

## **Adversity Quotient (AQ) Profiling among Polytechnic Students from Rasch Logit Setting**

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### **Abstract**

The study aims to develop a profile of AQ among polytechnic students based on their demographic status, using the Rasch logit setting. Proportionate stratified multistage cluster sampling was used to select 1,845 students. The results showed that the group of females, first-year students, Department of Marine Engineering program, and Western Zone Polytechnic Zone reported the highest AQ. This study advances the Rasch logit model as a robust technique for measuring AQ for profiling purposes, compared to the mean score. Future research should extend the Rasch logit model to broader educational contexts and to guide evidence-based educational interventions.

**Keywords:** Profiling; Adversity quotient; Rasch logit; Polytechnic students

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### **1.0 Introduction**

Adversity Quotient or AQ was founded by Stoltz & Weihenmayer (2010) with the original purpose of empowering companies and organizations. The idea of AQ is to measure human resilience, and emerged when many challenges were faced by humans in daily life and work (Haina et al., 2025). An employee needs characteristics such as the ability to face challenges and easily recover from failure. To produce workers who can face challenges, their potential needs to be honed from a young age. AQ based on Control, Ownership, Reach, and Endurance, or CORE model (Saxena & Rathore, 2025). This model was expanded across various contexts, including education, through cross-country studies.

Highlights from past studies show a tendency toward studies on AQ in the field of education and its effects on performance. Therefore, the potential of AQ for students' self-development can help them handle challenges effectively, thereby improving their academic achievement at polytechnics. Even the previous study reported that there is a moderate positive correlation between AQ and academic performance (Lontok et al., 2025). This can also train them to be a leader who enables them to maintain their resilience and be agile in the environment (Reyes & Prado, 2025). Stoltz (1997) emphasized that the CORE construct in AQ is used in the context of the work environment. Previous studies by researchers have fully used the CORE construct in the context of work without any changes from the original construct. This shows that the CORE construct proposed by Stoltz (1997) is agreed upon and appropriate, and has been used by past researchers. The AQ construct has not changed at all.

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The research gap is evident in the very little focus on the use of the CORE model in polytechnic education, especially in Malaysia. The gaps exist because profiling of AQ among polytechnic students was limited, as most effort focused on resilience, per se. Besides, the previous report used ordinal data, whereas this report should use more accurate data, such as interval data. The Rasch model can provide the logits value as interval data. Hence, the objective of the study is to develop a profile of AQ among polytechnic students based on demographic status using the Rasch logit setting.

## 2.0 Literature Review

### 2.1 Definition of Adversity Quotient (AQ)

Stoltz (1997) emphasizes AQ as an individual's ability to face and overcome challenges, problems, or difficulties, and to transform them into opportunities for greater success. It can be categorizing the definition of AQ into three, namely: (i) a conceptual framework for improving all aspects of success; (ii) a measure of a person's response to challenges; and (iii) a set of scientific tools with a scientific basis for improving a person's response to challenges.

Many past researchers have defined AQ from their own perspectives. AQ is defined as the ability to survive in the face of difficulties, the measurement of response to difficulties, and many more such as the ability to turn challenges into opportunities, the ability to solve various problems, the way a person faces difficulties, the ability to overcome difficulties, persistence in the face of difficulties; the ability to be emotionally flexible when facing challenges, the ability to anticipate and observe difficulties, the ability to use what is learned in any situation as a basis for making better decisions, solving problems, and being innovative; and a numerical picture that represents the extent to which an individual faces and tries to overcome problems. AQ is a measure of a person's ability to survive and overcome challenges in their life, turning those challenges into opportunities for success, including in academics, and to strengthen other intelligences such as IQ, EQ, and SQ to support self-development.

### 2.2 Previous research for AQ based on Demographic Status

Literature shows that many past researchers have produced different findings regarding the level of AQ in the field of education (Fong, 2023). However, very little focus has been given to the replication of AQ in polytechnic students. In addition, most past studies have shown a tendency toward low AQ levels. A review of the literature also shows that studies have found that males have higher AQ scores than females. The literature highlights significant differences in students' AQ scores across years of study. However, there is little literature examining AQ norms by institution type. The lack of literature suggests that polytechnic-type norms by zone are likely to yield new findings.

## 3.0 Methodology

The survey research design uses a quantitative approach. The survey was chosen because this design is suitable for research involving many respondents. The sampling frame is polytechnic students in Malaysia. This study comprised 1845 polytechnic students from five zones (West, North, East, South, and Borneo) using a proportionate stratified multistage cluster sampling technique, with 10 percent for each stratum, as suggested (Gay & Mills, 2018). The 10 percent was taken from the established proportion of the population. The categories include program type, academic year, and gender. The decision to include this stratum is intended to ensure that respondents can be contacted effectively across multiple layers of sample features. This study has limitations because it excludes students pursuing job training and the last semester of studies to prevent upsetting students. The data collection technique includes obtaining approval from the Ministry of Higher Education (MOHE) and polytechnic institutions. To eliminate researcher bias, the college appointed student affairs officers to handle the process.

A total of 66 Adversity Quotient items from the Instrument Kecerdasan Menghadapi Cabaran (IKBAR) were applied across four constructs: Control, Ownership, Reach, and Endurance (CORE). The IKBAR was assessed for face and content validity through expert validation. Consent was obtained from the Ministry of Higher Education (MOHE), Malaysia, and the response rate was 93.27 percent. The scale uses four Likert points: (4 = Strongly agree, 3 = Agree, 2 = Disagree, and 1 = Strongly disagree). The item's psychometrics were assessed using the Rasch model, including analyses of item fit, unidimensionality, local independence, gender-differential item functioning (GDIF), Wright map, reliability, and separation index (Bond et al., 2021). The Rasch analysis fulfilled the psychometrics standard based on item fit (0.77 – 1.30), unidimensional (Principal Component Analysis > 20%, noise < 10%, Eigen < 3), local independence (0.20 – 0.29), gender differential item functioning (GDIF) with DIF contrast ( $\pm 0.5$ ) and t value ( $\pm 2.0$ ), item reliability (0.98), person reliability (0.92), item separation index (7.60), and person separation index (3.50). In addition, the Cronbach's  $\alpha$  coefficients for the total scale and its four dimensions were reported to be higher than 0.70 (Luo et al., 2025).

The method procedure converts Likert scores from ordinal to interval data using the Rasch model. Interval data is more accurate, allowing for better profiling with higher-quality data. The logit data here refers to the person measure. The norms for this study are obtained using the percentile ranking method because it ranks individuals (students) on a scale of 1 to 100. The norm construction is used only to divide the AQ score into several levels based on percentile rankings, using the weighted average method. The percentile values used are 5, 10, 25, 50, 75, 90, and 95. These percentiles are then divided into six levels: very low, low, medium low, medium, medium high, high, and very high. A student's AQ score can be compared with the levels provided in the construction of this norm. This study also compares student AQ scores.

## 4.0 Findings and Discussions

### 4.1 Overall Adversity Quotient (AQ) Profiling for Polytechnic Students

The AQ norms and profiles was based on gender (male and female), year of study (first, second and third year), type of program (Civil Engineering Department - JKA, Electrical Engineering Department - JKE, Mechanical Engineering Department - JKM, Petrochemical Engineering Department - JKPK, Marine Engineering Department - JKP, Commerce Department - JP, Information Technology Department - JTM and Information and Computer Technology Department - JTMK) and type of polytechnic by zone (Borneo zone, west zone, south zone, east zone and north zone).

The AQ level of students shows the percentile norm for AQ scores and CORE constructs. Quartiles are points that divide the frequency distribution into four parts, namely the 25th, 50th (median or interquartile), and 75th percentiles (Kaplan & Saccuzzo, 2017). Based on the weighted average approach, this study uses quartiles (first quartile as Q1, second quartile as Q2, and third quartile as Q3), and the AQ level is also determined by percentiles.

The 50th percentile value (Q2) is 1.520 because Q2 equals the 50th percentile and the mid score of the 100th percentile, while for control scores (2.110), belonging (1.490), reach (1.490), and endurance (1.830). Table 1 shows the distribution of overall AQ scores by quartile and percentile. The 50th percentile value serves as the cut score for the respective construct norms because it falls midway along the percentile continuum. The determination of the norm value for the overall AQ distribution is based on the cut score at the 50th percentile (second quartile) of the AQ score, which is 1.520.

Table 1. Overall distribution of AQ score on quartile and percentile

Total score	Percentile (weighted average)						
	5	10	25	50	75	90	95
AQ	.340	.550	.910	1.520	2.140	2.690	3.210
Control	.220	.450	.960	2.110	3.030	3.780	4.300
Ownership	.170	.420	.850	1.490	2.180	2.950	3.420
Reach	.050	.290	.850	1.490	2.170	2.940	3.410
Endurance	.100	.600	.990	1.830	2.710	3.530	4.370
AQ level	Very Low -3SP	Low -2SP	Medium Low -1SP Q1	Medium Min Q2	Medium High +1SP Q3	High +2SP	Very High +3SP

Table 2. Percentage of total students by overall AQ level

Overall AQ level	Quartile Indicator	Indicator	Respondents (N = 1845)	Percentage (%)
Very High	AQ score > 2.690	Mean + 3SD	201 / 1845	10.89%
High	2.110 < AQ score ≤ 2.690	Mean + 2SD	287 / 1845	15.56%
Medium high	1.520 < AQ score ≤ 2.110	Mean + 1SD	461 / 1845	24.99%
Medium low	0.910 < AQ score ≤ 1.520	Mean - 1SD	472 / 1845	25.58%
Low	0.550 < AQ score ≤ 0.910	Mean - 2SD	253 / 1845	13.71%
Very low	AQ score ≤ 0.550	Mean - 3SD	171 / 1845	9.27%

Table 2 testified that overall AQ level of polytechnic students was 10.89% (201/1845) of polytechnic students are at a very high AQ level, 15.56% (287/1845) at a high level, 24.99% (461/1845) at a medium-high level, 25.58% (472/1845) at a medium-low level, 13.71% (253/1845) at a low level and 9.27% (171/1845) at a very low level. Overall, polytechnic students have an AQ at a medium-low level.

### 4.2 Adversity Quotient (AQ) Profiling based on Demographic

The demographic status was based on gender (male and female), year of study (first, second, and third year), type of program (JKA, JKE, JKM, JKPK, JKP, JP, JTM, and JTMK), and type of polytechnic by zone (Borneo, West, South, East, and North). Table 3 showed that the AQ profile of female students was higher (M = 1.699; SD = 0.940) than that of male students (M = 1.472; SD = 0.904). The profile of first-year students were higher (M = 3.2314; SP = 0.2722) than second-year (M = 3.2067; SP = 0.2535) and third-year students (M = 3.2178; SP = 0.2717). The JKP program students had the highest profile (M = 1.899; SP = 0.918), while the JKE students had the lowest (M = 1.479; SP = 0.913). The JKP enrolled only 9 students because enrolment in the marine programme was low, and the earlier sampling proportion was also 10%. The findings also found that the western zone polytechnic AQ profile (M = 1.711; SP = 0.855) was the highest, while the norm for the northern zone (M = 1.456; SP = 0.983) was the lowest.

Table 3. Norms and AQ Profile Polytechnic Students based on Demographic Status

Overall AQ level	Demographic	Mean (logits)	S. D
Gender	Male (N = 994)	1.472	0.904
	Female (N = 851)	1.699	0.904
Year of Study	First Year (N = 619)	1.611	0.918
	Second Year (N = 287)	1.509	0.843
	Third Year (N = 939)	1.575	0.958
Type of Program	JKA (N = 490)	1.580	0.836
	JKE (N = 294)	1.479	0.913
	JKM (N = 383)	1.489	0.952
	JKP (N = 9)	1.899	0.918
	JKPK (N = 32)	1.665	1.007
	JP (N = 442)	1.684	1.002

Type of Polytechnic by Zone	JTMK (N = 142)	1.613	0.946
	JTM (N = 53)	1.627	0.830
	Borneo (N = 258)	1.563	0.912
	West (N = 363)	1.711	0.855
	South (N = 375)	1.577	0.811
	East (N = 393)	1.456	0.983
	North (N = 456)	1.583	1.018

## 5.0 Discussions

The norms and AQ overall score profiles showed that 1,845 students in five polytechnics had AQ at a moderately low level. The constructs of control, ownership, and endurance showed moderately high AQ levels, whereas reach showed moderately low AQ levels. Several previous studies have recorded inconclusive findings regarding AQ levels in the educational context. The majority of past studies have actually shown a tendency towards low AQ levels. The low-medium level indicates that polytechnic students are not very capable of handling academic challenges well in their lives. Students' experience of handling challenges in secondary school does not help them much to have a high AQ in polytechnics. From a psychological and educational perspective, adaptability and resilience are essential qualities for students to navigate the unique challenges (Tohirin & Mardiana, 2025).

In addition, the AQ profile of female students was found to be higher than that of male students, and this finding is in line with previous studies (Maiquez et al., 2015). Generally, males have stronger resilience and are calmer in the face of problems than females (Jing & Stewart, 2007). Many contemporary theories describe males as competitive and task-oriented in problem-solving, especially in the occupational domain. Females, on the other hand, are described as pro-social and empathetic, especially in the interpersonal domain. (Jing & Stewart, 2007). In the context of polytechnics, the study's findings are contradictory: female students have higher AQ because they are skilled at handling the challenges there, especially those of studying and learning.

Based on the CORE model of AQ, inspired by Stoltz (2010), it means that female polytechnic students know how to manage and overcome adversities in their lives, and to rejuvenate professionalism and endurance in confronting life challenges at the polytechnic. The AQ was also associated with coping strategies. Some individuals may perceive their environment as a source of conflict with their goals and activities. Personality and coping style are key factors in determining how individuals respond to tough situations (Zhou & Xiang, 2025). Inability to cope with adversity can impact one's life and growth. This will impact their ability to become trustworthy builders and future leaders for society. In addition, past findings have shown that female students are more resilient than male students (Allan et al., 2014). Individuals with a higher AQ are believed to demonstrate greater perseverance, adaptability, and problem-solving skills when facing tough situations (Peng et al., 2025).

Literature highlights show that there is a significant difference between students' AQ and differences in years of study (Sun & Stewart, 2007). Students who have been studying for a long time will face more challenges than new students (Macasaet, 2013). In this study, the characteristics of years of study at polytechnics are divided into first-, second-, and third-year students. Previous studies (Macasaet, 2013) reported that more mature students are more easily adaptable to challenges. Besides, the AQ values for polytechnic students across study programs are not much different. The differences in a person's AQ are not determined by the year of study, as AQ is shaped by genetics, education, and confidence (Stoltz, 1997). Students' ability to handle challenges is not much different across study programs. Study programs in educational institutions do not affect a student's response to failure because the student's coping mechanisms remain largely the same. There is little literature examining AQ norms by institution type.

Findings show that polytechnics in the Western zone recorded the highest AQ norms, while those in the East recorded the lowest. The differences in AQ are not determined by the type of polytechnic (zone or geographical location), as AQ is shaped by genetics, education, and confidence (Stoltz, 1997), and is unrelated to the polytechnic's location. However, the AQ in the Western zone was recorded as the highest because it may be affected by the enrolment of students who are more confident in dealing with adversity. Students at any polytechnic can also achieve excellent AQ and handle challenges more effectively. In a nutshell, AQ significantly influenced college students' well-being, particularly under challenging conditions (Peng et al., 2025). The implication of this study can change the practice to focus on the person logits by detecting the potential students with lower AQ for specific interventions from the Ministry of Higher Education, such as resilience-based interventions, as a support (Purba et al., 2025). The policy pathways for polytechnics can be improved by examining self-development training for lower AQ students. offers practical implications for leadership training, mentorship, and policy development in higher education (Jose & Cabual, 2025).

## 5.0 Conclusion & Recommendations

In summary, these results show that the profiling was produced by using the Rasch logit setting. The AQ profile of female students was higher than that of males. The first-year and JKP program students reported the highest AQ. The findings also found that the western zone reported the highest, while the northern zone reported the lowest. However, this assessment of analysis has several boundaries. Firstly, the assessment is based on the person's logit and not the item logit. This will encourage future researchers to use the logit person as an anchor for profiling in the setting. The current study adds to the corpus of knowledge on AQ by providing more dynamic data for the applicability of measurement theory, such as item response theory. Further research might explore the new AQ intervention modules, investigate resilience, grit, and endurance, and develop a better evaluation plan for students.

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## Paper Contribution to the Related Field of Study

This research extends our knowledge of the psychological profiling of the Adversity Quotient (AQ) using the Rasch logit model. The inspection of AQ, which had excellent diagnostic accuracy under the Rasch model, helped provide empirical data (from an ordinal to a logit setting) from polytechnic students, using modern measurement-theory applications. The contribution was also made by producing logit segregation using a weighted average based on percentile ranking.

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