SJME (Supremum Journal of Mathematics Education)
Vol.10, No.2, July 2026, pp. 231-244
ISSN: 2548-8163 (online)| ISSN: 2549-3639 (print)
DOI: 10.35706/sjme.v10i2.13183

Mapping Mathematical Critical Thinking and Adversity Quotient Using Wright Maps: Evidence from Senior and Vocational High School Students

Alya Shafiyah Rahma[1], Retno Widiastutik[2], Ayu Faradillah[3*], and Syafika Ulfah[4]
[1,2,3*,4] Universitas Muhammadiyah Prof. Dr. Hamka
Email: alyshar168@gmail.com [1], retnowidiastutik29@gmail.com [2], ayufaradillah@uhamka.ac.id [3*], syafika.ulfah@uhamka.ac.id [4]

Article Information
Received December 11st, 2025
Revised December 31st, 2025
Accepted July 08th, 2026

Diterima 11 Desember 2025
Direvisi 31 Desember 2025
Disetujui 8 Juli 2026

Keywords:
Mathematical Critical Thinking, Adversity Quotient, Wright Map, Rasch model.

Kata kunci:
Kemampuan Berpikir Kritis Matematis, Adversity Quotient, Wright Map.

ABSTRACT
This study aimed to analyze the difficulty levels of items measuring mathematical critical-thinking ability and adversity quotient (AQ), as well as to map students' abilities according to gender and school type using Wright maps. A quantitative survey design was employed with purposive sampling involving tenth-grade students from senior and vocational high schools. A total of 299 students completed the mathematical critical-thinking test, while 284 students responded to the AQ questionnaire. The mathematical critical-thinking instrument covered interpretation, analysis, evaluation, and inference indicators, whereas the AQ instrument measured control, origin and ownership, reach, and endurance. Response data were analyzed using the Rasch model in Winsteps, and Wright maps were used to simultaneously display item difficulty and student ability on a common logit scale. The findings showed that inference items had the highest difficulty level, indicating that students experienced considerable difficulty drawing logical and accurate conclusions from mathematical information. In contrast, evaluation items tended to have lower difficulty levels. Within the AQ instrument, several control and reach items were the most difficult to endorse, suggesting that some students still struggled to regulate their responses to academic difficulties and prevent those difficulties from affecting other aspects of learning. Gender-based mapping revealed only minor differences: male students had slightly higher proportions in the high critical-thinking and AQ categories, whereas female students were more concentrated in the moderate categories. Based on school type, senior high school students had higher proportions in the high categories of mathematical critical thinking and AQ, while vocational high school students were predominantly distributed in the moderate categories. These findings demonstrate that Wright maps are useful for diagnosing item difficulty, mapping student ability, and identifying demographic variations. The results can inform the revision of assessment instruments and the development of differentiated and adaptive mathematics instruction that strengthens inference skills, critical reflection, persistence, and students' responses to academic challenges.

ABSTRAK
Penelitian ini bertujuan menganalisis tingkat kesukaran butir instrumen kemampuan berpikir kritis matematis dan adversity quotient (AQ), serta memetakan kemampuan siswa berdasarkan jenis kelamin dan jenis sekolah menggunakan Wright Map. Penelitian menggunakan desain survei kuantitatif dengan teknik purposive

sampling yang melibatkan siswa kelas X dari Sekolah Menengah Atas dan Sekolah Menengah Kejuruan. Sebanyak 299 siswa mengerjakan tes kemampuan berpikir kritis matematis, sedangkan 284 siswa mengisi angket AQ. Instrumen berpikir kritis matematis mencakup indikator interpretasi, analisis, evaluasi, dan inferensi, sementara instrumen AQ mengukur dimensi control, origin and ownership, reach, dan endurance. Data respons dianalisis menggunakan model Rasch melalui perangkat lunak Winsteps. Wright Map digunakan untuk menampilkan tingkat kesukaran butir dan kemampuan siswa secara bersamaan pada skala logit yang sama. Hasil penelitian menunjukkan bahwa butir pada indikator inferensi memiliki tingkat kesukaran tertinggi. Temuan tersebut mengindikasikan bahwa siswa masih mengalami kesulitan dalam menarik kesimpulan yang logis dan tepat berdasarkan informasi matematis. Sebaliknya, butir pada indikator evaluasi cenderung memiliki tingkat kesukaran lebih rendah. Pada instrumen AQ, beberapa butir pada dimensi control dan reach merupakan butir yang paling sulit disetujui, yang menunjukkan bahwa sebagian siswa belum mampu mengendalikan respons terhadap kesulitan akademik dan membatasi dampaknya terhadap aspek pembelajaran lainnya. Berdasarkan jenis kelamin, siswa laki-laki memiliki proporsi yang sedikit lebih tinggi pada kategori kemampuan berpikir kritis dan AQ tinggi, sedangkan siswa perempuan lebih terkonsentrasi pada kategori sedang. Berdasarkan jenis sekolah, siswa SMA memiliki proporsi lebih tinggi pada kategori kemampuan berpikir kritis matematis dan AQ tinggi, sementara siswa SMK lebih dominan pada kategori sedang. Temuan ini menegaskan bahwa Wright Map bermanfaat untuk mendiagnosis tingkat kesukaran butir, memetakan kemampuan siswa, dan mengidentifikasi variasi berdasarkan karakteristik demografis. Hasil penelitian dapat digunakan untuk menyempurnakan instrumen asesmen serta merancang pembelajaran matematika yang adaptif dan terdiferensiasi guna memperkuat kemampuan inferensi, refleksi kritis, ketekunan, dan respons siswa terhadap tantangan akademik.

INTRODUCTION

Mathematical critical thinking is closely related to the cognitive competencies that students need. However, classroom practice shows that many students are not yet accustomed to solving mathematical problems (Aprilia & Diana, 2023). In general, mathematical critical thinking comprises the ability to analyze, evaluate, and draw conclusions logically and systematically, thereby supporting students' understanding of mathematical problems (Rizky & Sritresna, 2021; Wilujeng & Sudihartinih, 2021).

Yuliana and Miatun (2023) found that vocational high school students had not fully achieved the indicators of mathematical critical thinking, including interpretation, analysis, evaluation, and inference. Similarly, Purnaningsih and Zulkarnaen (2022) reported low levels of mathematical critical thinking in problem comprehension and mathematical model construction, as well as insufficient accuracy in problem solving, which hindered students' ability to identify, interpret, and analyze problems.

Critical thinking is a fundamental ability that helps students develop an efficient framework for evaluating information and solving problems (Faudziah & Budiman, 2023). This emphasis is consistent with the Merdeka Curriculum, through which the Ministry of Education, Culture, Research, and Technology identified critical reasoning as one dimension

of the Pancasila Student Profile (Lukman et al., 2023). Therefore, mathematical critical thinking provides an important foundation for developing students who can reason critically and respond to challenges.

Mathematical critical thinking involves identifying and reflecting on problems, but performance may decline when students experience pressure (Hanifah & Miatun, 2024). Astuti et al. (2022) likewise reported that AQ supports logical and systematic thinking. Hidayah et al. (2024) found that climber-type students met all critical-thinking indicators when solving mathematical problems, whereas students with other AQ types met only some indicators. Siswanto et al. (2024) also showed that students' AQ positively influenced mathematical problem solving. Thus, AQ may help sustain mathematical critical thinking when students face academic challenges.

Adversity quotient (AQ) refers to an individual's capacity to manage difficulties as challenges and persist in solving problems (Laili, 2021; Manazila et al., 2022). Students respond differently to mathematical problems: some view them as challenges, whereas others struggle to resolve them (Lestari & Hanifah, 2025). AQ is therefore important because it can strengthen students' persistence when they encounter difficulties in mathematical problem solving (Kartika et al., 2021). Students with high AQ have also been reported to maintain critical-thinking strategies more effectively than those with low AQ (Rahayu et al., 2024). Thus, AQ may influence students' mathematical critical thinking when they face learning challenges.

AQ may strengthen students' critical-thinking skills, particularly in understanding problems and selecting mathematical problem-solving strategies (Irfiani et al., 2024). Accordingly, analyzing the items in mathematical critical-thinking and AQ instruments is necessary to support the development of high-quality instruments for evaluating mathematics learning.

Item analysis is a systematic process for evaluating test items based on student responses and psychometric parameters, including difficulty, discrimination, validity, and reliability (Syaifudin, 2023). It is essential in instrument development because it helps determine item quality (Safitri et al., 2024). In this study, item analysis was used to verify that the items appropriately measured students' mathematical critical thinking and AQ.

Several studies have examined mathematical critical thinking and AQ in secondary education. Putri and Alyani (2023) analyzed high school students' mathematical critical thinking by gender, domicile, and AQ and used a Wright map to map student ability. Although the study identified differences by gender and location, it did not analyze item difficulty. Sholihah and Afriansyah (2017) examined a STEM-based critical-thinking instrument for elementary mathematics and compared item difficulty with student ability using a ranking system. Prasetya and Pratama (2023) evaluated the validity and reliability of a critical-thinking instrument using the Rasch model and assessed gender-related item bias. However, that study did not include AQ or compare senior and vocational high school students.

Few studies have comprehensively analyzed mathematical critical-thinking and AQ items by demographic characteristics, such as gender and school type, using Wright maps. Previous studies generally examined only one or two dimensions and did not integrate item difficulty with comparisons between senior and vocational high schools. This study addressed that gap by using Rasch analysis to examine the alignment between item difficulty and student ability and by relating the results to demographic characteristics. Specifically, the study identified items with high, moderate, and low difficulty and described the distribution of student abilities by gender and school type. The findings were expected to

provide a comprehensive account of instrument quality and students' ability to solve mathematics problems requiring critical thinking.

METHOD

This study employed a quantitative survey design. Survey research collects data from a sample to describe respondents' views and measure relevant variables in a defined setting (Widyaningrum, Lutfiyana, et al., 2024; Yusfiah et al., 2024).

The study used purposive sampling, which selects participants according to predefined criteria (Astiana et al., 2021; Pramadani et al., 2024). The sample comprised tenth-grade students from senior and vocational high schools. Of these, 299 completed the mathematical critical-thinking test and 284 completed the AQ questionnaire. Table 1 presents the sample distribution.

Table 1. Research Sample

Demographic Variable	Description	Code	Sample Size	
			Mathematical Critical Thinking	Adversity Quotient
School	Senior High School	C	221	178
	Vocational High School	B	78	106
Gender	Female	F/P	181	189
	Male	M/L	118	95

Across the two instruments, 583 responses were analyzed: 299 test responses and 284 questionnaire responses. By school type, 399 responses (68.4%) were from senior high school students and 184 (31.6%) were from vocational high school students. By gender, 370 responses (63.5%) were from female students and 213 (36.5%) were from male students. Thus, the response distributions were dominated by senior high school and female students.

Data were collected using a mathematical critical-thinking test and an AQ questionnaire. Table 2 lists the indicators for both instruments. The critical-thinking test was developed based on previous studies (Chaniago & Awalludin, 2024; Karim & Normaya, 2015), whereas the AQ questionnaire was developed from previous studies (Gradini & Noviani, 2024; Jana & Nugrahayuningtyas, 2019).

Table 2. Indicators of Mathematical Critical Thinking and Adversity Quotient

Instrument	Indicator	Description
Mathematical Critical Thinking Skills	Interpreting	Identifying the information in a problem by accurately expressing or explaining its meaning.
	Analyzing	Developing relevant mathematical models and accurately identifying and explaining the components, question forms, and main ideas presented in a problem.
	Evaluating	Selecting appropriate methods or strategies, solving the problem correctly, and performing accurate calculations.
	Inferring	Drawing logical and accurate conclusions from the calculations.

Instrument	Indicator	Description
Adversity Quotient	Control	The extent to which students can regulate their responses to academic difficulties, both immediately and over time.
	Origin and Ownership	The extent to which students recognize the causes of difficulties and accept responsibility for improving challenging learning situations.
	Reach	The extent to which learning difficulties affect other areas of students' lives.
	Endurance	Students' perceptions of the duration and intensity of difficulties and their ability to persist in the learning process.

Data were analyzed in Winsteps using Wright maps, which simultaneously display the distribution of person abilities and item difficulties. The analysis transformed the response data into person and item measures to evaluate student ability and item quality. Triyanti et al. (2025) similarly noted that item difficulty can be interpreted by comparing person ability measures with item locations on the Wright map.

RESULTS AND DISCUSSION

Item-Based Wright Maps of Mathematical Critical Thinking and Adversity Quotient

Wright maps were used to examine whether students could respond correctly to each test item. The maps display the distribution of student ability and item difficulty on a common logit scale.

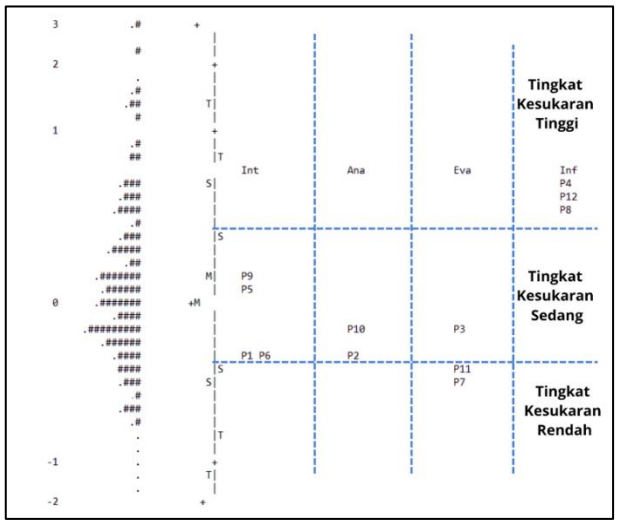

Figure 1. Wright Map of Mathematical Critical Thinking Items

Figure 1 shows that three inference items were located at the top of the map and therefore had high difficulty, whereas two evaluation items were located at the bottom and had low difficulty (Hikmah et al., 2021). This pattern is consistent with Faradillah and Maulida (2022), who explained that more difficult items appear toward the top of a Wright map and easier items toward the bottom.

Based on Figure 1, students experienced the greatest difficulty in drawing logical and accurate conclusions from the information provided, as represented by the three inference items. At the moderate difficulty level were four interpretation items, two analysis items,

and one evaluation item, indicating moderate difficulty in identifying problems, analyzing information, and selecting problem-solving strategies. Items P11 and P7, both representing evaluation, had low difficulty, suggesting that students found it relatively easy to apply the required solution strategies.

The AQ questionnaire items were also examined using a Wright map to identify their relative endorsement difficulty.

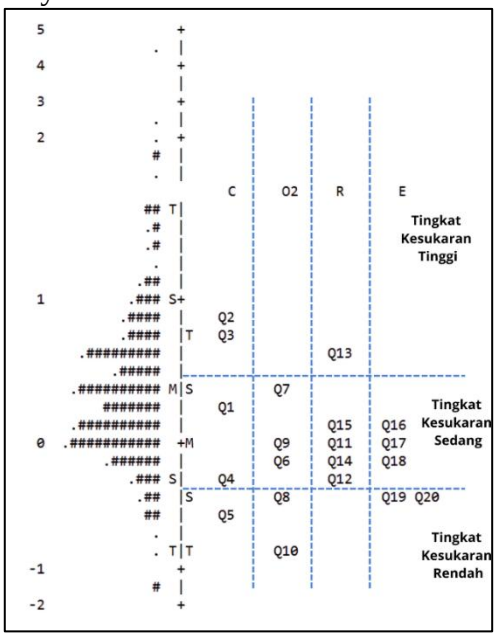

Figure 2. Wright Map of Adversity Quotient Items

Figure 2 shows that two control items and one reach item had high difficulty, indicating that students were less likely to agree with these statements. Items in the middle of the map had moderate difficulty, suggesting a relatively balanced distribution of agreement and disagreement. Items at the bottom had low difficulty and were generally endorsed by students. As Harjanti and Faradillah (2020) explained, items positioned higher on a Wright map are more difficult to endorse, whereas lower items are easier to endorse.

The two least-endorsed control items suggest that some students perceived their responses to difficulties as being shaped by external barriers (Utami et al., 2023). The least-endorsed reach item suggests difficulty in preventing academic problems from affecting other areas. This interpretation is consistent with Basith et al. (2021), who found that students experiencing difficulty tended to allow its effects to extend to their learning performance. Gender-based wright maps of mathematical critical thinking and adversity quotient at Figure 3. Classifies students' mathematical critical-thinking ability into high, moderate, and low categories. Of the 299 students, 181 (60.5%) were female and 118 (39.5%) were male. Among female students, 26 (14.4%) were in the high category, 132 (72.9%) in the moderate category, and 23 (12.7%) in the low category. Among male students, 19 (16.1%) were in the high category, 84 (71.2%) in the moderate category, and 15 (12.7%) in the low category. Although the proportion of male students in the high category was slightly greater, the number of female students in the high and moderate categories was larger because the female sample was larger

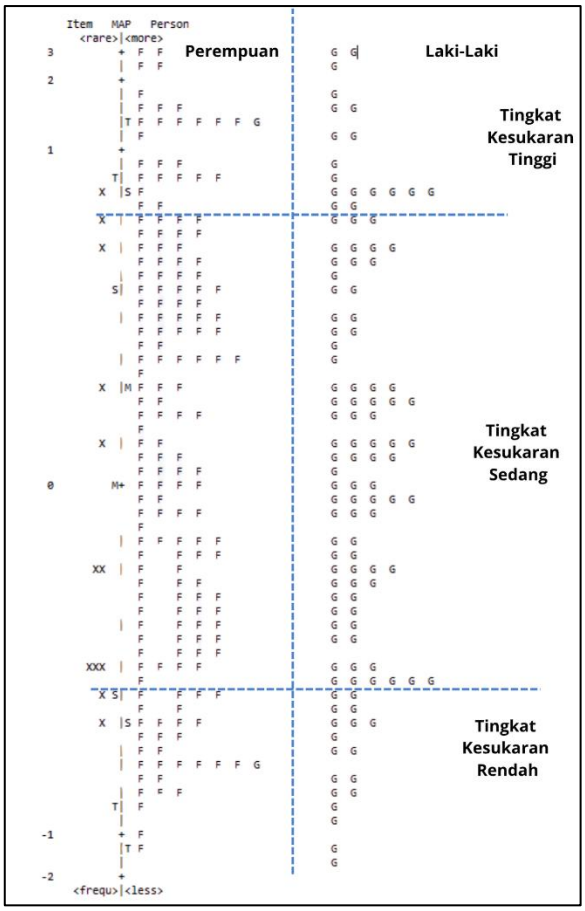

Figure 3. Wright Map of Mathematical Critical Thinking Ability by Gender

This finding partly aligns with Yuliana et al. (2022), who reported stronger performance by female students on mathematical critical-thinking indicators. Gufron (2022) likewise found that female students' critical-thinking ability was approximately 6% higher than that of male students.

The gender-based distribution of AQ provides an overview of how male and female students responded to adversity-related statements.

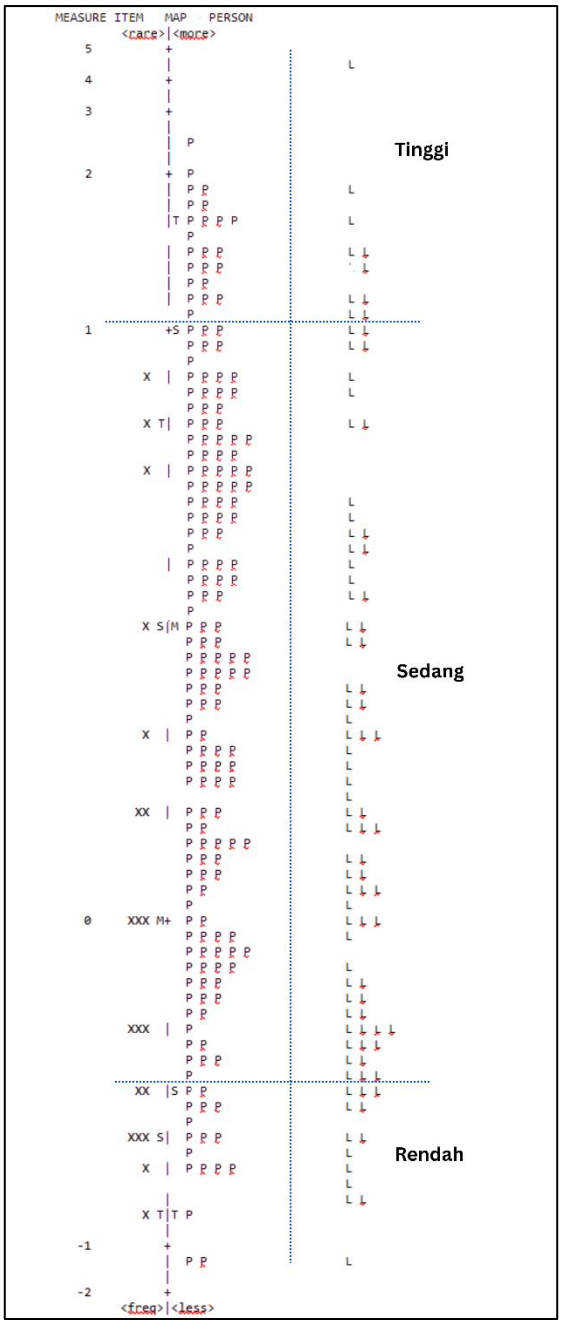

Figure 4. Wright Map of Adversity Quotient by Gender

Figure 4 shows the AQ distribution of 284 students: 189 (66.5%) female students and 95 (33.5%) male students. Among female students, 22 (11.6%) were in the high category, 150 (79.4%) in the moderate category, and 17 (9.0%) in the low category. Among male students, 12 (12.6%) were in the high category, 70 (73.7%) in the moderate category, and 13 (13.7%) in the low category. Female students were more concentrated in the moderate category, suggesting relatively stable responses to academic challenges, whereas male students had slightly larger proportions in both the high and low categories.

These findings are consistent with Amindayani and Muryono (2024), who reported a slightly higher AQ frequency among female students. Agustina and Suniasih (2021) also found that women had higher AQ scores, particularly in endurance and reach, which reflect

persistence and the ability to seek solutions under academic pressure. School-type-based wright maps of mathematical critical thinking and adversity quotient at Figure 5. The distribution of mathematical critical-thinking ability among senior and vocational high school students. Four senior high school students were positioned at the highest ability level, whereas one senior high school student was positioned at the lowest level.

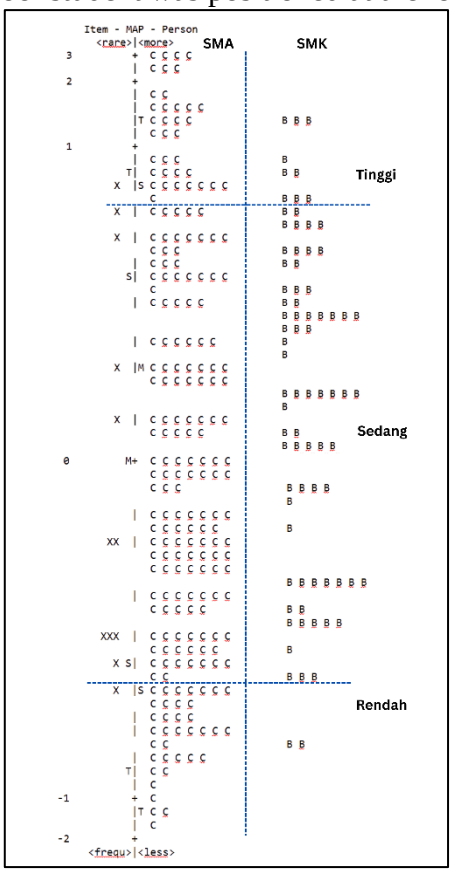

Figure 5. Wright Map of Mathematical Critical Thinking Ability by School Type

Figure 5 classifies the 299 students into high, moderate, and low categories. Of these, 221 (73.9%) were senior high school students and 78 (26.1%) were vocational high school students. Among senior high school students, 36 (16.3%) were in the high category, 149 (67.4%) in the moderate category, and 36 (16.3%) in the low category. Among vocational high school students, 9 (11.5%) were in the high category, 67 (85.9%) in the moderate category, and 2 (2.6%) in the low category. Thus, senior high school students had a greater proportion in the high category, whereas vocational high school students were more concentrated in the moderate category. This finding is consistent with Safitri et al. (2024), who reported that high cognitive ability was associated with strong critical-thinking performance among senior high school students. Putri et al. (2025) found that vocational high school students encountered difficulties in evaluation and inference because of limited reflective thinking and logical reasoning in mathematics learning.

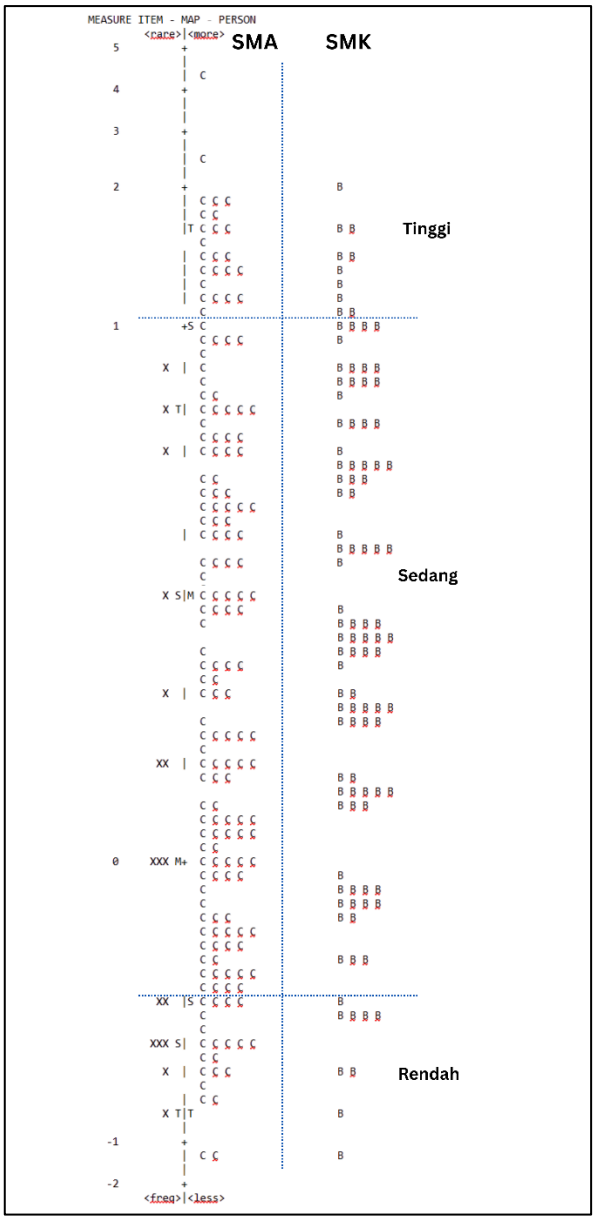

Figure 6. Wright Map of Adversity Quotient by School Type

Figure 6 shows that 178 students (62.7%) were from senior high schools and 106 (37.3%) from vocational high schools. Among senior high school students, 24 (13.5%) were in the high AQ category, 133 (74.7%) in the moderate category, and 21 (11.8%) in the low category. Among vocational high school students, 10 (9.4%) were in the high category, 87 (82.1%) in the moderate category, and 9 (8.5%) in the low category. Erza et al. (2024) reported that senior high school students demonstrated resilience when facing substantial difficulties, whereas Jannah et al. (2023) found that climber-type AQ contributed significantly to vocational maturity among vocational high school students. Together, these findings suggest that senior high school students showed somewhat stronger academic persistence, while vocational high school students' AQ may also support career readiness.

Overall, senior high school students tended to show higher mathematical critical-thinking ability and AQ, suggesting greater readiness to engage with complex mathematical concepts. Vocational high school students were more concentrated in the moderate categories, which may reflect strength in applying concepts to contextual situations.

Mathematics learning in senior high schools generally emphasizes abstract concepts, whereas vocational mathematics places greater emphasis on practical problem solving (Habsyi & Nur, 2021; Purba, 2019). Darmayasa et al. (2023) similarly argued that vocational mathematics should integrate content with real-world situations to improve student engagement. These differences suggest that mathematics instruction may be more effective when adapted to the characteristics and learning contexts of senior and vocational high school students.

The findings have important implications for both assessment development and mathematics instruction. The concentration of difficult items within the inference indicator suggests that learning activities should provide students with more opportunities to justify solutions, evaluate the consistency of mathematical arguments, and formulate conclusions based on relevant evidence. Similarly, the difficulty of several control and reach items indicates that cognitive support should be accompanied by learning strategies that strengthen students' persistence, emotional regulation, and ability to manage the effects of academic difficulties. Teachers may use the Wright-map results to design differentiated tasks according to students' ability levels and school contexts, rather than applying identical instructional treatments to all students. Nevertheless, the interpretation of demographic differences should be made cautiously because the numbers of participants across gender and school-type groups were unequal. Moreover, the study focused on item difficulty and ability distribution and did not statistically examine causal relationships between mathematical critical thinking and adversity quotient. Future studies should involve more balanced samples, investigate differential item functioning, and examine the relationship between the two constructs using more comprehensive Rasch-based or multivariate analyses.

CONCLUSION

This study identified high-, moderate-, and low-difficulty items in the mathematical critical-thinking test and AQ questionnaire. In the critical-thinking test, inference items were the most difficult, indicating that students had difficulty drawing logical conclusions, whereas evaluation items were the easiest. In the AQ questionnaire, highly difficult items were those that students were less likely to endorse, while low-difficulty items were more readily endorsed. The ability distributions varied by gender and school type. Male students had slightly higher proportions in the high category for both critical thinking (16.1% vs. 14.4%) and AQ (12.6% vs. 11.6%), whereas female students were more numerous in the high and moderate categories because of their larger sample size. Senior high school students had higher proportions in the high categories for both critical thinking and AQ, while vocational high school students were more concentrated in the moderate categories. These results demonstrate the usefulness of Wright maps for simultaneously examining item difficulty and student ability across demographic groups. The findings can inform the development of learning strategies that are responsive to students' needs and educational contexts.

REFERENCES

Agustina, P. N. S. S., & Suniasih, N. W. (2021). Adversity Quotient (Aq) Ditinjau dari Jenis Kelamin Siswa Kelas VI SD. *Jurnal Mimbar Ilmu*, *26*(1), 118–127. https://doi.org/10.23887/mi.v26i1.32284

Amindayani, R., & Muryono, S. (2024). Perbedaan Tingkat Adversity Quotient Antara Siswa Laki-Laki dan Perempuan di SMP Negeri 254 Jakarta. *Islamic Guidance and Counseling Journal*, *4*(1), 100–111. https://doi.org/10.51192/cons.v2i2

Aprilia, I. S., & Diana, H. A. (2023). Pembelajaran CORE Terhadap Kemampuan Berpikir Kritis Matematis Siswa Taruna Terpadu Bogor. *PLUS, MINUS: Jurnal Pendidikan Matematika*, *3*(1), 83–92. https://doi.org/10.31980/plusminus.v3i1.1225

Astiana, Y., Wardana, M. Y. S., & Subekti, E. E. (2021). Analisis Kemampuan Pemecahan Masalah Dalam Menyelesaikan Soal Cerita Pecahan. *MENDIDIK: Jurnal Kajian Pendidikan Dan Pengajaran*, *7*(1), 54–59. https://doi.org/10.30653/003.202171.143

Astuti, D. W., Zuhri, M. S., & Wulandari, D. (2022). Analisis Berpikir Kritis Siswa dalam Menyelesaikan Soal Open Ended Materi SPLTV Ditinjau dari Adversity Quotient. *Imajiner: Jurnal Matematika Dan Pendidikan Matematika*, *4*(5), 393–400. https://doi.org/10.26877/imajiner.v4i5.10978

Basith, A., Syahputra, A., Fitriyadi, S., Rosmaiyadi, Fitri, & Triani, S. N. (2021). Academic Stress and Coping Strategy in Relation to Academic Achievement. *Cakrawala Pendidikan*, *40*(2), 292–304. https://doi.org/10.21831/cp.v40i2.37155

Chaniago, Z. A., & Awalludin, S. A. (2024). Analisis Kemampuan Berpikir Kritis Matematis Ditinjau dari Tipe Kepribadian dalam Menyelesaikan Soal Literasi dan Numerasi. *SJME (Supremum Journal of Mathematics Education)*, *8*(2), 215–233. https://doi.org/10.35706/sjme.v8i2.11306

Darmayasa, J. B., Wulandari, S., & Ervana, L. (2023). Matematika dalam Kurikulum SMK Pasca Pandemi Covid-19. *Jurnal Pembelajaran Matematika Inovatif*, *6*(3), 913–924. https://doi.org/10.22460/jpmi.v6i3.17112

Erza, I. T. M., Hariko, R., & Adlya, S. I. (2024). Gambaran Adversity Quotient Siswa Sekolah Menengah Atas. *Jurnal Pendidikan Tambusai*, *8*(2), 36161–36168.

Faradillah, A., & Maulida, A. (2022). Students' creative thinking ability assisted augmented reality based on visualizer-verbalizer cognitive style. *Jurnal Elemen*, *8*(2), 659–674. https://doi.org/10.29408/jel.v8i2.5693

Faudziah, W. S., & Budiman, I. A. (2023). Efektivitas Penggunaan Model Pembelajaran Problem Based Learning (PBL) Terhadap Kemampuan Berpikir Kritis Matematika Siswa SD. *Papanda Journal of Mathematics and Sciences Research (PJMSR)*, *2*(1), 22–29. https://doi.org/10.56916/pjmsr.v2i1.272

Gradini, E., & Noviani, J. (2024). Students Profile of Adversity Quotient in Mathematics Learning: Control, Origin and Ownership, Reach, and Endurance. *American Journal of STEM Education: Issues and Perspectives*, *3*, 84–104. https://doi.org/10.32674/2y5p9359

Gufron, A. (2022). Analisis Kemampuan Berpikir Kritis Matematis Ditinjau Perbedaan Gender pada Materi Aritmatika Sosial. *J-Pimat: Jurnal Pendidikan Matematika*, *4*(1), 451–458. https://doi.org/10.31932/j-pimat.v4i1.1603

Habsyi, R., & Nur, I. M. (2021). Perbandingan Hasil Belajar Matematika Siswa SMA Melalui Model Pembelajaran Problem solving dengan Jigsaw. *JURNAL PENDIDIKAN MIPA*, *11*(2), 47–53. https://doi.org/10.37630/jpm.v11i2.475

Hanifah, A. K., & Miatun, A. (2024). Kecemasan dan Kepercayaan Diri Matematika Hubungannya dengan Kemampuan Berpikir Kritis Matematis Siswa SMA. *Indiktika: Jurnal Inovasi Pendidikan Matematika*, *6*(2), 325–338. https://doi.org/10.31851/indiktika.v6i2.15367

Harjanti, I. A., & Faradillah, A. (2020). An Exploration of Secondary Students' Perception of Blended Learning in Mathematics Learning. *SJME (Supremum Journal of Mathematics Education)*, *4*(2), 197–204. https://doi.org/10.35706/sjme.v4i2.3650

Hidayah, M. L. A., Mashuri, A., & Rahmawati, A. D. (2024). Analisis kemampuan berpikir aljabar siswa ditinjau dari Adversity Quotien (AQ) di Kelas VIII SMPN 2 Jogorogo

Tahun 2023. *Jurnal Jendela Matematika*, *2*(1), 67–74. https://doi.org/10.57008/jjm.v2i01.681

Hikmah, F. N., Sukarelawan, Moh. I., Nurjannah, T., & Djumati, J. (2021). Elaboration of High School Student's Metacognition Awareness on Heat and Temperature Material: Wright Map in Rasch Model. *Indonesian Journal of Science and Mathematics Education*, *4*(2), 172–182. https://doi.org/10.24042/ijsme.v4i2.9488

Irfiani, V., Junaedi, I., & Waluya, S. B. (2024). Systematic Literature Review: Kemampuan Berpikir Kritis Matematis Siswa Ditinjau dari Adversity Quotient. *Jurnal Pendidikan Matematika*, *1*(2), 1–11. https://doi.org/10.47134/ppm.v1i2.157

Jana, P., & Nugrahayuningtyas, A. (2019). Efektivitas Model Pembelajaran IMPROVE Ditinjau dari Kemampuan Adversity Quotient. *Jurnal Didaktik Matematika*, *6*(2), 112–120. https://doi.org/10.24815/jdm.v6i2.14196

Jannah, T., Tarmidi, & Dewi, I. S. (2023). The Role of Adversity Quotient and Self Efficacy Through Career Maturity on Students of State Vocational School in Lhokseumawe. *International Journal of Progressive Sciences and Technologies (IJPSAT*, *38*(2), 312–316. https://doi.org/10.52155/ijpsat.v38.2.5329

Karim, & Normaya. (2015). Kemampuan Berpikir Kritis Siswa dalam Pembelajaran Matematika dengan Menggunakan Model JUCAMA di Sekolah Menengah Pertama. *EDU-MAT: Jurnal Pendidikan Matematika*, *3*(1), 92–104. https://doi.org/10.20527/edumat.v3i1.634

Kartika, R. W., Megawanti, P., & Hakim, A. R. (2021). Pengaruh adversity Quotient dan Task Commitment terhadap Kemampuan Pemecahan Masalah Matematika. *Jurnal Riset Pendidikan Matematika*, *8*(2), 206–216. https://doi.org/10.21831/jrpm.v8i2.36831

Laili, N. (2021). Hubungan Adversity Quotient dan Hasil Belajar Matematika Peserta Didik dalam Pembelajaran Jarak Jauh di SMP. *Journal of Humanities and Social Sciences*, *3*(1), 33–39. https://doi.org/10.36079/lamintang.jhass-0301.210

Lestari, W. D., & Hanifah. (2025). Analisis Adversity Quotient Siswa SMP Pada Pembelajaran Matematika. *Jurnal Didactical Mathematics*, *7*(1), 203–210. https://doi.org/10.31949/dm.v7i1.13438

Lukman, H. S., Setiani, A., & Agustiani, N. (2023). Validitas Instrumen Tes Kemampuan Berpikir Kritis Matematis Berdasarkan Teori FRISCO. *SJME (Supremum Journal of Mathematics Education)*, *7*(1), 55–67. https://doi.org/10.35706/sjme.v7i1.6960

Manazila, S. I., Kharisudin, I., & Waluya, S. B. (2022). Kemampuan Berpikir Kreatif Berdasarkan Tipe Adversity Quotient Pada Pembelajaran Matematika. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *6*(2), 1788–1796. https://doi.org/10.31004/cendekia.v6i2.1059

Pramadani, R. A., Mentari, T. R. P., Hidaya, H. A. H., Indraini, Z. F., & Widyastuti, T. R. (2024). Belajar Toleransi dari Masyarakat Desa Klinting, Kecamatan Somagede, Kabupaten Banyumas. *Padaringan: Jurnal Pendidikan Sosiologi Antropologi*, *07*(1), 1–13. https://doi.org/10.20527/pn.v7i01.14062

Prasetya, W. A., & Pratama, A. T. (2023). Item Quality Analysis Using the Rasch Model to Measure Critical Thinking Ability in the Material of the Human Digestive System of Biology Subject in High School. *Jurnal Penelitian Dan Evaluasi Pendidikan*, *27*(1), 76–91. https://doi.org/10.21831/pep.v27i1.58873

Purba, A. (2019). Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa Kelas XI SMK melalui Pembelajaran Kontekstual. *Journal of Mathematics Education and Science*, *5*(1), 42–50. https://doi.org/10.30743/mes.v5i1.1932

Purnaningsih, I., & Zulkarnaen, R. (2022). Identifikasi Faktor Penyebab Kemampuan Berpikir Kritis Matematis Pada Siswa Kelas VIII. *Teorema: Teori Dan Riset Matematika*, *7*(2), 291. https://doi.org/10.25157/teorema.v7i2.7185

Putri, I. S., Kusno, & Jazuli, A. (2025). Problematika Proses Berpikir Kritis Siswa SMK pada Pembelajaran Matematika Materi Sinus dan Cosinus. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *09*(1), 460–474. https://doi.org/10.31004/cendekia.v9i1.3965

Putri, N. D. S., & Alyani, F. (2023). Mathematical critical thinking Ability Reviewing From Domicile, Gender, and Adversity Quotient. *Jurnal Pengembangan Pembelajaran Matematika*, *5*(1), 1–16. https://doi.org/10.14421/jppm.2023.51.1-16

Rahayu, S., Vizha, A., & Fatqurhohman. (2024). Analysis of Critical Thinking Ability of Junior High School Students Based On Adversity Quotient on Algebra Material. *Daya Matematis: Jurnal Inovasi Pendidikan Matematika*, *12*(2), 92. https://doi.org/10.26858/jdm.v12i2.64809

Rizky, E. N. F., & Sritresna, T. (2021). Peningkatan Kemampuan Berpikir Kritis dan Disposisi Matematis Siswa Antara Guided Inquiry dan Problem Posing. *Plusminus: Jurnal Pendidikan Matematika*, *1*(1), 33–46. https://doi.org/10.31980/plusminus.v1i1.866

Safitri, A., Lusiana, R., & Adamura, F. (2024). Karakteristik Kemampuan Berpikir Kritis Siswa SMA dengan Kemampuan Kognitif Tinggi dalam Pemecahan Masalah Matematika. *JMPM: Jurnal Matematika Dan Pendidikan Matematika*, *9*(1), 14–29. https://doi.org/10.26594/jmpm.v9i1.4562

Safitri, F., Rusdiana, D., Samsudin, A., & Widiyatmoko, A. (2024). Analysis of Critical Thinking Skills Test Items on The Topic of Temperature, Heat, and Expansion using The Rasch Model. *PAEDAGOGIA: Jurnal Penelitian Pendidikan*, *27*(3), 390–400. https://doi.org/10.20961/paedagogia.v27i3.91259

Sholihah, S. Z., & Afriansyah, E. A. (2017). Analisis Kesulitan Siswa dalam Proses Pemecahan Masalah Geometri Berdasarkan Tahapan Berpikir Van Hiele. *Mosharafa: Jurnal Pendidikan Matematika*, *6*(2), 287–298. https://doi.org/10.31980/mosharafa.v6i2.451

Siswanto, E., Aziz, T. A., & El Hakim, L. (2024). Meningkatkan Kemampuan Berpikir Kritis Dalam Pemecahan Masalah Matematika: Perspektif Filsafat dan Adversity Quotient. *JP2M (Jurnal Pendidikan Dan Pembelajaran Matematika)*, *10*(1), 17–27. https://doi.org/10.29100/jp2m.v10i1.5210

Syaifudin. (2023). Analisis Butir Soal Penilaian Akhir Tahun Mata Pelajaran Matematika dengan Item And Test Analysis. *Jurnal Jendela Matematika*, *1*(2), 34–42. https://doi.org/10.57008/jjm.v1i2.559

Triyanti, A., Yuniarti, A., & Afandi. (2025). Analisis Instrumen Tes Pengambilan Keputusan Taksonomi Presseisen dan Abilitas Peserta Didik Menggunakan Model Rasch. *BIODIK*, *11*(1), 46–58. https://doi.org/10.22437/biodik.v11i1.36941

Utami, S., Azizah, N., Hajaroh, M., Eliasa, E. I., Sovayunanto, R., & Siswoko, H. (2023). Profil Kecerdasan Adversitas (Adversity Quotient) Siswa Kelas XII SMAN 1 Tarakan. *QUANTA: Jurnal Kajian Bimbingan Dan Konseling Dalam Pendidikan*, *8*(1), 57–66. https://doi.org/10.22460/quanta.v8i1.4342

Widyaningrum, A., Lutfiyana, R. D., Faradillah, A., & Miatun, A. (2024). Survey of Rasch Model Analysis of Mathematical Literacy Abilities of Senior High School Students. *Pattimura Proceeding: Conference of Science and Technology*, *5*(1), 57–66. https://doi.org/10.30598/ppcst.knmxxiiv5i1p57-66

Wilujeng, S., & Sudihartinih, E. (2021). Kemampuan Berpikir Kritis Matematis Siswa SMP Ditinjau dari Gaya Belajar Siswa. *Jurnal Pendidikan Matematika Indonesia*, *6*(2), 53–63. https://doi.org/10.26737/jpmi.v6i2.2415

Yuliana, D., & Miatun, A. (2023). Analisis Kemampuan Berpikir Kritis Matematis Siswa Berdasarkan Self Efficacy dan Gender. *Jurnal Wahana Pendidikan*, *10*(2), 231. https://doi.org/10.25157/jwp.v10i2.11126

Yuliana, D., Rahmah, F., Faradillah, A., & Jusra, H. (2022). Analisis Kemampuan Berpikir Kritis Matematis Siswa Sekolah Menengah Atas dalam Menyelesaikan Soal Matematika Berdasarkan Gender dan Geogebra. *Indonesian GeoGebra Jurnal*, *2*(2), 8–26.

Yusfiah, K., Zakiyah, S., Faradillah, A., & Jusra, H. (2024). Analysis of the Rasch Model: Validity of Students' Mathematical Creative Thinking Ability on Quadratic Function Material. *Pattimura Proceeding: Conference of Science and Technology*, *5*(1), 49–56. https://doi.org/10.30598/ppcst.knmxxiiv5i1p49-56