

THE ROLE OF CURIOSITY TO STUDY ENGAGEMENT OF STUDENTS IN GYMNASTICS: EXTRAPOLATING RECIPROCITY

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Abstract

The academic literature on the reversible association between curiosity and study engagement in elementary and high school contexts has been extensive and widespread across several countries. Regrettably, research in the field of gymnastics within the setting of higher education in the Philippines remains mostly unexplored and unknown. This study examined the reciprocal association between curiosity and study engagement in the context of gymnastics from a selected higher education institution in the Philippines. A study was conducted with 177 Bachelor of Physical Education students enrolled in Movement Education where gymnastics is part of the said course. The findings of the study revealed a noteworthy correlation between overall curiosity and study engagement in the field of gymnastics, as well as a reciprocal relationship between the two variables. Additionally, a significant and positive correlation was found between the constructs of curiosity and all three components of study engagement (vigor, dedication, and absorption), as well as a reciprocal link. The study concluded that encouraging students' natural curiosity can help them develop a healthy tolerance for ambiguity. As a result, this may have positive repercussions on students' academic performance by fostering a lifelong and sustained curiosity in expanding their knowledge and skills in gymnastics. Recommendations for teachers, replicability of the study, and future research endeavors are presented in this study.

Keywords: *curiosity, gymnastics, purposeful learning, stretch and embrace, study engagement*

INTRODUCTION

Numerous scholarly investigations have underscored the significant correlation between students' involvement in the pursuit of academic achievement and their degree of curiosity (Hulme et al., 2013; Karcher et al., 2022; Oliveira & Lathrop, 2022; von Stumm

et al., 2011). Within the realm of positive psychology within academia, considerable focus is being directed by educational psychologists and researchers towards the examination of this particular and favorable characteristic. This attribute has been found

to have a significant correlation with students' intentional acquisition of knowledge and their notable academic accomplishments. The existing body of empirical research on the correlation between study engagement and curiosity has primarily emerged from independent studies conducted in various educational institutions globally. Numerous scholarly investigations have aimed to explore the relationship between these variables. However, there is a lack of research specifically addressing the reciprocal nature of the relationship between study engagement and curiosity.

The natural propensity of individuals toward curiosity serves as a powerful driver of motivation (Mahama et al., 2023; Shah et al., 2023), forming a crucial area of investigation for psychologists and educational researchers exploring fundamental traits and personal attributes (Evans et al., 2023; Spitzer et al., 2023). However, curiosity research faces challenges arising from diverse vocabulary, operational definitions, and measuring methods, which have hindered its progress despite its widespread recognition among academic communities. In many cases, the intrinsic motivation is frequently conceptualized in manners that are congruent with the underlying principle of curiosity. Within the realm of human nature, intrinsic motivation stands out as a prominent expression of favorable characteristics. This concept represents individuals' inherent drive to actively pursue novelty, confront challenges, foster personal development, engage in exploration, and acquire knowledge (Ryff, 1989). The phenomenon known as flow, characterized by a state of deep engagement

in a demanding and pleasurable task that necessitates the utilization of one's entire skill set, has been posited as an amplified manifestation of curiosity (Fredrickson, 1998). The psychological construct known as curiosity is sometimes employed synonymously with various other terms, including interest, novelty-seeking, and openness to experience, among a multitude of others. The fundamental tenet of this conceptualization of curiosity posits that individuals must possess a perception of self-efficacy in order to proficiently navigate and comprehend the novel, ambiguous, and capricious circumstances they encounter during their venturesome endeavors. The level of confidence may fluctuate based on specific contextual factors; yet, it is probable that, as a general trend, confidence is exhibited through a readiness to accept and engage with the novel, uncertain, and unpredictable aspects of daily existence. One crucial aspect of this concept pertains to the act of embracing uncertainty, rather than succumbing to fear and evading it. Curiosity plays a multifaceted role throughout an individual's lifetime, facilitating the acquisition of knowledge, the development of skills and expertise, and the establishment of relationships, (Ernst & Burcak, 2019). Undoubtedly, individuals who engage with unforeseen stimuli inevitably encounter a certain level of unique knowledge and experiences that were previously unachievable. Hence, an additional characteristic of curiosity encompasses the inclination, and even the aspiration, to consistently gain novel skills and encounters. The concept of curiosity encompasses the innate inclination of individuals to expand

their capacities. Curiosity can be defined as a cognitive phenomenon that encompasses the processes of recognizing, accepting, and actively seeking knowledge and novel experiences (Chang et al., 2023; Jirout, 2020). The current corpus of academic literature pertaining to the advantages of curiosity is currently in its nascent phase of advancement. Curiosity is believed to exert a favorable influence on various advantageous outcomes, encompassing the augmentation of cognitive abilities, acquisition of wisdom, subjective well-being, existential fulfillment, resilience in the face of adversity, gratifying and purposeful social connections, and active involvement in educational pursuits, alongside other associated effects (Jirout et al., 2022; Karcher et al., 2022; Kashdan et al., 2020; Wang & Li, 2015). In a study conducted by Kashdan et al. (2009), two unique components of curiosity were identified using a curiosity evaluating tool devised by the researchers. The primary factor to be taken into consideration is that the concept of *stretching* may be characterized as actively engaging in the process of acquiring new knowledge and experiences (Fry et al., 2023). Conversely, the notion of embracing involves the willingness to adjust to unfamiliar, unexplored, and ambiguous aspects of daily existence (Devereux, 2022). The intersection of expanding and embracing dimensions becomes apparent when examining the interrelated elements of curiosity, as elucidated by several specialists (Berlyne, 1960; Deci, 1975; Litman, 2019).

The subject of study engagement has garnered considerable interest among researchers in education due to its potential

as a predictive indicator for academic attainment (Liu et al., 2021). Students manifest a variety of attributes, including commitment, interest, inquisitiveness, lively behavior, and enthusiasm, when exposed to information pertaining to a specific academic domain. According to Charkhabi et al. (2019), there is a positive relationship between students' level of engagement in their academic pursuits and their internal motivation to acquire knowledge and progress in their educational endeavors. This notion encompasses multiple areas, specifically *cognitive* (demonstrated through a commitment to attaining expertise and the capacity to flexibly address challenges), *affective* (indicated by a sense of recognition and a favorable attitude towards education), and *behavioral* domains (exhibited through active engagement by students and the adoption of beneficial behaviors within an educational context) (da Fonseca et al., 2023; de Toro et al., 2023). The conceptualization of study engagement has three distinct elements, specifically *Vigor* (VIG), *Dedication* (DED), and *Absorption* (ABS), derived from the three domains as proposed by Jaya and Ariyanto (2021). A student exemplifying *vigor* demonstrates unwavering enthusiasm, perseverance, optimism, and flexibility in their pursuit of success (Cortés-Denia et al., 2022; Demirbatır, 2020; Pulido-Martos et al., 2020). Despite encountering numerous academic responsibilities, these students consistently exhibit a favorable disposition towards these tasks. *Dedication* is defined as an individual's profound involvement in numerous academic obligations, characterized by a substantial level of

commitment and a strong motivation for attaining success (Listau et al., 2017; Teuber et al., 2021). According to Kassab et al. (2023), the student demonstrates a cognitive orientation marked by a constructive inclination, indicating a notable commitment to the educational processes and objectives. *Absorption*, according to Dacillo et al. (2022), is a cognitive state marked by an intensified perception of proficiency, complete concentration, and profound engagement in one's scholarly pursuits. This domain is characterized by the presence of a significantly elevated perception of competence in relation to the acquisition and comprehension of content. The investigated study engagement exhibit distinct variations while also demonstrating strong interconnections (Archambault et al., 2022; Li, 2023).

Previous research has shown that there is a strong and positive correlation between student participation in their studies and their academic achievements. Numerous inquiries have been undertaken in recent years to further examine the association between the two variables. The research conducted by Sukor et al. (2021) involved selecting a cohort of 84 students who were not majoring in food science but were enrolled in a food science course. These individuals were chosen as participants for the survey. The findings of the study revealed a statistically significant positive correlation between students' overall engagement and their academic achievement ($r = 0.312; p < .001$). The findings of the study indicated the existence of two distinct components in students' level of involvement, namely, emotional engagement ($r = 0.529^{**}; p < .001$)

and cognitive engagement ($r = 0.391; p < .001$). Both components had a statistically significant positive correlation with excellent academic performance. Furthermore, the research conducted by Rashid and Asghar (2016) examined the correlation between study engagement and academic achievement in the context of independent online programs. The study utilized data on module content engagement obtained from an e-learning platform. This data included many indicators, such as the quantity of content views, participation in forums, completion of activities, and consumption of videos. The findings of the analysis indicate a statistically substantial and positive correlation between study engagement and student achievement, observed at both the level of individual modules and throughout the entire cohort. Additionally, a notable association was observed between early involvement in particular subjects and general scholarly involvement, suggesting that both variables play a role in enhancing academic achievement. Lei et al. (2018) conducted a study with the aim of examining the complex association between study engagement and academic achievement. The authors' main aim was to provide conclusive evidence through a meta-analysis that incorporated 69 separate studies, with a combined sample size of 196,473 people. The research revealed a statistically significant and positive association between students' overall level of engagement and their academic performance. Moreover, a comprehensive examination of various aspects of engagement, including behavioral, emotional, and cognitive engagement, demonstrated a significant positive

correlation between these dimensions and students' academic achievement. Within this framework, there is a hypothesis suggesting that the three domains of engagement serve as reliable indicators of academic achievement. This proposal is supported by numerous scholars in recent academic literature spanning diverse fields of study (Acosta-Gonzaga, 2023; Luo et al., 2023).

Prior research has extensively investigated the correlation between curiosity and academic engagement. The literature suggests that individuals who exhibit a tendency for curiosity in acquiring new knowledge within their area of expertise, coupled with the ability to adapt to unexpected situations, are more likely to experience heightened levels of engagement, potentially resulting in improved academic performance. The study conducted by Mahama et al. (2023) aimed to scrutinize the influence of learners' intrinsic traits, including motivation, curiosity, and creativity, on their academic achievement in the fields of science and mathematics. The sample size comprised 568 participants enrolled in secondary education institutions. After conducting Multiple Multivariate analysis, the results revealed that the collective impact of students' driven behaviors, inquisitive aptitudes, and imaginative potentials explained 15.5% of the variance in science scores and 33.1% of the variance in mathematics scores. In this particular context, it becomes evident that students demonstrating curiosity, creativity, and motivation in their educational environment are more likely to elevate their level of involvement, consequently enhancing their academic performance and

achieving their educational objectives. Additionally, Mahama (2022) explored the cumulative influence of curiosity, creativity, motivation, and academic achievement in core mathematics and integrated science on a sample of 652 adolescent learners. The results of a multivariate regression analysis revealed a substantial statistical correlation between students' inquisitive behaviors, creative aptitudes, and motivation, highlighting the interdependence of these variables within the realm of academic pursuit. Consequently, the amalgamation of these attributes results in an increase in learner engagement within the educational context. In a meta-analysis by Schutte and Malouff (2022) which scrutinized the effects of interventions designed to foster curiosity 41 randomized controlled trials involving 4,496 participants were comprehensively analyzed. The results demonstrated that several interventions led to a statistically significant increase in curiosity levels. Elevated curiosity levels were associated with various positive outcomes, including heightened overall satisfaction, increased engagement in work-related activities, and enhanced academic achievements (Dubey et al., 2022; Singh & Manjaly, 2022; Whitecross & Smithson, 2023). The above-mentioned investigations were conducted on a heterogeneous sample of pupils across both elementary and high school levels, hence encompassing a varied range of countries. Given the lack of extensive reporting on the state of higher education in the Philippines, especially in the field of gymnastics, and the dearth of accessible literature addressing the reciprocal relationship between curiosity and study engagement among teacher education

students specializing in Physical Education in the Philippine context, the present study aims to fill this gap. The research endeavors to explore and understand the dynamics between curiosity and study engagement within the specific context of gymnastics classes for teacher education students in the Philippines.

This present study explored the potential impact of participation in gymnastics on purposeful learning, which in turn may contribute to greater academic achievement. The current study is focused on the following objectives:

1. Explore the relationship between curiosity and study engagement; and
2. Ascertain the association that exists between the two constructs of curiosity (stretching and embracing) and the three facets of study engagement (vigor, dedication, and absorption).

The present investigation has been guided by the research recommendations proposed by Upadyaya and Salmela-Aro (2017) as well as Widlund et al. (2021). These recommendations function as a framework for examining study engagement, with a specific emphasis on its three components and the role of curiosity. Therefore, the primary objective of this inquiry is to empirically examine and evaluate the validity of the following hypotheses:

H₁ There is a significant and positive relationship between curiosity and study engagement;

H₂ There is a positive correlation between stretching, vigour, dedication and absorption; and

H₃ There is a positive correlation between embracing, vigour, dedication and absorption.

METHODS

The respondents to the study comprise undergraduate students who are currently enrolled in the Teacher Education program at a selected higher education institution in the Philippines. *The Purposive and Convenience Sampling Technique* was employed to choose the participants, considering their characteristics and convenience in participating in the study. (Bhardwaj, 2019). Data collection took place between February and April in the year 2022. The selection criterion was formulated to ensure the collection of reliable and accurate data from survey respondents:

1. Currently enrolled in Bachelor of Physical Education;
2. Currently enrolled in the gymnastics class included in the Movement Education course;
3. Male or female;
4. Aged 19 and above.

Three distinct questionnaires were used for the study. The first part gathered demographic information such as sex and age group. The second utilized the Curiosity and Exploration Inventory-II by Kashdan et al. (2009), a 10-item self-report tool measuring individual differences in the recognition, pursuit, and integration of novel and challenging experiences and information. It comprises two constructs: *Stretching* (e.g., "I can actively seek as much information as I can in new situations.") and *Embracing* (e.g., "I am the type of person who really enjoys the

uncertainty of everyday life.”). Responses are on a 5-point Likert Scale from 1- “very slightly or not at all” to 5- “extremely.” Lastly, the *Utrecht Work Engagement Scale for Students* (UWES-9S) by Carmona-Halty et al. (2019) was used. This particular scale is a nine-item self-report instrument that measures overall student engagement and is divided into three features: *Vigor* (e.g., “*I feel energetic and capable when I’m studying or going to class.*”), *Dedication* (e.g., “*I am proud of my studies.*”), and *Absorption* (e.g., “*I feel happy when I am studying immensely.*”). Responses are documented on a 6-point Likert Scale from 0- “never” to 6- “always.”

The research employed several statistical analyses. First, *normality* and *reliability* tests were conducted to assess the data distribution from the questionnaires. Second, a bivariate correlational analysis was utilized to examine the interrelatedness of the variables. Lastly, the Pearson correlation coefficient was employed to determine the interchangeable relationship between the studied variables. The Pearson correlation coefficient is a parametric statistical method used to quantify the degree of linear correlation between two sets of data (Schober & Schwarte, 2018). In this analysis, a composite score was computed from both the curiosity and study engagement scales. Subsequently, the two curiosity constructs

were examined in relation to the three components constituting study engagement.

The respondents were required to provide their consent by indicating their agreement to the statement included in the Google Forms. Additionally, participants were briefed on the research objectives, the tools used, and the specific factors under investigation. The online survey also outlined potential minor risks that participants might encounter. Respondents had the autonomy to withdraw from the study or request a debriefing at any point.

RESULTS AND DISCUSSION

A total of 179 students pursuing teacher education participated in the survey. After data cleaning, it was determined that all responses were considered suitable for analysis. Table 1 presents the demographic attributes of the participants. The sample (179) shows a higher proportion of female respondents compared to male respondents [$N_{FEMALE} = 112(62.6\%)$, $N_{MALE} = 67(37.4\%)$]. Additionally, a majority of the participants fall into the 19-21 age bracket, with the next highest representation in the age groups of 22-24 and 25 years and above [$N_{19-21 \text{ YEARS OLD}} = 154(86.0\%)$, $N_{22-24 \text{ YEARS OLD}} = 21(11.7\%)$, and $N_{25 \text{ YEARS OLD AND ABOVE}} = 4(2.2\%)$].

Table 1:
Demographic profile

Variables	Items	N(%)
Sex	Male	67(37.4%)
	Female	112(62.6%)
Age group	19-21	154(86.0%)
	22-24	21(11.7%)
	25 and above	4(2.2%)

Table 2:
Descriptive Statistics, Normality Estimates, and Bivariate Correlation.

Variables	1	2	3	4	5
CUR	(.95)				
ENG	.99**	(.95)			
STR	(.90)				
EMB	.91**	(.90)			
VIG	.89**	.95**	(.84)		
DED	.92**	.92**	.84**	(.89)	
ABS	.92**	.89**	.82**	.81**	(.89)
Mean \pm SD	4.00 \pm .83	3.96 \pm .83			
	4.10 \pm .85	3.93 \pm .84	3.90 \pm .87	4.17 \pm .88	3.81 \pm .90
Skewness	-1.393	-1.287			
	-1.406	-1.250	-.969	-1.606	-.730
Kurtosis	2.327	2.004			
	2.244	1.836	1.038	2.563	.484

Note: CUR-Curiosity (STR-Strength, EMB-Embrace); ENG-Study Engagement (VIG-Vigor, DED-Dedication, ABS-Absorption).

* Statistically significant at $p < .05$.

** Statistically significant at $p < .01$.

A test of normality and reliability was initially conducted on all variables under investigation. Based on the results obtained, it can be shown that the majority of the scales met the established threshold value of -2 and 2. In this context, it can be inferred that the data have normal distribution [CUR ($4.00 \pm .83$; *Skew* = -1.393 *Kurt* = 2.327), ENG ($3.96 \pm .83$; *Skew* = -1.287 *Kurt* = 2.004), Curiosity and Exploration: STR ($4.10 \pm .85$; *Skew* = -1.406 *Kurt* = 2.244), EMB ($3.93 \pm .84$; *Skew* = -1.250 *Kurt* = 1.836), Study Engagement: VIG ($3.90 \pm .87$; *Skew* = -.969 *Kurt* = 1.038), DED ($4.17 \pm .88$; *Skew* = -1.606 *Kurt* = 2.563), and ABS ($3.81 \pm .90$; *Skew* = -.730 *Kurt* = .484)]. Additionally, the reliability test showed that all scales obtained high to excellent reliability scores [CUR ($\alpha = .95$), ENG ($\alpha = .95$), Curiosity and Exploration: STR ($\alpha = .90$), EMB ($\alpha = .90$), Study Engagement: VIG ($\alpha = .84$), DED ($\alpha = .89$), and ABS ($\alpha = .89$)]. In the bivariate

correlation analysis, all scales and subscales indicated interrelatedness ($p < .05$).

Table 3 presents the results of the correlational analysis between overall curiosity and study engagement, as well as the sub-dimensions of CUR and ENG. The findings indicate a strong and positive relationship between curiosity and study engagement [$r(177) = .996$, $p < .05$], suggesting that as students' curiosity in gymnastics and their acceptance of life's unpredictability increase, their degree of engagement with studying also increases, and vice versa. Additionally, strong and positive relationships were also observed between stretching and vigor [$r(177) = .885$, $p < .05$], dedication [$r(177) = .915$, $p < .05$], and absorption [$r(177) = .920$, $p = <.05$]. This suggests that as the level of curiosity among students in gymnastics grow, their enthusiasm, commitment, and devotion to their studies are also increase, and vice-versa. Similarly, there were strong and positive

relationships between embracing and vigor [$r(177) = .951, p <.05$], dedication [$r(177) = .924, p <.05$], and absorption [$r(177) = .890, p <.05$], indicating a positive correlation between students' level of curiosity and their liveliness, commitment, and absorption in their studies. Conversely, a decrease in curiosity may lead to a decrease in these attributes.

The analysis of the collected data reveals a robust and statistically significant correlation between curiosity and study engagement, suggesting reciprocal relationship between these two key features. This finding aligns with previous research in various academic disciplines within the field of education(Mahama, 2022; Mahama et al., 2023; Schutte & Malouff, 2022). The study also identifies a favorable correlation between the concept of curiosity and the three dimensions of academic engagement: stretching, embracing, and the overall

engagement. In the context of gymnastics, the term *stretching* refers to the proactive engagement in acquiring novel knowledge and engaging in unfamiliar activities, as discussed by Fry et al. (2023). The concept of *embracing* involves a mindset that recognizes and adapts to the uncertain, unexplored, and unpredictable aspects of daily existence (Devereux, 2022). The findings suggest that students who exhibit an inclination towards active engagement in the educational process and embrace the inherent uncertainty of life experience enhanced enthusiasm, dedication, and the ability to acquire knowledge in their academic pursuits in gymnastics. Previous research has consistently demonstrated a significant impact of curiosity on students' engagement in academic pursuits, contributing to improved academic performance. (Amerstorfer & Freiin von Münster-Kistner, 2021; Arnone et al., 2011; Hulme et al., 2013).

Table 3:
Curiosity vis-à-vis Study Engagement

		Study Engagement		
		Correlation Coefficient	.996**	
		Sig. (2-tailed)	.000	
Pearson-r	Stretching	Correlation Coefficient	.885	.915**
	Stretching	Sig. (2-tailed)	.000	.000
	Embracing	Correlation Coefficient	.951**	.924**
	Embracing	Sig. (2-tailed)	.000	.000
		Absorption		

Note: **. Correlation is significant at the 0.01 level (2-tailed).

The literature review highlights studies from various disciplines that have explored the relationship between curiosity and engagement. For example, the study of Saeed AlShamsi et. al. (2023) in the aviation industry found that work engagement positively influenced the curiosity and

exploration of employees in the United Arab Emirates (UAE). Young et al.'s (2018) meta-analysis revealed a significant role of curiosity in employees' engagement. Generally, it can be concluded that curiosity has a significant relationship with engagement. However, there is a noticeable

gap in research specifically considering the characteristics of curiosity and the three components of study engagement, particularly in the field of gymnastics within the context of higher education. The existing body of knowledge emphasizes the crucial role of curiosity in various aspects of individuals' lives, including knowledge acquisition, skill enhancement, social connections, and expertise development (Dubey et al., 2022; Singh & Manjaly, 2022; Whitecross & Smithson, 2023). Given the limited research in the specific context of gymnastics and higher education, the study suggests that a similar investigation would help bridge the gap and provide a more nuanced understanding of how curiosity influences study engagement in the unique setting of gymnastics education.

The current investigation aligns with the recommendations of Upadyaya and Salmela-Aro (2017) and Widlund et al. (2021), indicating that the concept of study engagement can be universally applied to younger students in both primary and secondary education settings. However, the research acknowledges that young adults, specifically college-aged individuals, may demonstrate a nuanced understanding of the three domains of study engagement. The study focuses on exploring the interconnected influence of curiosity on the three facets of study engagement within the context of gymnastics education. Further research could investigate and evaluate the potential discrepancies in its results among different demographic cohorts or provide additional arguments for its claims.

CONCLUSIONS

The study emphasizes that individuals with a natural inclination towards curiosity tend to invest a significant amount of time actively engaging in the pursuit of knowledge within the field of gymnastics. This engagement is driven by a desire to bridge the gap between their current level of knowledge and skills and the level they aspire to achieve. The motivation is not solely based on the pursuit of high academic scores but rather on a genuine interest in acquiring in-depth knowledge and competence. This study posits that the promotion of curiosity with supportive feedback among students can play a role in building an enduring acceptance of uncertainties throughout one's life. Consequently, this has the potential to generate favorable outcomes in fostering students' curiosity to acquire further knowledge in the domain of gymnastics, thereby aiding them in their academic pursuits.

The study underscores the importance of providing comprehensive training to gymnastics instructors to effectively promote the development of curiosity within the educational setting. The results suggest that such training is crucial for the professional advancement of instructors. Additionally, the study recommends that policymakers and practitioners initiate programs aimed at enhancing the proficiency of educators. This is seen as essential for improving instructors' abilities to address challenging educational difficulties throughout their entire professional careers.

The study acknowledges certain limitations of this study. The study's sample

comprises only of individuals currently enrolled in a higher education institution in the Philippines. This limits the applicability of the results to a broader student population in gymnastic classes, both in the Philippines and globally. To enhance the generalizability, future research should consider diverse institutions. Additionally, the study suggests exploring additional variables like sociodemographic characteristics. Despite these limitations, the study contributes to the understanding of the reciprocal relationship between curiosity and study engagement, addressing a gap in the existing literature, particularly in the context of gymnastics and academic achievement.

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