A BIBLIOMETRIC REVIEW OF EMPIRICAL STUDIES ON STUDENTS' ADVERSITY INTELLIGENCE QUOTIENT AND PHYSICS ACADEMIC ACHIEVEMENT

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Abstract
This paper had critically reviewed empirical studies on students' adversity intelligence quotient and physics academic achievement. The study adopted bibliometric review approach which was guided by three objectives and research questions. A comprehensive search for articles, journals and books from 2015-2025, through googlescholar.com was vigorously engaged to obtain 18 articles. The search was carried out by using short phrases from the title and key words. Analysis was done by systematic synthesis and presented in tables. The study showed that old publications are more cited; only four articles were published within the last 10 years in physics and none is from Nigeria. Further reviews showed that students with high adversity intelligence quotient performed better in physics than their low adversity intelligence quotient counterparts. Adversity intelligence quotient also has a more dominant influence on physics problem solving. The study recommends that future researchers should consider more in-depth research on AIQ in physics and Nigeria as a geographic location where adversity intelligence quotient is underexplored.
Keywords: Bibliometric Review, Adversity Intelligence Quotient, Physics, Academic Achievement.

Introduction

There is a recent paradigm shift in the realm of education which emphasizes that adversity intelligence quotient should be viewed as an important success measure that goes beyond the academic domain and permeates every aspect of human life. Adversity intelligence quotient is defined by (Stoltz, 1997) as the capacity to learn from challenges, barriers and failures yet stay focused on the objective. Traditionally, success had always been assigned to intellectual intelligence quotient and emotional intelligence quotient. Nonetheless, recent research tends to support the fact that even the smartest students fail to cope with and abandon their learning when seriously challenged, which highlights the role of adversity intelligence quotient in learning success (Stoltz, 1997). Adversity Intelligence Quotient (AIQ) is an innate ability that enables people to turn their adverse situations into life changing advantage (Bakare, 2015). Determining students' AIQ and its influence in relation to other factors that affect achievement is likely to provide greater understanding and better prediction of academic achievement (Bakare, 2015).

Adversity intelligence quotient consists of control, ownership, reach, and endurance as components with an acronym called CORE (Stoltz, 1997). Control is ability to regulate one's own reactions and responses to adversity; Ownership is ability to take responsibility for one's

own life and circumstances; Reach is ability to spread out and seek support from others when needed; and Endurance is ability to bear and persist in the face of adversity (Stoltz, 1997). The concept of adversity intelligence quotient emphasizes the ability to persevere through difficulty, suggesting that resilience can be as important as cognitive and emotional skills in determining students' overall success (Dweck, 2006). The variable adversity intelligence quotient was introduced by Stoltz for almost three decades now yet it still remains relatively under-explored in certain full first subjects, like Physics. This necessitated this bibliometric review to identify the existing gap in empirical study, knowledge and areas regarding students' adversity intelligence quotient and physics academic achievement.

This research is grounded in Masten's (2001) Resilience Theory (RT), which defines resilience as the capacity to adapt successfully to adversity using internal strengths and external resources. Masten emphasizes that resilience is a common outcome of normal adaptive processes referred to as "ordinary magic." Key principles of the theory include: resilience being a typical human capacity; its dynamic nature, evolving over time; positive adaptation despite risk; the interplay of risk and protective factors; and the involvement of multiple systems (individual, relational, and institutional). The theory is applied to the context of physics education, a subject that poses significant academic challenges requiring persistence, problem-solving, and confidence. Students with high resilience or a strong Adversity Intelligence Quotient (AIQ) are more likely to persist through difficulties, seek help, and stay motivated aligning with the idea of resilience as adaptive functioning. Thus, the theory supports this study's premise that academic success in physics is possibly influenced not only by Intelligence Quotient (IQ) but also by students' resilience and access to support systems.

Objectives of the Study

The objective of the study is to review empirical papers within the last 10 years on students' adversity intelligence quotient and academic achievement using the bibliometric review approach. Specifically, the study was set to:

1. Assess the frequency of data extraction from database for review or other academic usage.
2. Identify co-authorship pattern, use of keywords and evaluate methods used by authors in the published papers.
3. Evaluate the characteristics of included papers published on adversity intelligence quotient and physics academic achievement within the last 10 years.

Research Questions

To achieve these objectives, the following questions were raised to guide the study:

1. What is the citation frequency of data extraction from database for review or other academic usage?
2. What is the frequency count of articles co-authorship pattern, keywords on AIQ, methodologies of research used on AIQ and academic achievement?

3. What are the characteristics of included papers published on AIQ and physics academic achievement in the last 10 years?

Methodology

The study adopted the bibliometric review approach to comprehensively search and analyze literature on students' Adversity Intelligence Quotient (AIQ) and physics academic achievement. The process involved the following steps: (1) Database selection was Google Scholar, chosen as the main source for literature retrieval. (2) Search strategy used keywords which included; adversity intelligence quotient, AIQ, and physics academic achievement. (3) Data extraction focused on information collected which included: author names, publication year, title, hypotheses and citation counts. (4) Data analysis involved statistical methods applied to assess each study and included: publication frequency; authorship and collaboration patterns; citation trends; keyword pattern; and visualization tools (tables) which were used to represent findings. Synthesis of studies were organized after they had been analyzed systematically based on titles, citations rates, methodologies, keywords, and key findings. Results were guided by three research questions and presented in Tables 1–3. Studies were included if they were: (a) published in peer-reviewed journals or conference proceedings. (b) focused on adversity intelligence quotient and academic performance/achievement in physics (c) written in English, and (d) published within the last ten years.

Results

Research Question One: What is the citation frequency of data extraction from database for review or other academic usage?

Table 1: Data Extraction from Google Scholar Database

S/no	Name of author	Year of publication	Title of publication	Citation ratings
1	Hema & Gupta,	2015	Adversity Quotient for Prospective Higher Education.	85
2	Espaňola,	2016	Adversity Quotient (AQ) and academic performance of selected students in MSU Marawi City	27
3	Effendi, *et al*	2016	Correlation between adversity quotient (AQ) with IQ, EQ and SQ among polytechnic students using Rasch model.	64
4	Singh & Parveen	2018	Impact of adversity quotient on learning behavior among secondary school students	15
5	Mwivanda & Kingpi	2018	Effects of teachers' adversity quotient on student academic performance in public secondary schools in Kenya	4

6	Suryanda & Suprrianti	2019	The effect of adversity quotient and gender to learning outcome of high school students	38
7	Yazon	2019	Adversity quotient, emotional quotient and academic performance of Filipino student-parents	13
8	Mwivanda & Kingpi	2019	Teachers' adversity quotient dimension of control and students' academic performance in secondary schools in Kenya.	18
9	Mwivanda & Kingpi	2020	Teachers' adversity quotient dimension of ownership: predictor of students' academic performance in public secondary schools in Kenya	18
10	Safi'I *et al*	2021	The effect of the adversity quotient on student performance, student learning autonomy and student achievement in the COVID-19 pandemic era: evidence from Indonesia.	37
11	Wang *et al*	2021	Analysis of adversity quotient of nursing students in Macao: A cross section and correlation study.	28
12	Mwivanda	2021	Relationship between teachers' adversity quotient and students' academic performance in public secondary schools in Kiambu and Nairobi counties, Kenya.	-
13	Suryandari & Yuliana	2023	Effect of Adversity Quotient (AQ) on natural science learning outcomes in elementary school students.	26
14	Cai & Guo	2024	The mediating effects of adversity quotient and self-efficacy on college students' engagement and achievement	-
15	Chrisanti, *et al*,	2024	Learning achievement of Open University students in relation to adversity quotient and achievement motivation.	-

Table1 shows that majority of the studies were conducted at the university and college levels, with secondary schools being underrepresented or studied. Expectedly, older publications tended to have higher citation rates. Precisely, eight studies were conducted in universities or college levels while six studies were carried out in secondary schools with correlational survey research design while only one study used experimental approach The year of publication has 2015 as the oldest which also revealed the highest citations of 85, and one citation as lowest of a study carried out in 2019 while two studies in the year 2024 and another study in 2021 had no citations. Two separate studies in 2021 had 38 and 28 citations respectively. This suggests that year of publication may not be the only factor responsible for high citation rate.

Research Question Two: What is the frequency count of articles co-authorship pattern, keywords on AIQ, methodologies of research used on AIQ and academic achievement?

Table 2. Frequency Count of Co-Authorship Pattern, Article Keywords on AIQ and Methodologies

S/no	Name of author	Year of publication	Title of publication	Research design	Number of hypotheses
1	Espanola	2016	Adversity Quotient (AQ)and academic performance of selected students in MSU Marawi City	Design was not reported; however, analysis shows is correlational survey research design	Not specify
2	Mwivanda & Kingpi	2018	Effects of teachers' adversity quotient on student academic performance in public secondary schools in Kenya.	Correlational survey research design	2
3	Mwivanda & Kingpi	2019	Teachers' adversity quotient dimension of control and students' academic performance in secondary schools in Kenya.	Correlational survey research design	3
4	Yazon	2019	Pre-service teachers' adversity quotient and	Reported as descriptive research design	Not specify

			proficiency in English language and Mathematics.		
5	Mwivanda & Kingpi	2020	adversity quotient dimension of ownership: predictor of students' academic performance in public secondary schools in Kenya.	Correlational survey research design	2
6	Rosiqoh, *et al*	2020	Analysis of senior high school students' ability to understand concept and adversity quotient on elasticity	Post-test only.	2
7	Mwivanda	2021	Relationship between teachers' adversity quotient and students' academic performance in public secondary schools in Kiambu and Nairobi counties	Correlation research survey design	4

8	Wang, *et al*	2021	Analysis of adversity quotient of nursing students in Macao: A cross section and correlation study.	Correlation survey research design was used.	2
9	Hanifah, *et al*	2021	The effect of adversity quotients and attitudes of students' physical learning achievements	Ex pos facto research design	2
10	Suryandari & Yuliana	2023	The effect of adversity quotient (AQ) on natural science learning outcomes in elementary school students Surabaya, Indonesia.	Quasi experimental research design	2

Table 2 shows that with regards to collaboration, the review indicated that most papers were co-authored by two to three individuals, with some authors appearing frequently across multiple papers confirming Price's law, which states that the number of publications or contributions in a given field is often disproportionately dominated by a small percentage of authors (Price, 1963; Price, 1976). A keyword analysis revealed that "Adversity Intelligence Quotient" (AIQ) was a common thread across most articles in the bibliometric review. Specifically, for the ten studies displayed on Table 2, some authors did not collaborate with others on any study but one author stood out as the most active collaborative author for other studies. The review also identified prevalent methodology trends, including the use of correlational survey research design, quasi-experimental designs, post-test only designs, ex-post facto designs, and descriptive research designs. Some studies employed a mixed-methods

approach, combining both qualitative and quantitative research designs. In specific terms, five studies out of ten used correlational research design while others used; post-test only, ex post facto, quasi experimental and descriptive survey, while two studies were not specific on their designs. The findings of most of the correlational studies showed a positive and significant relationship between AIQ and academic performance for the components of AIQ called CORE

Research Question Three: What are the characteristics of included papers published on AIQ and physics academic achievement in the last 10 years?

Table 3: Analysis of Downloaded Papers Published on AIQ and Physics Academic Achievement

S/no	Name of author	Year of publication	Study area	Research title
1	Napis	2018	Jakarta, Indonesia	Analysis of Physics problem solving in in the perspective of self-efficacy and adversity quotient
2	Rosiqoh, *et al*	2020	Indonesia	Analysis of senior high school students' ability to understand concept and adversity quotient on elasticity
3	Hanifah, *et al*	2021	Indonesia	The effect of adversity quotients and attitudes of students' physical learning achievements.
4	Suryandari & Yuliana	2023	Surabaya, Indonesia	The effect of adversity quotient (AQ) on natural science learning outcomes in elementary school students Surabaya, Indonesia.

Table 3 indicates that four studies affirm that adversity quotient plays a critical role in students' academic success, especially in science and physics education. Whether examined independently or in conjunction with self-efficacy and attitudes, AIQ consistently emerged as a positive and significant predictor of learning outcomes and problem-solving skills in particular. Although each study varied in scope, design, and sample characteristics, they all underscored the value of fostering resilience and adaptability among learners. A notable gap in the literature was identified, which showed only four papers focusing on physics-related topics within the last ten years and none of these papers originated from Nigeria. It has been observed that none of the study used a correlational survey research design rather ex post facto, post-test only and quasi experimental designs were used respectively. The statistical tools used in the studies were considered adequate based on the types of studies. Also, it was observed from the review that students with high adversity intelligence quotient performed better in physics. Also, adversity intelligence quotient had a more dominant influence on Physics problem solving skills in learning. Moreover, there exists a positive and significant impact of adversity intelligence quotient on students' academic achievement in physics.

Conclusion and Recommendations

The empirical review highlighted the need for more research on adversity intelligence quotient and academic achievement in physics particularly at the secondary school level. The dominance of university and college-level studies indicates a gap in understanding the relationship between adversity intelligence quotient and academic achievement in younger students. Furthermore, the paucity of research on physics-related topics, especially from Nigeria, underscores the need for more diverse and inclusive research. To address these gaps, it is recommended that future studies should focus on secondary school students to better understand the link between Adversity Intelligence Quotient (AIQ) and physics academic achievement. Researchers should explore this relationship specifically in physics and more especially in the underexplored countries like Nigeria. Future studies should use more inclusive designs with larger and more representative samples, include longitudinal components, and ensure clearer data presentation. Collaborative research efforts are also encouraged to deepen understanding of AIQ and academic achievement especially in a core science subject like physics.

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