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An Examination of Curiosity and Academic Self-Concept among Students of Category “A” Senior High Schools in the Central Region of Ghana

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Curiosity and academic self-concept as psychological constructs are often mentioned in education and psychology. These constructs are elusive in terms of how they are exhibited or portrayed and measured. Despite their elusive nature, they are highly significant to the success or otherwise of learners. Therefore, the current study explored curiosity and academic self-concept among students of category “A” Senior High schools in the Central Region of Ghana. Using a descriptive-quantitative method, a sample of 400 students was selected through proportionate-stratified and systematic sampling techniques. Adapted curiosity (Kashdan et al., 2018) and academic self-concept (Liu & Wang, 2005) scales were used for the data collection. The data collected were analysed using frequencies, percentages, and structural equation modelling (SEM). The study revealed that the majority of the students possessed low curious abilities and low academic self-concepts. The study further revealed that curiosity of deprivation sensitivity ($b=.577$, $p<.001$), the curiosity of stress tolerance ($b=.248$, $p=.007$), and curiosity of thrill-seeking ($b=.544$, $p<.001$) positively and significantly predicted academic self-concept of students but the curiosity of joyful exploration and social curiosity did not predict academic self-concept of students. It was concluded that students' curious abilities were precursors to their academic self-concept. Thereupon, teachers need to devise new approaches by allowing students to engage in other learning opportunities without much restrictions so that they could hone their natural potentials.

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Introduction

Curiosity and academic self-concept as psychological constructs are often mentioned in the academic spheres of education and psychology. These two constructs are dissimilar and provide details about their differences but hold a particular reputation for educational training (Tang et al., 2020). Curiosity is a human drive that propels people to seek information or knowledge (Grossnickle, 2016; Kidd & Hayden, 2015), and has been shown to have reflective effects on learning (Kang et al., 2009; Shah, Weeks, Richards, & Kaciroti, 2018), motivation (Vogl et al., 2020), and cognitive development (Malanchini et al., 2019).

Generally, in education, the human mind of a student is able, in different ways, to represent future events flexibly, to imagine different possible results, and to act in response to them. These actions of the mind become possible through curiosity because the mind engages in the latent exploration of such events. Curiosity is an indispensable mechanism for knowledge discovery, innovation and, more unanimously, an accepted and uncontrollable component of learners (Engel, 2013; Livio, 2017; Kashdan, Sherman, Yarbro, & Funder, 2013). According to Litman (2010) and Litman, Crowson, and Kolinski (2010), curiosity is the craving for novel information anticipated to arouse encouraging feelings of “interest” (I) or reject unknowns to progress in understanding when feeling “deprived” (D) of familiarity. Different dispositional inclinations toward I-type and D-type curiosity represent the degree of comparable curiosity states (Litman, Hutchins, & Russon, 2005). While their shared affinity for learning new things overlaps with I and D-type curiosity, they differ substantially in how they encourage self-directed learning. The I-type curiosity is a modest thirst for information sated by situations and positive moods such as discoveries (Hidi & Renninger, 2019; Litman & Silvia, 2006; Silvia, 2008).

I-type curiosity is connected empirically to positive influence, enjoyment of news, and pleasure in finding discoveries (Lauriola et al., 2015). D-type curiosity is a more intensified 'need to know that involves a disturbing experience of a puzzle, activated by identifying gaps in the information in a network of associative knowledge (Gruber, Gelman, & Ranganath, 2014). The curiosity of type D is positively linked to the negative impact and concern for the exactness of newly acquired knowledge. A curiosity of type D is characterized by persistence in connecting points to solve conflicts (Koo & Choi, 2010; Lauriola et al., 2015; Litman, 2010; Litman & Mussel, 2013; Richards, Litman, & Roberts, 2013).

Curiosity, according to Kashdan and Steger (2007), is described as an individual's willingness to know, to experience, to observe, or to understand something new, which is what motivates inquiry into something completely new. Curiosity is termed as a desire to learn about a novel stimulus that causes people to engage in a search for information about that stimulus. It is described with a positive connotation, commencing investigation, supporting the accumulation of knowledge, stimulating research and competence, and initiating the exploration process. According to Jirout and Klahr (2012) and Engel (2011), students' ability to exhibit curiosity could lead to searching for new information innknown situations and can support them in dealing with challenges learning challenges, and taking intellectual risks.

As students become successful in such situations, they are likely to develop a positive self-concept. In addition to providing fundamental education and skills for young people worldwide, there is a growing consensus that educators must support students in developing the trust and adaptive motivations needed for their long-term learning (Lüftenegger et al., 2012). According to Bong and Skaalvik (2003), Rashid and Iqbal (2015) and Kalaivani and Rajeswari (2016) self-concept is a general term used to refer to the way people think about



their selves, their general level to the skills and abilities that they possess and their beliefs about their academic prowess. Gabriel et al. (2009) alleged that educational accomplishment or failure seems to depend on how a person feels about the curious and self-concept qualities and attributes he or she owns. It appears that achievement depends as much on the ability as on the self-concept of the aptitude of the student. Studies on self-concept have attracted the interest of scholars in many fields because numerous studies conducted over the years have advised that academic self-concept is related to academic, where self-concept could predict students' academic progress (Choi, 2005; Liu & Wang, 2008).

According to Fryer (2015), curiosity and self-concept as latent variables powerfully overlap with each other. Students' accomplishment is supported by providing opportunities for learners to demonstrate curiosity and improving their academic self-concept while also being supportive of students' achievement. These are critical and interconnected components of formal education (Fryer, 2015). A scholarly demonstration has regularly confirmed the existence of a positive and negative relationship between one's self-concept and one's academic accomplishment (Marsh & Craven, 2006). Marsh, Trautwein, Ludtke, Koller, and Baumert (2005) extended the reciprocal model to add curiosity as a third fundamental determinant of learning outcomes, arguing that it is rational to combine two fundamental determinants of learning outcomes. According to scholarly disclosures, neither curiosity nor self-concept can propel students to academic achievement on their own. However, when both work together, they can propel students to academic success (Fryer, Carter, Ozono, Nakao, & Anderson, 2013; Fryer, Ginns & Walker, 2014; Vansteenkiste, Soenens, Verstuyf, & Lens, 2009).

Köller, Baumert, and Schnabel (2001) argued that while self-concept is also an important predictor and result across educational environments, the importance of curiosity among students increases when students change to less structured learning environments. The transition from a lower level of education to a higher level of education is marked by substantial growth in learner autonomy, which is an aspect of curiosity. Therefore, curiosity is a major determinant of academic self-concept in the current study.

21st century education system suggests an education model focused not necessarily on improving the intellectual abilities of students but also their ability to own and control their view of themselves through curiosity. Having understood the role of schools by training students with the skills, knowledge, and attitudes to facilitate their autonomy using curiosity, it is also important for schools to work toward the promotion and development of academic self-concept among students. Many studies have been conducted on the relationship between academic self-concept and academic achievement (Marsh et al., 2005), self-efficacy and self-concept influence on college students' academic performance (Choi, 2005), development of self-concept among university students (Rashid & Iqbal, 2015), academic motivation and academic self-concept (Kalaivani, M., & Rajeswari, 2016), self-concept and academic mindfulness (Palomino, 2017), self-concept and self-regulation (Malanchini et al., 2019) and knowledge exploration and academic self-concept (Vogl et al., 2020) yet it seems little to nothing is known about the effect of curiosity on academic self-concept among high school students.

Theoretical Perspective

The optimal-arousal theory (Berlyne, 1960) and self-categorization theory (Berlyne, 1960) serve as the foundation for this study (Turner, 1985). When the optimal-arousal

hypothesis was developed, it was motivated by the desire to understand why certain people seek ways to conduct themselves in exploration that are free of uncertainty or ambiguity. When it comes to understanding this component of curiosity, the optimal arousal theory proposes that individuals are driven by these exploratory behaviours in order to sustain an enjoyable experience of arousal. It is believed that Category “A” schools in Ghana are more academically stimulating as they push students through uncertain academic tasks so that they could make identify in themselves their strengths and weakness. Based on this, the optimal-arousal theory assumes that students may exhibit a predisposition to maintain an optimal level of excitement in acts that look unclear to them as they strive to establish themselves in the discovery learning process. As such uncertain academic environments are encountered, the zeal to explore is heightened as students are compelled to learn more due to the excitements they may be experiencing.

In Turner’s self-categorization theory, the self-concept includes at least two “levels,” one personal and the other social. The theory assumes that people put themselves and others into social categories and that the social categorization process forms a range of attitudes, emotions, and behaviours. The theory of self-categorization assumes that if students self-categorize as group members, they are seen in a process known as depersonalization as similar to other members of the group on the key stereotypic aspects of the group. In doing this, it does not take away one’s personalization but rather enhances their progress in school (Turner & Reynolds, 2011; Turner, 1975). Aligning this theory to Category “A” schools, it is a known secret they pride themselves better than other schools in Ghana. As such, students may see themselves to belong to the group, unite in the group and project the group with higher academic performances. Such shared and common behaviour was contended by Turner (1984) that it is the cognitive redefinition of the self, which mediates collective behaviour from unique attributes and individual differences into social group memberships and associated stereotypes. This implies that students in Category “A” schools see themselves as a unique group with a common aim in protecting academic legacies carved and honed by those who have been to such schools some many years ago. Once such a mindset is harboured by these students, it is difficult for them to relax so they keep pushing even in extreme situations.

Given the scarcity of studies on students’ experience of curiosity and how it influences their self-concept, the main objective of the current study was to establish the predictive ability of curiosity academic self-concept of Category “A” Senior High School students in the Central Region of Ghana. The study was delimited to Category “A” schools because they perform very well in the West Africa Senior Secondary Certificate Examination. The academic feats chalked by these schools are consistent and supersedes other schools in the region. It is surprising to note that teachers in all senior high schools across the region possess adequate qualifications and the skills needed to teach any senior high school students, yet those students who are privileged to be in Category “A” schools perform better year-in-year-out. Although Category “A” schools are known to have adequate learning facilities as compared to Category “B” and Category “C” schools, these alone cannot be the main reason for their superiority because their teachers passed through similar training and nurturing as to those in the other classifications. In denouncing the sole of role possessions of Category “A” schools, it is important to note that human beings are blessed with innate abilities to prosper in their chosen areas, provided such abilities are identified and honed. By implication, students in Category “A” schools may be exhibiting the curious abilities that propel them to assume control of their academic works because no single factor, including their intellectual abilities, could be credited, hence the study.



Methods

Research Design

Descriptive-quantitative research was used. This design was chosen on the basis that it allowed the researchers to measure the respondents at once. Again, this design provided the researchers with the opportunity to give a premium to objective measurement of the variables through the use of standardized measures. Following this, numerical-based data analysis was employed. According to Babbie (2010) and Muijs (2010), descriptive-quantitative research design aims at collecting mathematical information and generalizing it across groups of people or explaining a particular phenomenon. The researchers' focus in this study was to establish the bond between students' curious abilities and academic self-concept, hence the soundness of this research design.

Research Sample

The population for the study was 9,993 (male=5,387; female=4,606) comprising all Senior High School students in Category "A" schools in the Central Region of Ghana (Holy Child School=1,185, Mfantsipim=2,145, Adisadel College=1,620, St. Augustine's College=1,622, Wesley Girls High School=1,165, and Mfantsiman Girls=2,256). Category "A" schools are those recognized as highly ranked in terms of high academic performance and achievement in Ghana. The accessible population was 6,399 (male=3,529; female=2,870) comprising form two gold and green track students (Holy Child School=742, Mfantsipim School=1,406, Adisadel College=1,164, St. Augustine's College=959, Wesley Girls High School=702, and Mfantsiman Girls=1,426). This group was used because they were the only available group of students as of the time of data collection. This happened because the form one students had not reported to school yet and the form three students too were writing their final examination so the process could have distracted their attention if they had been engaged.

Participants

The sample size for the study was 400 more than 376 observed from Slovin's (1960) formula (Tejada & Punzalan, 2012). Thus, $N/(1+Ne^2)$, where N represents the accessible population and e represents the margin of error. The sample was selected through proportionate-stratified sampling technique and systematic sampling technique. The proportionate-stratified sampling technique was used because of the population differences in the schools, where the fairness of sample proportions to the schools was key to analysis and interpretation. The systematic sampling technique was used to select individual cases from the schools. This was made possible by $Kth=N/n$, where $Kth=16$ and represents the decision number, $N=6,399$ and represents the accessible population, and $n=400$ and represents the sample size. In each of the researchers visited, a respondent was picked at random, and subsequently, the count of 16th respondent was used until the total sample size was exhausted.

Data Collection Tools

The data for the study were collected using adapted scales. The adaptation of the scales was done to make sure that the information each scale carries related to the context and practices of the Ghanaian culture. In the adaptation process, some statements in the original scale were modified to reflect the understanding and application of curious and self-concepts

constructs in Ghanaian high schools. Again, the Likert-type scale was changed from 5-point to 4-point so that each respondent offer their opinion what they experience in their learning expeditions. With curiosity, Kashdan et al. (2018) 25-items 5-Dimensional Curiosity Scale (5DC) with a reliability coefficient of .753 was used. With the academic self-concept, 20-items Liu and Wang (2005) Academic Self-Concept Questionnaire (ASQ) with a reliability coefficient of .771 was used. These scales were pilot-tested among 43 students (Browne, 1995; Julious, 2005; Machin, Campbell, Tan, & Tan, 2018) in two categories “A” schools in the Western Region of Ghana, where their internal consistencies were established using the Cronbach’s Alpha.

Data Analysis

The data collected were analysed using frequencies and percentages and structural equation modelling (SEM) through the help of AMOS version 23. This analytical procedure was chosen by the researchers because it gives room for the estimation of multiple and interrelated dependence in a single analysis, where endogenous variables and exogenous variables were used (Raykov & Marcoulides, 2006; Vermunt & Magidson, 2005).

Results

What are the levels of curiosity among students?

The researchers considered the levels of curiosity among the students as these could serve as a panacea to their view of themselves and their abilities in executing academic tasks. Table 1 presents the results:

Table 1. Level of curiosity among students.

| Levels | Score Range | Frequency | Percentage |
|----------------|-------------|-----------|------------|
| Low Level | 25-50 | 145 | 36.1 |
| Moderate Level | 51-75 | 122 | 30.5 |
| High Level | 76-100 | 133 | 33.3 |
| Total | 3 | 400 | 100.0 |

Table 1 shows the results of the measured levels of curiosity. The study revealed that the majority of the students possessed a low level of curiosity (n=145; 36.1%), followed by those with high levels (n=133; 33.3%) and those with moderate levels (n=122; 30.5%).

What are the levels of self-concept among students?

The researchers took into consideration the levels of self-concept among students. The extent to which a student possesses self-concept determines the abilities, skills, and zeal they attach to their learning and interaction with people. Table 2 presents the results:

Table 2. Levels of academic self-concept among students.

| Levels | Score Range | Frequency | Percentage |
|----------------|-------------|-----------|------------|
| Low Level | 20-40 | 165 | 41.1 |
| Moderate Level | 41-60 | 122 | 30.5 |
| High Level | 61-80 | 113 | 28.3 |
| Total | 3 | 400 | 100 |

Table 2 shows the results of academic self-concept among students. The study revealed that



the majority of the students exhibited a low level of self-concept (n=165; 41.1%) followed by those with a moderate level of self-concept (n=122; 30.5%) and those with a high level of self-concept (n=113; 28.3%).

Research Hypothesis: Curiosity in students will predict their academic self-concepts

The researchers sought to establish the effects of curiosity dimensions on academic self-concept (ASfC) as a composite variable. The dimensions of curiosity include joyful exploration (JoEx), deprivation sensitivity (DpSy), stress tolerance (STol), social curiosity (SoCy), and thrill-seeking (ThSk). The analysis was performed based on 1000 bootstrap samples. Bootstrapping was used to minimize issues of errors and biases in the dataset.

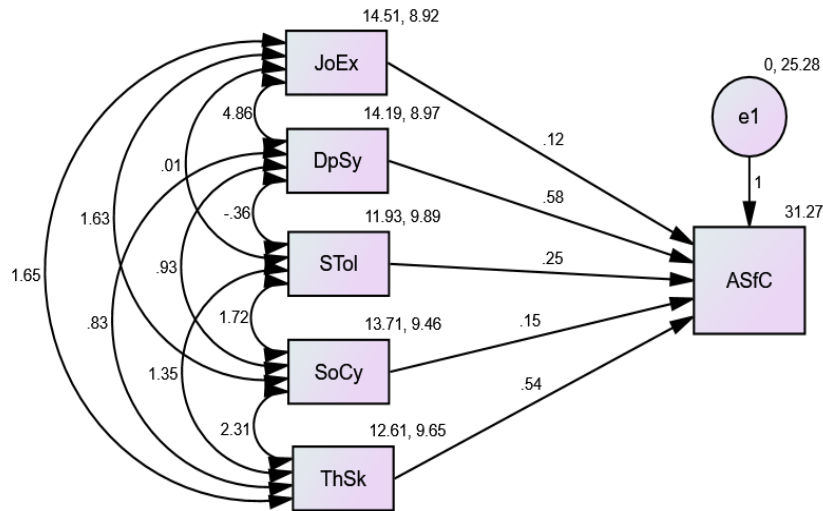


Figure 1. Structural model of curiosity dimensions and academic self-concept.

Table 3. Regression weights.

| Curiosity | Estimate | S.E. | St. Beta | C.R. | p | CI | |
|-----------------------------------|----------|------|----------|-------|-------|-------|-------|
| | | | | | | Lower | Upper |
| ASfC <--- Joyful exploration | .121 | .114 | .062 | 1.062 | .288 | -.152 | .394 |
| ASfC <--- Deprivation sensitivity | .579 | .112 | .295 | 5.175 | .000* | .372 | .858 |
| ASfC <--- Stress tolerance | .248 | .091 | .133 | 2.715 | .007* | .055 | .468 |
| ASfC <--- Social curiosity | .152 | .096 | .080 | 1.581 | .114 | -.060 | .367 |
| ASfC <--- Thrill seeking | .544 | .095 | .287 | 5.739 | .000* | .305 | .766 |

R-Square= 26.8%

Table 3 shows the results of curiosity dimensions predicting the academic self-concept of students. The results show that curiosity explained 26.8% of the variance in the academic self-concept of students. The study revealed that curiosity of deprivation sensitivity (b=.577, p<.001) positively and significantly predicted the academic self-concept of students. This denotes those students who can understand, withstand and live with deprivation in school are likely to exert control over their academic lives and as well, have positive beliefs about themselves in terms of their abilities. The study further revealed that curiosity of stress tolerance (b=.248, p=.007) positively and significantly predicted the academic self-concept of students. This suggests that students who can understand their difficulties, soak academic pressure and manage to make them part of their process of learning will have a good view of themselves and what they are capable of doing. Tolerance is an important skill for every



determined and successful learner, so such a trait must be nurtured among all learners. Also, the study revealed that the curiosity dimension of thrill-seeking ($b=.544$, $p<.001$) positively and significantly predicted the academic self-concept of students. This infers that students' who can defy their academic confinement and engage in extreme academic adventures are likely to own their learning, trust their abilities, and engage in academic tasks. However, curiosity dimensions such as joyful exploration and social curiosity did not predict the academic self-concept of students.

Conclusion

Undoubtedly, curiosity and academic self-concept are important determinants of students' success. Despite this, it was found in the current study that students showed low levels of curiosity and academic self-concept. The revelation implies that most students might not try on their own to explore their environments for knowledge. This could be a result of the fact that these students operate under strict school rules and regulations, which do not allow free exploration. With this, it might curtail the drive of self-direction among students, hence the difficulty in taking personalized initiations in learning. Based on the low levels of curiosity, it may seem impossible to spark new learning in the students, difficult for the students to develop new skills, knowledge, and attitudes that teachers are obliged to nurture in them. The low levels of curiosity established among students could affect their psychological, emotional, social, and even health benefits that are related to curiosity (Campbell, 2015; Kashdan & Roberts, 2004; Kashdan, Rose, & Fincham, 2004).

The low levels of self-concept found among students could be as a result of inconsistent behavioural rules, lack of support for autonomy, lack of academic instruction from teachers and parents, and lack of feedback on abilities, behaviour, and achievement by teachers and parents (Pekrun & Stephens, 2015). The revelation implies that most of these students might lack confidence in their academic work because they view themselves to be less capable. This revelation could be a result of unhappy life experiences from parents and teachers. When parents and teachers become much critical of these students as they make mistakes in their actions and inactions, they are likely to have a negative view of themselves and their abilities.

It is important to note that low self-concept can reduce students' desire to learn, ability to focus, and their willingness to take risks. Also, the study revealed that low levels of curiosity predicted low levels of self-concept among students. This implies that students' ability to exhibit curious abilities could improve upon their academic self-concept as curiosity was found to relate positively with academic self-concept.

The revelations of this study are startling as the future may look blurry for these students as most of them may not be able to explore their learning opportunities and as well may not be able to exert control over opportunities because they possess low levels of curiosity and academic self-concept. To avert this, teachers and parents need to restore their belief in students, so that they persevere in the face of academic challenges. Teachers can shape curiosity and self-concept every day, as they interact with their students. Although teachers cannot teach curiosity and self-concept as subjects to students, they can nurture curiosity and self-concept in students through continual process of exposure, encouragement, and support by showing appreciation for the things they do well, expressing confidence that students will improve in problematic subject areas, and adjusting to instruction to experience success. In education, students need to engage in explorative behaviours so that they could broaden their knowledge in various areas. Students' ability in doing this will allow them to assume



ownership of their learning situations. It is therefore, imperative for teachers in schools where these students are selected to devise new approaches by allowing them to engage in other learning opportunities without much restrictions. In executing this, students might make some mistakes so teachers should consider such mistakes as part of the learning process than disgracing or rebuking efforts made by students. Issues of self-concept might start from the immediate environment of learners. Therefore, it is prudent that parents are educated on their actions and inactions that could curtail the positive development of self-concept among students. Parental education in this regard could be radio or television talks and public fora.

The study concentrated on curiosity and self-concept among category “A” schools in the Central Region of Ghana. This offers restrictions in the generalization of study findings to only the group used but not all students in the region or the country. Based on this, future research direction should be all second cycle institutions in Ghana irrespective of the category so that a more comprehensive finding could be established for policy decisions in the country. Finally, the study was limited in as much as literature is concern. The constructs investigated duly related but no readily available empirical works could be used to support the findings. Therefore, the current study’s findings do not only add up to literature but has revealed a fertile research area that needs more and extensive exploration.

Declaration of interest

The authors declare that there was no competing interest in this study. The study came about with a unanimous effort put up by the authors. All authors contributed equally from the beginning to the end of this manuscript. Again, no funds were solicited from any institution to support the process. Also, ethics in research were considered as the respondents were given the free will to partake in the study. Informed consent, confidentiality of information and anonymity of respondents were catered for in this study.

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