kadioglu and Kondakci (2014) and Ayodele, Aladelusi and Akinlana (2014)). To avoid any ambiguity, this study adopted the dichotomous framework which places students' under Mastery goal-oriented and Performance goal-oriented.

Students hold mastery goals (also referred to as being mastery-oriented) when their goal is to really understand or master the task at hand. Students who are mastery-oriented are interested in self-improvement and tend to compare their current level of achievement to their own prior achievement. In contrast, the second category is called a performance goal orientation. Students hold performance goals (also referred to as being performance-oriented) when their goal is to demonstrate their ability compared to others. Students who are performance-oriented are interested in competition, demonstrating their competence, outperforming others; and using social comparison standards to make judgments of ability and performance. They also tend to use other students as points of comparison, rather than themselves (Meece, Anderman and Anderman, 2006).

2. Students' Goal orientations and Learning Outcomes

Goal orientation is one of the concepts that have emerged in educational psychology over the last few decades and Rashidi and Javanmardi (2012) believed that it is one of the most important concepts regarding learning in any educational setting. The place of student goal orientation in learning has been examined over these years; its direct and mediating effects, predictive power as well as relationship with various learning outcomes; both cognitive and affective. The earliest ideas about goal orientation dates back to the 1970s when an educational psychologist J.A. Eison. Eison opined that some students viewed learning in college as an opportunity to acquire new skills and knowledge. He termed them as learning-oriented. While those who approached college solely to obtain high grades, he termed grade-orientated. In those times, he believed that these two orientations were two ends of the same continuum. So, he developed the Learning Orientation-Grade Orientation Scale to measure the continuum. However, this was changed in 1982, when the two orientations were viewed as distinct and separate constructs.

Dweck, in line with Eison also proposed that children with performance goals tackled situations with the goal of earning approval from their peers and teachers. Dweck's work corroborated that of Eison as he described those with mastery (learning) goals as those not concerned about their performance in comparison to others, but rather with advancing their understanding of a given topic or task. He agreed that persons with performance goal orientation just aim at displaying their academic prowess so as to get favorable judgments and avoid negative judgments. Dweck considered the adoption of a particular goal orientation to be related to the theory of intelligence held by that individual.

Studies have confirmed that goal orientation strongly influence students learning processes and outcomes (Ali, Hatala, Winne and Gasevic, 2014). Mastery and performance goals are associated with various learning outcomes in significant ways. When students adopt either mastery or performance goals, predictable outcomes often result (Meece, Anderman and Anderman, 2006). Performance approach and mastery approach positively determined students' learning strategies; in favour of mastery approach.(Kadioglu and Kondakci, 2014). Also, Heinke (2007) submitted that both mastery and performance goals may facilitate college students' achievement and satisfaction.

Also, Asuquo and Kalu (2016) found that there was a significant relationship between goal orientation, learning strategies and academic achievement in primary health care examinations. Usoroh, Akpan and Effiong (2015) described mastery-avoidance and performance-avoidance goal orientations as "detrimental" to students' learning and achievement outcomes in Home economics. In a related study, Ayodele, Aladenusi and Akinlana (2014) found that all three independent variables examined (personality factors, academic emphasis and student-lecturers relationship) had significant influence on achievement goal orientation among under-graduates in South-west, Nigeria. Achievement goal orientation has also been examined along with academic self-efficacy and shown to have significant effects (Samareh and Kezri, 2016). Students may adopt certain goal orientations independently but there is evidence in literature that students can be influenced by teachers to adopt a particular goal orientation (Asuquo and Kalu, 2016).

3. Students' Goal orientations and Interest in Learning Chemistry

A study carried out by Matsumiya (2021) involved tracking the progress of some learning outcomes among a sample of clinical psychology graduate-level students in a university. There were indications that students' interest did not change much over time and that mastery-oriented students engaged deep-level strategy processing. Yederlen, Aydin, Yalmanci and Goksu (2014) showed that the relationship between mastery-approach and intrinsic motivation was positive. Positive correlations were also identified between performance-approach and extrinsic motivation. They also concluded that mastery-approach was the best predictor of most of the sub-dimensions of motivated examined in the study. Harackiewicz, Barron, Pintrich, Elliot, And Thrash (2002) submitted that there are many indications of a positive effect of mastery goal orientation on students'

interest. The links between performance goals and various learning outcomes are more intricate. Trumper (2006) concluded from results obtained in a study on students' interest in Physics at the end of their compulsory schooling in Israel (ROSE Project) that students' overall interest in physics was neutral, that is, neither positive nor negative. Though, boys appeared to indicate higher interests than girls. The researcher also found that there was strong correlation between students' neutral interest in physics and their negative opinions about their science classes. Wigfield and Cambria (2010) considered the closeness in interplay of goal orientation and interest. They pointed that there are recognizable overlaps in the nature of the respective questionnaires. For instance, some goal orientation questionnaires have been found to contain words such as 'like' and 'enjoy' which are usually associated with interests.

4. The Problem

Studies show that interest is vital for academic success. Since students studying chemistry in senior secondary school voluntarily chose the subject, it is expected that they should possess a good level of sustained interest in the subject. However, evidence and observations show that students' level of interest in chemistry is low. This is reflected in students' lackadaisical display in terms of involvement and participation in class, boredom in practical classes and non-challant behavior. Perhaps, they are affected by influence from peers, parents, teachers, their environment or goal orientations. The purpose of this work was to determine if goal orientation had any significant connection with students' interest in learning chemistry in Ibadan metropolis.

5. Research Questions

RQ 1 What is the level of students' interest in chemistry in Ibadan metropolis?

RQ 2 What is the level of students' goal orientation in Ibadan metropolis?

RQ 3 What is the difference between mastery-oriented and performance-oriented students' with regards to their interest in chemistry?

6. Methodology

This study adopted the survey design of ex post facto type. There was no manipulation of variable and no treatment was introduced. The participants in this study comprised 250 senior school II chemistry students from six (6) co-educational public secondary schools in Ibadan metropolis. From each of the six schools selected, an intact class of SSII chemistry students was chosen to participate in the study; making a total of six (6) intact classes. Research instruments used were adapted and validated by the researcher. They are:

1. Interest in Chemistry Questionnaire (ICQ) (α=0.70).
2. Student Goal Orientation Questionnaire (SGOQ) (α=0.73).

7. Research Procedure/Data Collection

The students were first given the ICQ and the SGOQ was administered second. The SGOQ was used to measure and categorize the participants under mastery-oriented and performance-oriented.

Data obtained from the sample students were analysed using mean, standard deviation and t-test.
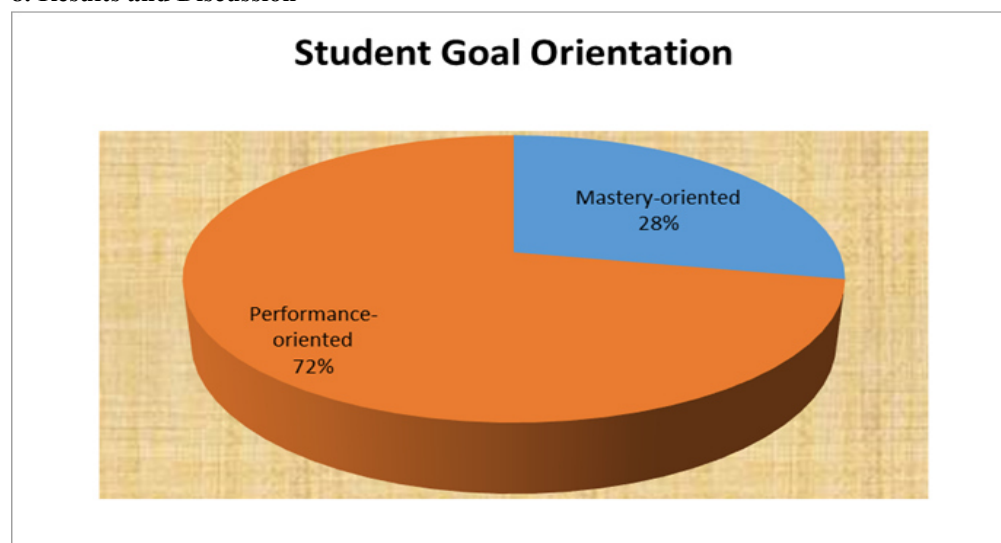
8. Results and Discussion

Figure 1. Pie chart representing the percentage distribution of samples between the two goal orientations

The above figure shows that 72% of the students who participated in this study were found to be performance-oriented while 28% were found to be mastery-oriented to chemistry.

Research question 1. What is the level of students' interest in chemistry in Ibadan metropolis?

The result obtained showed that the weighted mean value of students' interest in chemistry was 2.0. This is lower than the standard mean of 2.50. Therefore, students' interest in chemistry is low.

Research question 2. What is the level of students' goal orientation in Ibadan metropolis?

The weighted mean value obtained for mastery goal orientation is 2.14. This is less than the standard mean of 2.50. Therefore, the level of mastery-goal orientation is low.

However, the weighted mean obtained for performance-goal orientation is 3.40 which is greater than the standard mean of 2.50. Therefore, the level of performance-goal orientation is relatively high.

Research Question 3 What is the difference between mastery-oriented and performance-oriented students' with regards to their interest in chemistry?

Table 1: T-test table showing means difference between mastery-oriented and performance-oriented students' with regards to their interest in chemistry.

Goal Orientation	Mean	N	Standard deviation	T	df	Sig/remark
Mastery-oriented	59.26	70	8.86	1.589	248	0.356
Performance-oriented	57.36	180	8.31			Insignificant

Table 1 shows the magnitude of the significant difference. On the table, it is clear that students who are mastery oriented had a slightly higher mean score ($\bar{x}$ =59.26) in interest in chemistry than those classified as performance oriented ($\bar{x}$ =57.36). It can therefore be implied that mastery-oriented and performance-oriented students don't differ significantly in their interest in chemistry. The result obtained in the study agrees with the conclusions of Heinke (2007) but in contrast to the findings of Wigfield and Cambria (2010), Yederlen, Aydin, Yalmanci and Goksu (2014) and Harackiewicz, Barron, Pintrich, Elliot and Thrash (2002) who submitted that there are indications of a positive effect of mastery goal orientation on students' interest as well as intrinsic motivation.

The findings of this study suggest that there seems to be a narrow gap that exists between student goal orientation and interest. It may also be proper to say that an appreciable amount of aspects of interest and goal orientation are closely related. It is also noteworthy to state that when both questionnaires are compared; the instruments for measuring interests and goal orientations share words such as "like" and "enjoy". Although negligible, the little difference in interest observed among students can be accounted for. From the result table, the mastery-oriented students' interest mean score was to some extent higher than that of the performance-oriented students. This is probably due to the fact that students' goals reveal their motivation for carrying out learning tasks. Both mastery-oriented and performance-oriented students may have equal baseline interest in a given task. But due to the inherent nature of the mastery-oriented students to really master the given task, there is the tendency that this would translate into a slightly elevated interest; especially in comparison to their counterparts.

Judging from the sample distribution between the two categories of goal orientation, it was observed that a greater fraction of students were categorised as performance-oriented rather than mastery-oriented. This, we believe, is of significance and it is imperative that attention should be drawn to this observation. Performance-oriented students are more interested in appearing 'capable' in the eyes of others (peers, family, teachers, etc.). They are not entirely given to understanding the lesson taught. They are the set of students who merely 'read to pass'. If Nigeria is to attain its goals for science education, her students must be motivated to master and 'really learn' science, especially chemistry. By so doing, there would be creative innovations and inventions in many institutions of learning. Where most of the chemistry students are basically performance-oriented, there is very little hope for advancement in Nigeria's science education.

Furthermore, an overview of recent West African Examination Council (WAEC) results shows some improvement in students' performances. Placing this side by side with the fact that most chemistry students are performance-oriented, it appears that they are doing well not because they indeed, have deep understanding of the subject and can apply the knowledge in new situations, but rather, to get good grades in order to gain admission to study courses like medicine and show teachers, parents and peers that are capable of doing well. Arguably, students' level of interest in chemistry is generally low. Therefore, there is a need to continually explore various means of increasing students' motivation and sustaining their interests in learning chemistry. It appears that when students' interests and motivation are high, they tend to adopt mastery goals in learning. Since

goals can be altered, teachers and schools could help direct their students towards adopting mastery goals. This is likely to make them see learning chemistry as interesting and invariably, create the environment for effective learning to take place.

9. Conclusions

It is evident that students' goal orientation and interest are closely related and students' interest in chemistry is regardless of their goal orientations. However, teachers and parents can encourage chemistry students to adopt mastery-oriented goals.

10. Recommendations

1. Teachers should adopt better learning strategies in order to make chemistry attractive to many students. Therefore, curriculum planners should use the findings of this study to formulate a more learner-centered curriculum.
2. Teachers need to be aware of goal orientation and its implications in learning.
3. Teachers and other stakeholders such as parents, need to direct students towards adopting and maintaining mastery goals.
4. The idea of 'reading merely to obtain credit pass in order to study a particular course in the university must be minimized among students studying chemistry. If Nigeria must achieve economic and technological advancement, students studying science, especially chemistry must lay emphasis on process rather than knowledge. When students understand process, they able to apply creative abilities and come up with innovations that would advance the nation.
5. Furthermore, learning chemistry should involve not just knowledge acquisition but practice. Effective learning takes place when learners are able to use their knowledge to solve problems, both at individual levels and the society in general
6. Lack and decay of infrastructure in schools especially for science should be addressed via the implementation of strategic public-private partnerships.
7. Lastly, career guidance is very vital for academic success. Students should be tailored to fields where their natural interests lie, rather than succumb to societal and parental pressure to pursue only courses like medicine and pharmacy.

Acknowledgments

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