Intelligence Components, Learning Agility Quotient, and Work Readiness of Indonesian Islamic Education Graduates in Industry 4.0

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Abstract

Integrating Islamic education with Industry 4.0 (IR4.0) presents significant challenges for graduates preparing to enter the workforce. This study aims to analyze the relationships between intelligence components (technology literacy, professional knowledge, critical thinking, problem-solving skills), learning agility quotient, and work readiness of Indonesian Islamic education graduates in the IR4.0 environment and to examine the mediating role of learning agility in these relationships. Using a quantitative cross-sectional approach, data were collected from 182 final-year Islamic education program students (96.2% aged 22-25 years; 73.1% female) and analyzed using partial least squares structural equation modeling (PLS-SEM). Results indicate that technology literacy ($\beta=0.438$, $p<0.001$) and problem-solving skills ($\beta=0.345$, $p<0.001$) positively influence learning agility, while critical thinking demonstrates an unexpected negative relationship ($\beta=-0.229$, $p<0.001$). Learning agility positively influences work readiness ($\beta=0.258$, $p<0.001$) and significantly mediates the relationships between technology literacy, problem-solving skills, critical thinking, and work readiness. These findings highlight the importance of developing learning agility as a linking mechanism between cognitive capabilities and work readiness and imply that Islamic education institutions should strengthen technology literacy and problem-solving skills while developing approaches that balance traditional values with adaptive learning capabilities to prepare graduates for the complex demands of the IR4.0 era.

Keywords: Industry 4.0, Intelligence Components, Islamic Education, Learning Agility Quotient, Work Readiness.

Abstrak

Integrasi pendidikan Islam dengan tuntutan Industri 4.0 (IR4.0) menghadirkan tantangan signifikan bagi lulusan dalam mempersiapkan diri memasuki dunia kerja. Penelitian ini bertujuan menganalisis hubungan antara komponen kecerdasan (literasi teknologi, pengetahuan profesional, berpikir kritis, keterampilan pemecahan masalah), *learning agility quotient*, dan kesiapan kerja lulusan pendidikan Islam Indonesia di lingkungan IR4.0, serta menguji peran mediasi *learning agility* dalam hubungan tersebut. Menggunakan pendekatan kuantitatif *cross-sectional*, data dikumpulkan dari 182 mahasiswa tingkat akhir program pendidikan Islam (96,2% berusia 22-25 tahun; 73,1% perempuan) dan dianalisis menggunakan *partial least squares structural equation modeling* (PLS-SEM). Hasil penelitian menunjukkan literasi teknologi ($\beta=0,438$, $p<0,001$) dan keterampilan pemecahan masalah ($\beta=0,345$, $p<0,001$) berpengaruh positif signifikan terhadap *learning agility*, sedangkan berpikir kritis menunjukkan hubungan negatif yang tidak terduga ($\beta=-0,229$, $p<0,001$). *Learning*

agility berpengaruh positif terhadap kesiapan kerja (β=0,258, p<0,001) dan secara signifikan memediasi hubungan antara literasi teknologi, keterampilan pemecahan masalah, berpikir kritis, dan kesiapan kerja. Temuan ini menyoroti pentingnya pengembangan *learning agility* sebagai mekanisme penghubung antara kapabilitas kognitif dan kesiapan kerja, serta mengimplikasikan bahwa institusi pendidikan Islam perlu memperkuat literasi teknologi dan keterampilan pemecahan masalah sambil mengembangkan pendekatan yang menyeimbangkan nilai-nilai tradisional dengan kapabilitas pembelajaran adaptif untuk mempersiapkan lulusan menghadapi tuntutan kompleks era IR4.0.

Kata Kunci: Industri 4.0, Kesiapan Kerja, Komponen Kecerdasan, *Learning Agility Quotient*, Pendidikan Islam .

Introduction

Integrating Islamic education into Industry 4.0 (IR4.0) dynamics presents both challenges and opportunities for educational institutions.[1] As the world increasingly embraces technological advancements, Islamic education must adapt to ensure its graduates have the necessary skills and competencies to thrive in a rapidly changing environment.[2] This adaptation involves a comprehensive transformation of curricula, teaching methodologies, and the overall educational framework.

One foundational aspect of this transformation is the curriculum of Islamic Religious Education (IRE). The curriculum must be designed to reflect traditional Islamic values while incorporating modern pedagogical approaches that align with the demands of IR4.0.[3] Halim emphasizes that the Islamic education curriculum should be rooted in the Quran and Hadith as a guide for developing educational content that fosters religious and technological literacy.[4] This is echoed by Nasir et al., who

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[1] Zubir Azhar et al., "Learning Agility Quotient and Work Readiness of Graduating Accounting Students: Embracing the Dynamics of IR4.0," *Accounting Education* 33, no. 4 (2024): 450–72, https://doi.org/10.1080/09639284.2023.2211567.

[2] Muhammad Nasir, Syeh Hawib Hamzah, and Muhammad Khairul Rijal, "Anatomical Analysis of Islamic Religious Education Curriculum At General Higher Education in Indonesia," *Ta'dib* 24, no. 1 (2021): 53, https://doi.org/10.31958/jt.v24i1.2827; Abdul Halim et al., "The Curriculum of Islamic Religious Education in the Whirlwind of Independent Education and Its Implementation on Learning," *Progresiva : Jurnal Pemikiran Dan Pendidikan Islam* 12, no. 02 (2023): 261–74, https://doi.org/10.22219/progresiva.v12i02.29415; Tohirin Tohirin and Dina Mardiana, "The Role of Counselors and University Students' Adversity Quotient in Enhancing Islamic Education (PAI) Online Learning: Insights from the COVID-19 Experience," *Educational Process: International Journal* 14 (2025): 1–14, https://doi.org/10.22521/edupij.2025.14.30; Faisal Fauzan Ilyasa et al., "Integrasi Konsep Ta'dib Dengan Program 5S Dalam Pembentukan Karakter Sosial Dan Cinta Damai Siswa," *Intelektual: Jurnal Pendidikan Dan Studi Keislaman* 15, no. 1 (2025): 75–96, https://doi.org/10.33367/ji.v15i1.6722.

[3] Azhar et al., "Learning Agility Quotient and Work Readiness of Graduating Accounting Students: Embracing the Dynamics of IR4.0," 2024.

[4] Halim et al., "The Curriculum of Islamic Religious Education in the Whirlwind of Independent Education and Its Implementation on Learning."

highlight the importance of aligning graduate learning outcomes with contemporary educational needs, ensuring students are prepared for religious and secular challenges.[5]

Moreover, the management of Islamic education curricula must be systematic and goal-oriented. Sa'dullah et al. discuss the necessity of a well-structured curriculum management system that integrates Islamic teachings with modern educational practices, allowing for continuous improvement and adaptation to societal needs.[6] This approach is essential for producing graduates who are knowledgeable in Islamic teachings and competent in various fields, including technology and entrepreneurship, as noted by Muvid.[7]

The role of educators in this transformation cannot be overstated. Teachers must have the necessary skills to utilize technology effectively in their teaching practices. Fitri emphasizes the importance of bilingualism and technological proficiency among graduates, which is crucial for competing in the global job market.[8] Furthermore, integrating the TPACK (Technology, Pedagogy, and Content Knowledge) framework can enhance the creativity and effectiveness of teaching methods in Islamic education, as highlighted by Saili.[9] This framework encourages educators to blend technology with pedagogical strategies, fostering an interactive and engaging learning environment.

In addition to curricular and pedagogical changes, Islamic educational institutions must also embrace digital transformation. Solichah points out that the effective use of educational technology can significantly enhance the quality and accessibility of Islamic education, particularly for students in remote areas.[10] This digital shift improves learning outcomes and prepares students to navigate the complexities of a technology-driven world.

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[5] Nasir, Hamzah, and Rijal, "Anatomical Analysis of Islamic Religious Education Curriculum At General Higher Education in Indonesia."

[6] Anwar Sa'dullah, Abdul Haris, and Wahidmurni Wahidmurni, "Curriculum Management of Al Izzah Islamic International Boarding School Batu," *Nidhomul Haq : Jurnal Manajemen Pendidikan Islam* 6, no. 3 (2022): 704–15, https://doi.org/10.31538/ndh.v6i3.1992.

[7] Muhamad Basyrul Muvid, "The Reasoning of Integrative Islamic Religious Education from Al-Qabisiy's Perspective," *Scaffolding: Jurnal Pendidikan Islam Dan Multikulturalisme* 5, no. 1 (2023): 162–74, https://doi.org/10.37680/scaffolding.v5i1.2288.

[8] Agus Zaenul Fitri, "Achieving Graduate Competency Standards: Impact of The Excellence Program," *Jurnal Pendidikan Islam* 4, no. 1 (2018): 51, https://doi.org/10.15575/jpi.v4i1.1581.

[9] Jahidih Saili and Muhamad Suhaimi Taat, "Enhancing the Creativity of Islamic Education Teaching through the TPACK Approach: A Conceptual Review," *International Journal of Academic Research in Progressive Education and Development* 12, no. 4 (2023): 1503–17, https://doi.org/10.6007/ijarped/v12-i4/20311.

[10] Ira Wirdatus Solichah and Ni'matuz Zuhroh, "The Existence of Islamic Institutions Through the Transformation of Education Digitalization at MTs Almaarif 01 Singosari," *Edumaspul: Jurnal Pendidikan* 7, no. 2 (2023): 3481–91, https://doi.org/10.33487/edumaspul.v7i2.5909.

Furthermore, the cultivation of entrepreneurial skills among students is vital. Taufik and Ernawati suggest that integrating entrepreneurial education into Islamic curricula can empower students to become proactive contributors to society, capable of leveraging their skills in various sectors.[11] This is particularly relevant in IR 4.0, where innovation and entrepreneurship are key drivers of economic growth. Lastly, the challenges posed by globalization and the digital era require Islamic education to adopt a more holistic approach. Wajdi et al. emphasize the importance of producing graduates who are academically proficient, socially responsible, and ethically grounded.[12] It aligns with the broader goal of Islamic education, which aims to develop individuals who can contribute positively to their communities and global society.

The positive correlation between learning agility quotient and work readiness is supported by diverse literature. Learning agility enhances individuals' ability to learn from various experiences and adapt rapidly to new challenges, which is critical in the industry 4.0 (IR4.0) environment where technological and digital demands continuously evolve.[13] For Indonesian Islamic education graduates, whose educational context uniquely integrates religious and modern pedagogies, fostering learning agility may build adaptive skills essential for emerging work demands.[14] Furthermore, research indicates that higher learning agility is associated with increased work readiness, as agile learners demonstrate better problem-solving, critical thinking, and digital competencies.[15] These findings suggest that investments in developing learning agility can directly improve the work readiness of graduating students, preparing them to navigate the complexities of the digital age and meet the labor market requirements in a rapidly transforming industrial landscape.

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[11] Taufik Taufik and Ernawati Ernawati, "Encouraging the Rise of Young Entrepreneurs: Promoting Entrepreneurial Intention through Storytelling," *The Open Psychology Journal* 14, no. 1 (2021): 213–19, https://doi.org/10.2174/1874350102114010213.

[12] Muh Barid Nizarudin Wajdi et al., "Contribution of Pesantren Miftahul Ula Nganjuk in Community-Based Education Development," *EDUTEC : Journal of Education And Technology* 6, no. 1 (2022): 1–10, https://doi.org/10.29062/edu.v6i1.429.

[13] Gresika Tabitha Vinesian, Suryanto Suryanto, and Reza Lidia Sari, "Factors Related To Learning Agility: A Systematic Literature Review," *Journal of Business Studies and Mangement Review* 6, no. 2 (2023): 182–86, https://doi.org/10.22437/jbsmr.v6i2.24817.

[14] Habibah Ab Jalil et al., "Predicting Learners' Agility and Readiness for Future Learning Ecosystem," *Education Sciences* 12, no. 10 (2022), https://doi.org/10.3390/educsci12100680.

[15] Putu Aditya Antara et al., "The Effect of Learner Autonomy and Institutional Support System on Agile Learners, Independence, and Work Readiness of Students Participating in the Merdeka Belajar Kampus Merdeka Program," *Journal of Higher Education Theory and Practice* 23, no. 15 (2023): 158–79, https://doi.org/10.33423/jhetp.v23i15.6432; Ade Irfansyah et al., "Factors That Affect the Quality Of Vocational Education Graduates in the 4.0 Era: Job Readiness, Skills and Digital Services," *Dinasti International Journal of Education Management And Social Science* 4, no. 4 (2023): 485–96, https://doi.org/10.31933/dijemss.v4i4.1734.

The relationship between the intelligence quotient (Technology literacy, Professional Knowledge and Skills, Critical Thinking, Problem-solving Skills) and learning agility quotient (LAQ) is essential for the preparedness of Indonesian graduating Islamic education students to adapt to the Industry 4.0 (IR4.0) environment. Research indicates that higher IQ correlates positively with learning capabilities, suggesting that students with superior cognitive abilities are better positioned to rapidly acquire and apply new skills.[16] This is particularly crucial in the IR4.0 context, where adaptive problem-solving and continuous learning are paramount. Additionally, studies demonstrate that intelligence facilitates a deeper understanding and quicker assimilation of concepts necessary for navigating advanced technological landscapes, which enhances learning agility.[17] Furthermore, integrating different quotients, such as emotional and adversity quotients, alongside IQ may provide insights into how these factors collectively influence LAQ and overall academic performance.[18] Thus, fostering both IQ and LAQ in educational frameworks can significantly enhance graduates' readiness to meet contemporary workplace demands.

Research indicates that higher IQ (Technology literacy, Professional Knowledge and Skills, Critical Thinking, Problem-solving Skills) facilitates cognitive skills critical for navigating complex work tasks and aligns strongly with enhanced LAQ, which denotes the ability to learn, adapt, and apply knowledge in real-world situations.[19] The interaction between IQ and LAQ suggests a pathway where IQ positively influences LAQ, consequently enhancing work readiness and employability

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[16] Sirong Shi et al., "Evaluating the Associations between Intelligence Quotient and Multi-Tissue Proteome from the Brain, CSF and Plasma," *Brain Communications* 6, no. 4 (2024): 1–8, https://doi.org/10.1093/braincomms/fcae207; Amir Jahanian Najafabadi et al., "Intelligence, Beliefs on IQ and Learning Style Predict Academic Performance in Mechanical Engineering Students," *U.Porto Journal of Engineering* 8, no. 1 Special Issue (2022): 59–72, https://doi.org/10.24840/2183-6493_008.001_0007.

[17] Pt Karna et al., "Publisher : Manuscript Central The Effect of Intelligence Quotient and Emotional Quotient on Employee" 10 (2019): 21401–7; Ardhiana Puspitacandri et al., "The Effects of Intelligence, Emotional, Spiritual and Adversity Quotient on the Graduates Quality in Surabaya Shipping Polytechnic," *European Journal of Educational Research* 9, no. 3 (2020): 1075–87, https://doi.org/10.12973/EU-JER.9.3.1075.

[18] Arshad Mahmood et al., "Establishing Linkages between Intelligence, Emotional and Spiritual Quotient on Employees Performance in Government Sector of Pakistan," *Mediterranean Journal of Social Sciences* 6, no. 6 (2015): 553–60, https://doi.org/10.5901/mjss.2015.v6n6s2p553; Puspitacandri et al., "The Effects of Intelligence, Emotional, Spiritual and Adversity Quotient on the Graduates Quality in Surabaya Shipping Polytechnic."

[19] Azhar et al., "Learning Agility Quotient and Work Readiness of Graduating Accounting Students: Embracing the Dynamics of IR4.0," 2024; Ab Jalil et al., "Predicting Learners' Agility and Readiness for Future Learning Ecosystem."

in emerging technologies.[20] Furthermore, the development of skills inherent to LAQ, nurtured from a robust IQ base, prepares students for adaptive thinking required in the IR4.0 context.[21] Such findings highlight the importance of integrating cognitive and agile learning strategies into educational curricula to foster readiness among graduates for an increasingly dynamic work environment.[22] Thus, emphasizing the interplay between IQ and LAQ enhances individual preparedness and equips students with the necessary skills to succeed in the evolving work landscape.

Therefore, the hypothesis is suggested as follows: H1: There is a positive relationship between the learning agility quotient and the work readiness of Indonesian graduating Islamic education students to work in the IR4.0 environment; H2: There is a positive relationship between intelligence quotient (Technology literacy, Professional Knowledge and Skills, Critical Thinking, Problem-solving Skills) and Learning agility quotient among Indonesian graduating Islamic education students to work in the IR4.0 environment; H3: Learning agility quotient mediates the relationship between intelligence quotient (Technology literacy, Professional Knowledge and Skills, Critical Thinking, Problem-solving skills) and the readiness of Indonesian graduating Islamic education students to work in the IR4.0 environment.

Method

This study employed a quantitative cross-sectional survey with a causal-predictive approach to examine relationships between intelligence quotient components, Learning Agility Quotient, and Work Readiness among graduating Indonesian Islamic education students. Structural equation modeling (PLS-SEM) was used to test both direct and mediating relationships between constructs. The target population comprised final-year undergraduate students in Indonesian Islamic religious education programs. Using purposive sampling, 187 respondents were initially recruited. After screening for

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[20] Hae Young Woo and Jung Hee Song, "The Factors Affecting the Adversity Quotient of Nurses and Office Workers," *International Journal of Bio-Science and Bio-Technology* 7, no. 5 (2015): 1–10, https://doi.org/10.14257/ijbsbt.2015.7.5.01.

[21] R. J. Popp and J. F. Voss, "Mediation Effects as a Function of Mediator Rall and Meaningfulness.," *Canadian Journal of Psychology* 21, no. 1 (1967): 69–80, https://doi.org/10.1037/h0082961; Richard Popp and James F. Voss, "Mediational Effects as a Function of Stage 3 Mediator Presentation," *Psychonomic Science* 5, no. 4 (1966): 133–34, https://doi.org/10.3758/BF03328317.

[22] Ratno Abidin and Asy'ari, "The Relationship between Adversity Quotient and Early Childhood Cognition," *Jurnal Pendidikan Anak Usia Dini Undiksha* 12, no. 1 (2024): 167–76, https://doi.org/10.23887/paud.v12i1.75827.

age appropriateness (18-25 years), 5 respondents were excluded, resulting in a final sample of 182 participants (96.2% aged 22-25 years; 73.1% female).

Data were collected using a structured questionnaire with 5-point Likert scales measuring six constructs: Critical Thinking (adapted from Facione),[23] Professional Knowledge (modified from Tong & Choy),[24] Problem-solving Skills (based on Heppner & Petersen),[25] Technology Literacy (integrated from Ng),[26] Learning Agility Quotient (adapted from De Meuse et al.),[27] and Work Readiness (modified from Caballero et al.).[28] All instruments underwent expert review and pilot testing for content validity and cultural appropriateness. Data collection occurred January-March 2024 via an online survey platform. Ethical approval was obtained, and all participants provided informed consent. The questionnaire was administered in Bahasa Indonesia using translation and back-translation procedures to ensure conceptual equivalence.

Analysis followed a two-stage approach as recommended by Anderson and Gerbing.[29] First, the measurement model was evaluated to establish construct validity and reliability. Internal consistency reliability was assessed using Composite Reliability (CR > 0.70), calculated as $CR = (\Sigma\lambda i)^2 / [(\Sigma\lambda i)^2 + \Sigma var(\varepsilon i)]$, where λi represents standardized factor loading and $var(\varepsilon i)$ represents error variance. Convergent validity was assessed via Average Variance Extracted (AVE > 0.50), calculated as $AVE = \Sigma\lambda i^2 /$

[23] Peter a. Facione, "Critical Thinking: What It Is and Why It Counts," *Insight Assessment* 1, no. 1 (2011): 1–28, https://www.insightassessment.com/CT-Resources/Teaching-For-and-About-Critical-Thinking/Critical-Thinking-What-It-Is-and-Why-It-Counts/Critical-Thinking-What-It-Is-and-Why-It-Counts-PDF.

[24] Rafael Lara-Alecio et al., "Teachers' Pedagogical and Content Knowledge after Participation in Virtual Professional Development," *International Journal of Virtual and Personal Learning Environments* 11, no. 1 (2021): 64–86, https://doi.org/10.4018/IJVPLE.2021010105.

[25] P. Paul Heppner and Chris H. Petersen, "The Development and Implications of a Personal Problem-Solving Inventory," *Journal of Counseling Psychology* 29, no. 1 (1982): 66–75, https://doi.org/https://doi.org/10.1037/0022-0167.29.1.66.

[26] Wan Ng, "Can We Teach Digital Natives Digital Literacy?," *Computers & Education* 59, no. 3 (2012): 1065–78, https://doi.org/https://doi.org/10.1016/j.compedu.2012.04.016.

[27] Kenneth P De Meuse, "A Meta-Analytic Examination of the Relationship between Learning Agility and General Cognitive Ability," *Journal of Managerial Issues* 35, no. 1 (2023): 2023.

[28] Catherine Lissette Caballero, Arlene Walker, and Matthew Fuller-Tyszkiewicz, "The Work Readiness Scale (WRS): Developing a Measure to Assess Work Readiness in College Graduates," *Journal of Teaching and Learning for Graduate Employability* 2, no. 1 (2011): 41–54, https://doi.org/10.21153/jtlge2011vol2no1art552.

[29] James C. Anderson and David W. Gerbing, "Assumptions and Comparative Strengths of the Two-Step Approach: Comment on Fornell and Yi," *Sociological Methods & Research* 20, no. 3 (1992), https://doi.org/https://doi.org/10.1177/0049124192020003002.

n, where n represents the number of items. Discriminant validity was established using the Heterotrait-Monotrait ratio (HTMT < 0.85) recommended by Henseler et al.[30]

The structural model was assessed using SmartPLS 4.0 software. Path coefficient estimation determined the strength and direction of hypothesized relationships. Significance testing employed bootstrapping with 5,000 resamples. The model's explanatory power was evaluated using the Coefficient of Determination (R^2). Mediation analysis used the product of coefficients approach (ab = a × b), where a represents the path from the independent variable to the mediator, and b represents the path from the mediator to the dependent variable (Preacher & Hayes, 2008). Effect size (f^2) evaluated the substantive impact of predictor constructs. The significance level was set at $p < 0.05$, with additional thresholds at $p < 0.01$ and $p < 0.001$ for stronger significance levels. The structural model assessment examined direct effects (H1-H5) and indirect effects (H6-H9) to evaluate the theoretical framework comprehensively.
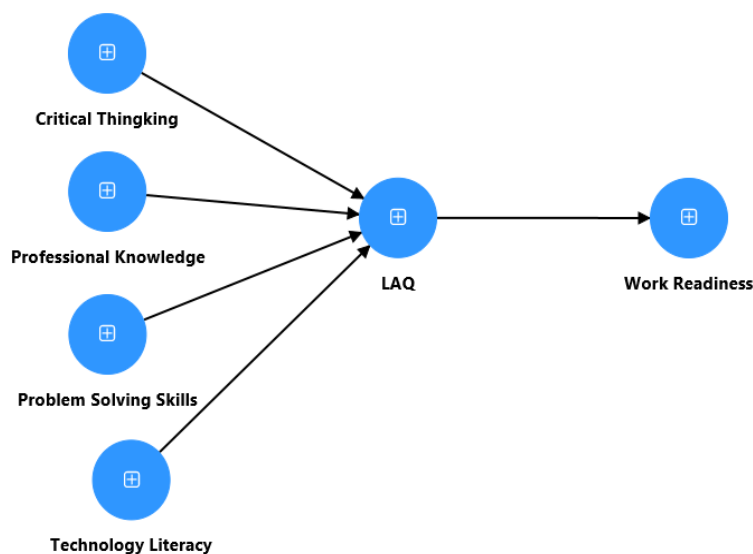

Figure 1. Research Framework.

Results and Discussion

The initial data collection yielded 187 respondents. However, a rigorous screening process was implemented to ensure all participants met the established criteria for undergraduate students. During this verification phase, 5 respondents (2.7%) were identified as being outside the target demographic due to their age exceeding 25 years—

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[30] Jörg Henseler, Christian M. Ringle, and Marko Sarstedt, "A New Criterion for Assessing Discriminant Validity in Variance-Based Structural Equation Modeling," *Journal of the Academy of Marketing Science* 43, no. 1 (2015): 115–35, https://doi.org/10.1007/s11747-014-0403-8.

specifically, 4 respondents (2.1%) in the 30-33 age bracket and 1 respondent (0.5%) above 33 years of age. These participants were subsequently excluded from the study to maintain the sample population's homogeneity and align with the research parameters focused exclusively on undergraduate students.

Table 1. Demographic Profile

Profile	Category	Frequency	Percentage
Age	18-21 years	7	3.8%
	22-25 years	175	96.2%
Gender	Male	49	26.9%
	Female	133	73.1%

The final sample consisted of 182 eligible respondents, primarily distributed across two age categories: 7 respondents (3.8%) aged 18-21 years and 175 respondents (96.2%) aged 22-25 years. This age distribution reflects the typical demographic profile of final-year undergraduate students in Indonesian Islamic higher education institutions, thereby enhancing the ecological validity of the findings. The predominance of respondents in the 22-25 age category (96.2%) provides a robust representation of the target population for examining work readiness in the Industry 4.0 environment.

Regarding gender distribution, the initial sample demonstrated a predominance of female participants, with 133 female respondents (71.1%) compared to 54 male respondents (28.9%). Following the age-based screening process, the gender composition of the final sample (n=182) showed a slight shift in proportions, with 133 female respondents (73.1%) and 49 male respondents (26.9%). This indicates that all five excluded participants were male. The gender imbalance observed in the sample is consistent with current enrollment trends in Indonesian Islamic education programs, where female students typically constitute a larger proportion of the student population. This gender distribution provides valuable insights into the demographic characteristics of prospective graduates entering the workforce in the Industry 4.0 era.

Table 2. *Composite Reliability and Average Variance Extracted Values for Latent Variables*

Variable	Composite reliability (ρc)	Average variance extracted (AVE)
Critical Thingking	0.842	0.638
Professional Knowledge	0.879	0.709
Problem-Solving Skills	0.915	0.844
Technology Literacy	0.858	0.754
Learning Agility Quotient	0.893	0.736
Work Readiness	0.761	0.529

Note. Threshold values: Composite reliability > 0.70; AVE > 0.50.

The measurement model was rigorously evaluated to establish construct validity and reliability before proceeding with hypothesis testing. Construct validity was assessed through convergent validity using Average Variance Extracted (AVE), while internal consistency reliability was examined through Composite Reliability (CR) coefficients.[31] The results presented in Table 2 demonstrate robust psychometric properties across all latent constructs. Composite reliability values ranged from 0.761 to 0.915, substantially exceeding the recommended threshold of 0.70,[32] indicating excellent internal consistency reliability. The highest reliability was observed for Problem-Solving Skills ($\rho c = 0.915$), suggesting powerful item coherence within this construct.

Convergent validity assessment revealed satisfactory results, with all AVE values surpassing the conservative criterion of 0.50 proposed by Fornell and Larcker (1981). The AVE values ranged from 0.529 to 0.844, demonstrating that the latent variables explain more than half of the variance in their respective indicators. Notably, Problem-Solving Skills exhibited the highest convergent validity (AVE = 0.844), indicating that the construct captures approximately 84.4% of the variance in its indicators. While Work Readiness demonstrated the comparatively lowest AVE (0.529), it still meets the established threshold, confirming adequate convergent validity.

Table 3. HTMT Validity

	(1)	(2)	(3)	(4)	(5)
Critical Thinking					
LAQ	0.209				
Problem-Solving Skills	0.746	0.277			
Professional Knowledge	0.408	0.319	0.555		
Technology Literacy	0.412	0.523	0.220	0.328	
Work Readiness	0.543	0.274	0.750	0.548	0.541

Discriminant validity was evaluated using the Heterotrait-Monotrait (HTMT) ratio of correlations, representing a more stringent criterion than traditional methods.[33] Table 3 presents the HTMT values for all construct pairs in the research model. The results demonstrate robust discriminant validity across all constructs, with HTMT ratios

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[31] J F Hair et al., *Multivariate Data Analysis, Multivariate Data Analysis*, *Book*, vol. 87, 2019; Joseph F. Hair et al., *Review of Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook*, *Structural Equation Modeling: A Multidisciplinary Journal*, vol. 30, 2023, https://doi.org/10.1080/10705511.2022.2108813.

[32] Joseph Franklin; Hair et al., "A Primer on Partial Least Squares Structural Equation Modeling," *Sage Publishing* 46, no. 1–2 (2022): 184–85, https://doi.org/10.1016/j.lrp.2013.01.002.

[33] Tamara Schamberger et al., *Robust Partial Least Squares Path Modeling*, *Behaviormetrika*, vol. 47, 2020, https://doi.org/10.1007/s41237-019-00088-2.
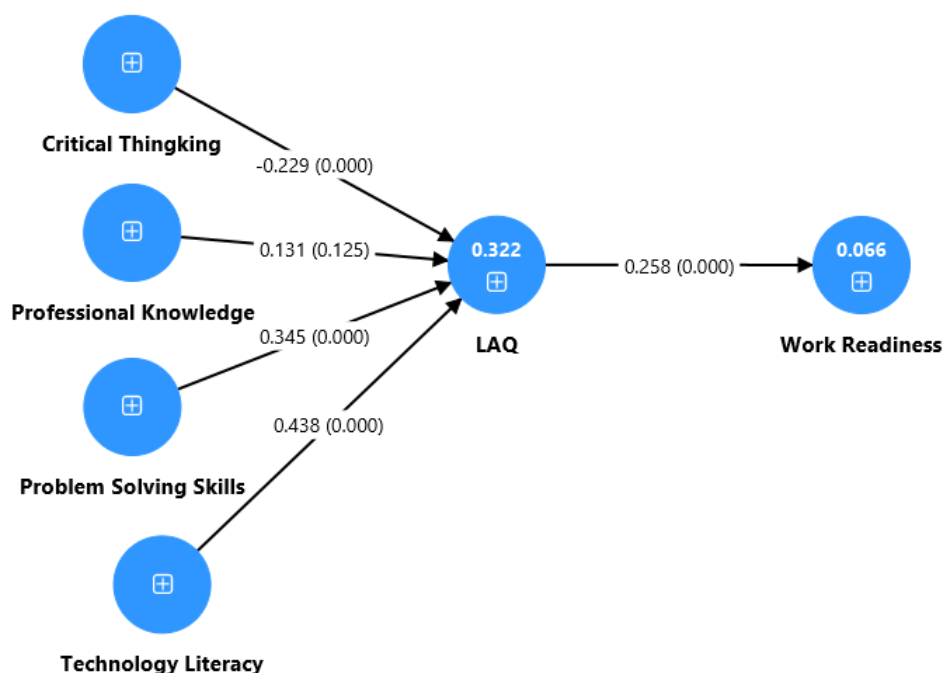
ranging from 0.209 to 0.750, all well below the conservative threshold of 0.85 recommended by Henseler et al. (2015). The lowest HTMT value was observed between Critical Thinking and Learning Agility Quotient (0.209), indicating a clear empirical distinction between these constructs.

The highest HTMT ratio was found between Problem Solving Skills and Work Readiness (0.750), which, while higher than other pairs, remains comfortably below the critical threshold, confirming adequate discriminant validity. The moderate HTMT values between Technology Literacy and Learning Agility Quotient (0.523) and between Work Readiness and both Critical Thinking (0.543) and Technology Literacy (0.541) reflect conceptually anticipated relationships while maintaining sufficient distinctiveness. Similarly, the relationships between Professional Knowledge and Problem-Solving Skills (0.555) and Work Readiness (0.548) demonstrate theoretically consistent associations while preserving construct uniqueness.

Table 4. *Direct and Indirect Effects of Path Model Analysis*

Hypothesis Relationship	Std. Beta	Std. Dev.	t-value	p-value
Direct Effects				
Critical Thinking → LAQ	-0.229	0.062	3.696	< 0.001***
Problem-Solving Skills → LAQ	0.345	0.076	4.514	< 0.001***
Professional Knowledge → LAQ	0.131	0.114	1.149	0.125
Technology Literacy → LAQ	0.438	0.070	6.260	< 0.001***
LAQ → Work Readiness	0.258	0.070	3.705	< 0.001***
Indirect Effects				
Critical Thinking → LAQ → Work Readiness	-0.059	0.019	3.092	0.001**
Problem-Solving Skills → LAQ → Work Readiness	0.089	0.031	2.905	0.002**
Professional Knowledge → LAQ → Work Readiness	0.034	0.039	0.866	0.193
Technology Literacy → LAQ → Work Readiness	0.113	0.030	3.723	< 0.001***

Note. LAQ = Learning Agility Quotient; Std. Beta = Standardized Beta coefficient; Std. Dev. = Standard Deviation *p < 0.05, **p < 0.01, ***p < 0.001

Source: Antara et al.[34]

The hypothesis testing results are presented in Table 4, which delineates both direct and indirect effects in the structural model. Bootstrapping procedures with 5,000 resamples were employed to determine the statistical significance of path coefficients. The analysis of direct effects revealed several significant relationships. Critical Thinking demonstrated a significant negative influence on the Learning Agility Quotient (β = -0.229, t = 3.696, p < 0.001), providing support for H1, albeit in the opposite direction than initially hypothesized. Problem-solving skills substantially positively affected the Learning Agility Quotient (β = 0.345, t = 4.514, p < 0.001), confirming H2. Similarly, Technology Literacy emerged as the strongest predictor of the Learning Agility Quotient (β = 0.438, t = 6.260, p < 0.001), strongly supporting the Hypothesis. The relationship between Professional Knowledge and Learning Agility Quotient (β = 0.131, t = 1.149, p = 0.125) failed to reach statistical significance, thus not supporting H3. Notably, the Learning Agility Quotient significantly influenced Work Readiness (β = 0.258, t = 3.705, p < 0.001), confirming the Hypothesis.

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[34] Antara et al., "The Effect of Learner Autonomy and Institutional Support System on Agile Learners, Independence, and Work Readiness of Students Participating in the Merdeka Belajar Kampus Merdeka Program"; Zubir Azhar et al., "Learning Agility Quotient and Work Readiness of Graduating Accounting Students: Embracing the Dynamics of IR4.0," *Accounting Education* 33, no. 4 (2024): 450–72, https://doi.org/https://doi.org/10.1080/09639284.2023.2211567; Askar Azhenov et al., "Career Decision-Making Readiness among Students' in the System of Higher Education: Career Course Intervention," *Frontiers in Education* 8, no. August (2023): 1–12, https://doi.org/10.3389/feduc.2023.1097993; Irfansyah et al., "Factors That Affect the Quality Of Vocational Education Graduates in the 4.0 Era: Job Readiness, Skills and Digital Services."

The mediation analysis revealed significant indirect effects for three proposed mediating pathways. Learning Agility Quotient significantly mediated the relationship between Critical Thinking and Work Readiness (β = -0.059, t = 3.092, p = 0.001), supporting the Hypothesis. However, the negative coefficient indicates that higher critical thinking skills unexpectedly led to decreased work readiness through the mediating mechanism of learning agility. The indirect effect of Problem-Solving Skills on Work Readiness through Learning Agility Quotient was positive and significant (β = 0.089, t = 2.905, p = 0.002), confirming the Hypothesis. Similarly, Technology Literacy exhibited the most substantial indirect effect on Work Readiness through the Learning Agility Quotient (β = 0.113, t = 3.723, p < 0.001), providing robust support for the Hypothesis. In contrast, the mediating effect of the Learning Agility Quotient on the relationship between Professional Knowledge and Work Readiness was not statistically significant (β = 0.034, t = 0.866, p = 0.193), thus failing to support the Hypothesis. These findings collectively highlight the pivotal role of the Learning Agility Quotient as a mediating mechanism through which specific cognitive and technological capabilities influence work readiness among Indonesian Islamic education graduates in the context of Industry 4.0 while also revealing the unexpected negative relationship between critical thinking and learning agility that warrants further investigation.

Discussion

Relationship Between Learning Agility Quotient and Work Readiness

The empirical findings of this study provide substantial support for H1, confirming that the Learning Agility Quotient (LAQ) positively influences work readiness among Indonesian graduating Islamic education students in the Industry 4.0 environment (β = 0.258, t = 3.705, p < 0.001). This result directly validates our theoretical framework and aligns with contemporary literature, highlighting the critical role of adaptive learning capabilities in preparing graduates for rapidly evolving workplace demands. Vinesian, Suryanto, and Sari posited that learning agility enhances individuals' capacity to learn from diverse experiences and adapt swiftly to new challenges—a crucial competency in the digital transformation era.[35] The moderate effect size observed in our study suggests that while learning agility significantly

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[35] Vinesian, Suryanto, and Sari, "Factors Related To Learning Agility: A Systematic Literature Review."

contributes to work readiness, it operates within a complex network of factors influencing graduate employability.

The significance of this relationship can be interpreted through the lens of Islamic educational philosophy, which emphasizes continuous learning (iqra) and adaptation to changing circumstances while maintaining core values. This finding bridges traditional Islamic educational principles with contemporary workforce requirements, suggesting that the development of learning agility represents a critical intersection between religious, educational paradigms, and modern professional demands. The results extend previous findings by Antara et al.[36] and Irfansyah et al.,[37] who established connections between learning agility and enhanced problem-solving, critical thinking, and digital competencies essential for workplace success.

Intelligence Quotient Components and Learning Agility Quotient

Our study investigated H2 by examining how different components of the intelligence quotient (Technology Literacy, Professional Knowledge, Critical Thinking, and Problem-solving Skills) influence the Learning Agility Quotient, yielding varied results across these dimensions. Technology Literacy emerged as the strongest positive predictor of LAQ ($\beta = 0.438$, $t = 6.260$, $p < 0.001$), consistent with the technological integration imperatives highlighted by Solichah and Zuhroh,[38] who emphasized how effective utilization of educational technology enhances learning outcomes and prepares students for a technology-driven world. This robust relationship underscores the essential role of digital fluency in fostering adaptive learning capabilities within contemporary educational contexts.

Problem-solving skills significantly influenced LAQ ($\beta = 0.345$, $t = 4.514$, $p < 0.001$), aligning with theoretical expectations. This finding resonates with Ab Jalil et al.'s[39] assertion that adaptive skills development is fundamental for meeting emerging workplace demands, particularly in environments where complex problem-solving is increasingly valued. The significant contribution of problem-solving capabilities to learning agility suggests that Islamic education institutions should emphasize practical

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[36] Antara et al., "The Effect of Learner Autonomy and Institutional Support System on Agile Learners, Independence, and Work Readiness of Students Participating in the Merdeka Belajar Kampus Merdeka Program."

[37] Irfansyah et al., "Factors That Affect the Quality Of Vocational Education Graduates in the 4.0 Era: Job Readiness, Skills and Digital Services."

[38] Solichah and Zuhroh, "The Existence of Islamic Institutions Through the Transformation of Education Digitalization at MTs Almaarif 01 Singosari."

[39] Ab Jalil et al., "Predicting Learners' Agility and Readiness for Future Learning Ecosystem."

problem-solving methodologies within their curricula to enhance students' adaptive capacities.

Surprisingly, Critical Thinking exhibited a significant negative relationship with LAQ (β = -0.229, t = 3.696, p < 0.001), contradicting theoretical expectations derived from H2. This unexpected inverse relationship warrants careful interpretation. One possible explanation lies in potential methodological constraints in measuring critical thinking among Islamic education students, whose educational paradigm may emphasize different aspects of analytical reasoning than conventional essential assessments of thinking. Alternatively, as suggested by Shi et al.,[40] certain forms of critical thinking that prioritize rigorous questioning may temporarily inhibit the receptive flexibility required for learning agility, particularly in educational contexts that value tradition and established knowledge structures.

Professional Knowledge failed to demonstrate a significant relationship with LAQ (β = 0.131, t = 1.149, p = 0.125), contradicting expectations derived from H2. This non-significant finding challenges assumptions about how domain-specific knowledge contributes to adaptive learning capabilities. It may indicate that the mere accumulation of professional knowledge without corresponding application skills is insufficient for developing learning agility, which aligns with Karna et al.'s[41] distinction between knowledge possession and knowledge application concerning adaptive capabilities.

Mediating Role of Learning Agility Quotient

The mediating effects analysis partially supported H3, revealing the Learning Agility Quotient's significant role as a mechanism through which certain intelligence quotient components influence work readiness. Technology Literacy exhibited the most substantial indirect effect on Work Readiness through LAQ (β = 0.113, t = 3.723, p < 0.001), reinforcing the pivotal importance of technological competence in IR4.0 workplace preparedness. This finding aligns with Woo and Song's[42] proposition regarding the pathway where intelligence components positively influence LAQ, enhancing employability in emerging technological contexts.

Problem-Solving Skills similarly demonstrated a significant positive indirect effect on Work Readiness through LAQ (β = 0.089, t = 2.905, p = 0.002), confirming

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[40] Shi et al., "Evaluating the Associations between Intelligence Quotient and Multi-Tissue Proteome from the Brain, CSF and Plasma."

[41] Karna et al., "Publisher: Manuscript Central The Effect of Intelligence Quotient and Emotional Quotient on Employee."

[42] Woo and Song, "The Factors Affecting the Adversity Quotient of Nurses and Office Workers."

the theoretical proposition that problem-solving capabilities enhance workplace preparedness by fostering adaptive learning. This finding resonates with R. J. Popp and Voss's[43] early work on adaptive thinking. It extends it to contemporary IR4.0 contexts, highlighting the enduring importance of adaptive problem-solving across technological paradigms.

The adverse indirect effect of Critical Thinking on Work Readiness through LAQ (β = -0.059, t = 3.092, p = 0.001) presents an intriguing challenge to H3. While critical thinking is generally considered beneficial for workplace performance, our findings suggest that when mediated by learning agility, it may inadvertently diminish work readiness. This unexpected result merits contextual interpretation within the Islamic education framework, where certain aspects of critical questioning might conflict with traditional learning approaches emphasizing acceptance of established principles. This tension reflects broader challenges in reconciling traditional Islamic pedagogy with contemporary educational demands, as discussed by Abidin and Asy'ari.[44]

The non-significant mediating effect of LAQ in the relationship between Professional Knowledge and Work Readiness (β = 0.034, t = 0.866, p = 0.193) further nuances our understanding of H3. This finding suggests that professional knowledge may influence work readiness through alternative pathways not captured by learning agility, potentially including direct application of knowledge or social capital development, as indicated by Puspitacandri et al.'s integration of multiple quotients affecting performance.[45]

The results partially support our original theoretical framework while revealing greater complexity in the relationships between intelligence quotient components, learning agility, and work readiness. The differential impacts of Technology Literacy, Problem-solving Skills, Critical Thinking, and Professional Knowledge on LAQ suggest that the intelligence quotient should not be conceptualized as a monolithic construct but as a constellation of distinct cognitive capacities with varying relationships to adaptive learning. The strong positive relationship between Technology Literacy and LAQ, and

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[43] Richard J Popp and James F. Voss, "Mediation Effects as a Function of Mediator Recall and Meaningfulness," *Canadian Journal of Psychology* 21, no. 1 (1967): 69–80, https://doi.org/https://psycnet.apa.org/doi/10.1037/h0082961.

[44] Abidin and Asy'ari, "The Relationship between Adversity Quotient and Early Childhood Cognition."

[45] Puspitacandri et al., "The Effects of Intelligence, Emotional, Spiritual and Adversity Quotient on the Graduates Quality in Surabaya Shipping Polytechnic."

subsequently Work Readiness, aligns with Najafabadi et al.'s[46] findings on the importance of technological fluency for rapid skill acquisition. Similarly, the positive mediation pathway from Problem-solving Skills through LAQ to Work Readiness supports Ab Jalil et al.'s[47] emphasis on adaptive skill development for workplace readiness. The unexpected negative relationship between Critical Thinking and LAQ, and subsequently Work Readiness, suggests limitations in our initial conceptualization of intelligence quotient as uniformly beneficial for learning agility. This finding indicates that specific components of intellectual capabilities may relate differently to adaptive learning, reflecting the complex interplay between analytical reasoning and learning flexibility noted by Mahmood et al.[48]

Conclusion

These findings significantly affect curriculum development in Islamic education institutions, preparing students for IR4.0 workplace environments. Technology literacy and problem-solving skills' substantial influence on learning agility and work readiness underscores the imperative for strengthening these competencies within traditional Islamic educational frameworks. As suggested by our theoretical framework and supported by our empirical findings, focusing on these specific components of intelligence quotient may yield the most significant returns for enhancing graduate employability.

The complex relationship between critical thinking and learning agility indicates a need for reconceptualizing critical thinking pedagogy within Islamic education contexts. Future research should explore whether alternative approaches to developing analytical reasoning might better support learning agility while respecting traditional Islamic educational values, potentially addressing the tension identified by R. Popp and Voss (1966) between analytical and adaptive thinking styles.

The non-significant relationship between professional knowledge and learning agility suggests opportunities for enhancing knowledge application through experiential learning methodologies. Educational approaches that emphasize the practical application of knowledge rather than mere accumulation might strengthen the

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[46] Najafabadi et al., "Intelligence, Beliefs on IQ and Learning Style Predict Academic Performance in Mechanical Engineering Students."

[47] Ab Jalil et al., "Predicting Learners' Agility and Readiness for Future Learning Ecosystem."

[48] Mahmood et al., "Establishing Linkages between Intelligence, Emotional and Spiritual Quotient on Employees Performance in Government Sector of Pakistan."

connection between professional knowledge acquisition and adaptive learning capabilities, as suggested by the work of Azhar et al. (2024) on integrating traditional knowledge with contemporary applications.

Future research should employ mixed-methods approaches to provide deeper insights into the unexpected negative relationship between critical thinking and learning agility, potentially exploring qualitative dimensions of conceptualizing and practicing critical thinking within Islamic education settings. Additionally, longitudinal studies tracking graduates' workplace performance could provide valuable validation of the predictive validity of learning agility for actual workplace success in IR4.0 environments.

This study contributes to the growing body of literature addressing the intersection of Islamic education and contemporary workplace requirements, offering empirical evidence for the essential role of learning agility in mediating the relationship between educational outcomes and work readiness. By identifying specific intelligence quotient components that enhance or potentially hinder learning agility development, this research provides actionable insights for Islamic education institutions seeking to prepare graduates for the complex demands of the Industry 4.0 era while maintaining fidelity to core Islamic educational values.

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