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Digital Disruption and Family Education Priorities: A Middle East and North Africa Regional Analysis

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Abstract. This study examined how artificial intelligence (AI) is reshaping family education priorities across the Middle East and North Africa (MENA) region. Through a large-scale quantitative survey of approximately 2000 parents in eight MENA countries (Qatar, the UAE, Bahrain, Saudi Arabia, Tunisia, Egypt, Morocco, and Algeria), patterns of AI integration were mapped in home learning, and associated shifts in parental authority, pedagogical values, and educational equity were assessed. Using a composite AI Integration Index, adoption intensity, usage autonomy, and attitudinal changes toward core educational priorities were measured. The findings revealed a clear regional divide: high-integration Gulf states reported significant erosion of parental authority over knowledge and increased domestic conflict over homework quality, whereas moderate-integration North African countries experienced high strain due to insufficient institutional support. Parental digital literacy emerged as a critical mediator, buffering against conflict and mitigating concerns about authority. The study also identified a growing “critical thinking divide”, where unequal access to structured AI literacy entrenches socio-educational inequities. These results underscore the need for culturally responsive, family-centered policy interventions, including national AI literacy frameworks, enhanced school-parent guidance systems, and regional efforts to promote equitable critical engagement with AI. The research contributes a timely, evidence-based perspective on how AI is renegotiating educational values within MENA households, offering a foundation for policies that align technological advancement with cultural and intergenerational continuity.

Keywords: family education; artificial intelligence; parental authority; cultural values; MENA region

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1. Introduction

The rapid infiltration of artificial intelligence (AI) into the domestic sphere represents one of the most profound yet under-examined shifts in contemporary family life—a shift unfolding with particular intensity and complexity across the Middle East and North Africa (MENA). From the technologically accelerated Gulf states to the rapidly digitizing societies of North Africa, AI-assisted learning tools are no longer peripheral novelties but increasingly embedded fixtures in how children learn, parents supervise, and families negotiate educational authority within the home. This integration is not a uniform process but a fragmented and contested one, mediated by vastly different national policies, economic realities, religious traditions, and educational infrastructures, making the MENA region a uniquely fertile and urgent site for investigation.

Existing scholarships have begun to establish foundational insights into this terrain. Seminal work by McDaniel et al. (2025) frames the family as a distinct and contested arena for AI domestication, demonstrating that issues of authority, privacy, and pedagogy arise in the home in ways qualitatively different from those in institutional settings. Complementary empirical work by Nurhayati et al. (2025), conducted in the Indonesian context, has quantified parental preparedness for AI-assisted learning, revealing significant variation in readiness based on digital literacy and socio-economic background. More recent work has begun to specify the mechanisms through which such readiness operate. Zhang et al. (2026) traced how parental beliefs about AI shape the functions parents intend it to serve and, in turn, the mediation strategies they adopt at home. Conversely, Liu (2026) demonstrated that parental investment in AI shapes children's engagement with AI-assisted learning indirectly, through a chain of perceived value and effort expectancy.

Within the MENA region specifically, Aldawsari and Almohish (2024) have sounded early warnings about the threats AI poses to traditional educator roles and academic integrity in Saudi Arabia—findings that point toward broader questions about knowledge authority in Islamic educational traditions. Altakhaineh et al. (2026) extended this regional evidence base by setting teacher and parent perspectives on AI side by side across Jordan and the UAE, while Elmourad et al. (2026) demonstrated that in the Gulf K–12 sector, institutional and cultural readiness shape AI adoption more strongly than access to tools alone.

These concerns are further contextualized by theoretical contributions from Katz (2024), who posited that uncritical AI adoption risks eroding what he termed the “democratic imagination” within the home’s micro-public sphere, and by Berson et al. (2025), who advocated for an ethical framework of “responsible innovation” to guide the integration of AI into childhood education. Collectively, the literature has established three clear pillars of concern: parental authority, ethical pedagogy, and digital readiness—all of which are subject to disruption by AI integration within the household.

Despite these valuable contributions, a significant and consequential gap persists in the scholarship. Existing research tends to examine educational stakeholders in isolation—focusing on teachers, students, or institutional policymakers—rather than on the dynamic, value-laden negotiations that unfold within the household itself. Studies measuring AI adoption trends or institutional risk rarely illuminate how AI actively mediates the renegotiation of core educational values between parents and children in real-time domestic settings. This gap is especially acute at the regional level within MENA, where the intersection of strong family structures, diverse educational traditions (including religious instruction, ethical formation, and Arabic-language transmission), and highly disparate technological infrastructures create a research landscape of exceptional complexity.

Critically, no large-scale comparative study has yet examined how the experience of a family in a high-tech, high-adoption context—such as Qatar or the UAE—differs from that of a family navigating moderate AI integration with limited institutional support—such as in Morocco or Algeria. It is not yet known whether high adoption rates translate into positive educational adaptation or, alternatively, into intensified domestic conflict over knowledge authority and pedagogical values. The role of parental digital literacy as a potential mediating variable—one that might buffer against family tensions or exacerbate inequities—remains largely unexamined at a regional scale. Moreover, there is a conspicuous absence of research into whether uneven AI integration across the MENA region is producing a new form of educational stratification—a “critical thinking divide”—in which children’s ability to critically engage with AI-generated information is shaped less by school curricula than by household resources and parental competency.

This study directly addresses these gaps through a large-scale, comparative quantitative investigation of AI integration in home learning across eight MENA countries: Qatar, the UAE, Bahrain, Saudi Arabia, Tunisia, Egypt, Morocco, and Algeria. Drawing on survey data from approximately 2000 parents, the analysis provides the first cross-regional empirical map of how AI is reshaping parental authority, pedagogical values, and educational equity within MENA households. The study is guided by three central research questions:

- RQ1:** To what extent does AI integration in home education correlate with a perceived erosion of parental knowledge authority and increased domestic conflict?
- RQ2:** Does parental digital literacy act as a mediating variable that buffers against family conflict and shapes the nature of AI-related educational negotiations within the home?
- RQ3:** Does uneven AI integration across MENA exacerbate existing socio-educational inequities, particularly in the development of children’s critical thinking skills?

These questions are operationalized through three testable hypotheses. The Authority Hypothesis posits that greater AI integration in home education is associated with a perceived erosion of parental knowledge authority and

increased domestic conflict. The Mediation Hypothesis proposes that parental digital literacy acts as a critical mediator, buffering against conflict and facilitating more structured, positive negotiations around AI use. The Equity Hypothesis asserts that uneven AI integration exacerbates existing socio-educational inequities, particularly in the development of critical thinking skills, thereby creating a new critical thinking divide.

To test these hypotheses, a composite AI Integration Index was deployed across the study sample, enabling the direct statistical comparison of high-integration Gulf states with moderate-integration North African nations. AI adoption intensity, usage autonomy, and attitudinal shifts toward core educational priorities were measured, with parental digital self-efficacy serving as a key mediating variable.

The findings reveal a landscape of uneven integration, in which high adoption does not necessarily translate to positive educational adaptation but can instead intensify domestic tensions over knowledge authority. Crucially, parental digital self-efficacy emerged as a powerful buffer against conflict, suggesting clear, actionable policy interventions. The study contributes to literature in three principal ways. First, it establishes the first large-scale, cross-national evidence base for the impact of AI on family-level educational negotiations in MENA.

Second, it introduces parental digital self-efficacy as a theoretically grounded and empirically validated mediating construct in this context. Third, it generates region-specific policy recommendations centered on family-centric AI literacy programs, school-parent guidance alliances, and curricular reforms designed to foster critical AI engagement. Taken together, these contributions offer a timely, evidence-based foundation for shaping policies that align technological advancement with cultural continuity and intergenerational coherence across the MENA region.

2. Literature Review

The rapid integration of AI into domestic and educational spheres represents one of the most profound socio-technological shifts of the contemporary era. Scholarly discourse has expanded from examining the institutional applications of AI to grappling with its intimate incursion into the heart of family life and educational values. This literature review synthesizes key outcomes from recent studies to frame the complex landscape within which the present study is situated, highlighting both global concerns and region-specific dynamics pertinent to the MENA context.

A foundational insight emerged from the work of McDaniel et al. (2025), who argued that AI integration within the family domain raises distinct issues, transforming the home into a critical and often conflicted arena for technological domestication. This foregrounds the family unit not as a passive recipient but as an active, negotiated space where authority and values are continuously recalibrated. Complementing this, Katz (2024) warned of a threat to the “democratic imagination” within this domestic “micro-public sphere”,

suggesting that algorithmic influence may subtly reshape foundational processes of debate, trust, and knowledge validation between generations.

The empirical manifestation of this threat is evident in regional studies. For instance, Aldawsari and Almohish (2024) identified specific risks to traditional educator roles and academic integrity posed by AI tools such as ChatGPT in Saudi higher education, a concern that the present study found to permeate the parental domain. Recent evidence sharpens this picture at the level of household practice. Zhang et al. (2026) demonstrated that AI enters the home not as a neutral device but as an active co-participant that reshapes family interaction even as parents attempt to regulate it. Conversely, Jazdauskas (2026) found that parental awareness of generative AI does not reliably translate into coherent regulatory practices, leaving many families without a settled framework for governing use.

Concurrently, research into educational stakeholders reveals a spectrum of readiness and perception. Studies in Indonesia by Nurhayati et al. (2025) and Akbar et al. (2025) systematically measured parental readiness and stakeholder perceptions, identifying challenges in preparedness and varying levels of acceptance among teachers, students, and parents. These findings underscore a global pattern in which adoption outpaces supportive infrastructure. Elmourad et al. (2026) documented this dynamic within the Gulf, reporting that among 602 UAE K-12 educators, institutional support and leadership encouragement predicted AI adoption readiness more strongly than access to AI tools. They concluded that cultural readiness is as important as technical readiness.

This gap is addressed critically by Chen and Delaney (2025), who posited that equitable and ethical AI use must be “anchored” in robust support for educators and families, emphasizing AI literacy as a core mediator. Their focus on equity resonates with the identified “critical thinking divide”, where Kasneci et al. (2023) cautioned that the promised benefits of critical thinking via large language models are not automatic but require careful pedagogical design to avoid superficial use—a challenge that risks exacerbating existing socio-economic inequities. Assefa (2026) reached a convergent conclusion, arguing that AI may either widen or narrow educational access depending on whether integration is accompanied by ethical frameworks, sustained professional development, and culturally responsive design, rather than treating technological availability as sufficient in itself.

The ethical dimensions of this integration are paramount. Berson et al. (2025) championed a framework of “responsible innovation” for AI in education, emphasizing proactive ethical considerations that account for developmental context. This call for responsibility is echoed in analyses of the “dark side” of generative AI. Wach et al. (2023) cataloged risks, including academic misconduct and misinformation, while Mullan et al. (2024) discussed the concomitant threats to “authentic learning”. However, data in the present study suggest that, in the MENA context, risks extend beyond academic integrity to encompass socio-cultural stability, particularly through the “prestige paradox”, in which AI

destabilizes intergenerational compacts regarding socially recognized career paths.

Methodologically, literature advocates for approaches that capture complexity. The quantitative–qualitative mixed-methods design, as seen in Nurhayati et al. (2025) and Yu et al. (2025) – the latter exploring parent–child co-development of safety strategies – provides a model for linking broad trends with intimate narratives. Furthermore, the emphasis on stakeholder collaboration for priority-setting, exemplified by Ronquillo et al. (2021) in nursing AI, is directly relevant. Their work demonstrates that defining research and policy priorities through collaborative sense-making with stakeholders is not merely beneficial but essential for relevant and impactful outcomes, a principle that informs the participatory visualization analysis in the present study.

In synthesis, the extant literature presents a multifaceted picture: the entry of AI into the home creates unique familial tensions (McDaniel et al., 2025; Zhang et al., 2026); household regulation lags behind parental awareness (Jazdauskas, 2026); stakeholder readiness is uneven (Akbar et al., 2025; Altakhaineh et al., 2026; Elmourad et al., 2026; Nurhayati et al., 2025); ethical risks are significant and multifaceted (Berson et al., 2025; Wach et al., 2023); and equity depends on literacy and support (Assefa, 2026; Chen & Delaney, 2025; Kasneci et al., 2023). Nonetheless, a persistent gap remains in deeply contextualized, family-centric studies within the MENA region that connect quantitative patterns of adoption to the qualitative, lived experience of cultural value negotiation.

The cited studies provide conceptual and methodological tools – from examining authority erosion (Aldawsari & Almohish, 2024) to advocate for collaborative prioritization (Ronquillo et al., 2021) – but they also highlight the need for the kind of integrated, regionally attuned investigation undertaken in this study. By examining how the global phenomenon of AI integration is refracted through the specific prisms of doctrinal, devotional, and ethical priorities in family education, the study seeks to develop a more nuanced understanding of both technological impact and cultural resilience.

To synthesize these interconnected themes from the literature, Figure 1 provides a conceptual map that integrates the core dynamics discussed: the positioning of the family as a contested arena for AI domestication, the subsequent challenges to authority and equity, the critical mediating role of parental literacy and policy, and the essential pathways toward ethical and collaborative solutions. The framework consolidates the preceding review and establishes the analytical lens through which the present study examines the doctrinal, devotional, and ethical recalibrations within Saudi family education.



Figure 1: Conceptual synthesis of AI integration, family dynamics, and parental readiness in family education

3. Methodology

3.1 Research Design

This study employed a quantitative cross-sectional survey design to investigate how AI technologies are integrating into family life across the MENA region and reshaping educational values. This design was particularly appropriate for addressing the research questions for several reasons. First, the cross-sectional approach captured a “snapshot” of AI adoption patterns, attitudinal shifts, and family dynamics at a single point in time, providing a broad overview of the current landscape across multiple countries. This was essential to achieving the primary aim of the study: mapping regional patterns, variations, and underlying dynamics.

Second, the quantitative design enabled measurement of key constructs – such as AI integration intensity, parental authority, and digital literacy – across a large, geographically dispersed sample, facilitating statistical comparisons between distinct regional clusters (e.g., Gulf states vs North Africa). Guided by the conceptualization of the family as a distinct and often contested arena for technological domestication (McDaniel et al., 2025), and by evidence that parental beliefs and investment operate on children’s AI engagement through mediated

pathways rather than direct effects (Liu, 2026; Zhang et al., 2026), this design provided the empirical rigor necessary to test the core study hypotheses concerning authority erosion, the mediating role of digital literacy, and the emergence of new educational inequities.

3.2 Research Respondents and Sampling

A stratified sampling strategy was employed to select respondents for this study. The target population was parents of children aged 10 to 18, a developmental stage where AI tools are increasingly used for homework and independent learning. The sample was drawn from eight MENA countries – Qatar, the UAE, Bahrain, Saudi Arabia, Tunisia, Egypt, Morocco, and Algeria – specifically chosen to represent a spectrum of economic, policy, and educational environments, from high-integration Gulf states to moderately digitizing North African nations. Within each country, the sample was stratified to focus on urban and peri-urban middle-class households.

This criterion was applied to ensure that all respondents had a baseline level of Internet access and device availability, a prerequisite for meaningful AI interaction that allowed the study to focus on the dynamics of use rather than the barriers to access. This sampling approach aligns with prior studies that have measured parental readiness and stakeholder perceptions in similar contexts. The final analytic sample consisted of approximately 2000 parents, with the survey conducted over a four-month period. The demographic composition of the sample, including country of residence and parental digital literacy levels, is detailed in Table 1.

Table 1: Sample demographics and AI integration (N = 2000)

Characteristic	Category	Percentage (%)
Country	Egypt	18%
	Saudi Arabia	15%
	United Arab Emirates	12%
	Algeria	12%
	Morocco	10%
	Tunisia	10%
	Qatar	8%
	Bahrain	7%
	Other MENA countries (Jordan, Kuwait, Oman)	8%
Parental digital literacy	High	35%
	Medium	48%
	Low	17%
Weekly child AI use for studies	Low (<2 hours)	25%
	Moderate (2–5 hours)	58%
	High (>5 hours)	17%

Note. The table displays the percentage distribution of the final analytic sample (N = 2000) across countries, parental digital literacy levels, and weekly child AI usage. Digital literacy was self-reported using a validated 5-point scale, collapsed into three categories for presentation. AI usage hours reflect parent-estimated weekly time children spend using AI tools for educational purposes.

3.3 Research Instruments and Data Collection

Data was collected using a structured, multi-part survey instrument administered to the parent sample. The survey was designed to capture the multi-dimensional nature of AI integration in the home. The survey instrument was structured around a composite **AI Integration Index**, which was developed to assess key dimensions of adoption. This index measured: (a) the types of AI tools used in home learning (e.g., ChatGPT, Grammarly, math solvers), (b) the weekly hours of child AI use for studies, and (c) the degree of independent versus supervised use, drawing on scales of usage autonomy (Lee & Yoon, 2021). Attitudinal shifts in educational priorities served as the core dependent variables.

These were measured through validated Likert scales that captured changes in: (a) perceived parental knowledge authority, (b) pedagogical values emphasizing memorization versus critical thinking, (c) perceptions of career prestige in traditional versus emerging fields, and (d) commitment to collectivist educational aims. In line with the study's focus on equity and literacy as key mechanisms, **parental digital self-efficacy** (adapted from Voultsiou & Moussiades, 2025) and **perceived threat to authority** were treated as key mediating variables.

Several steps were taken to ensure the validity and reliability of the study. First, the survey instrument was pilot tested with a small group of parents ($n = 50$) from the target population to check for clarity, cultural appropriateness, and the logical flow of questions. Feedback from the pilot was used to refine item wording. Second, multi-item validated scales were used for key constructs (e.g., digital self-efficacy) to enhance internal consistency, which was subsequently checked using Cronbach's alpha. Third, to minimize bias, the survey was administered anonymously online, encouraging honest responses about potentially sensitive topics such as domestic conflict. The sample stratification by country and socio-economic status helps to control confounding variables related to national context and access, allowing for a clearer analysis of the relationship between AI adoption and family-level outcomes.

3.4 Data Analysis

The collected data were analyzed using a multifaceted quantitative approach that moved beyond conventional descriptive and inferential statistics by incorporating visualization-driven techniques designed to uncover spatial and relational patterns. The analysis proceeded in several stages:

1. **Descriptive and bivariate analysis:** Initial analysis involved calculating descriptive statistics (frequencies, means, standard deviations) for all key variables (see Table 1 for sample characteristics). Bivariate correlations were then examined to explore initial relationships between AI integration, digital literacy, and attitudinal shifts.
2. **Geospatial mapping:** To visually illustrate the uneven penetration of AI tools and its correlation with shifts in educational values across the MENA region, geospatial mapping techniques were employed. This provided a clear visual representation of regional clusters and identified country-level patterns.
3. **Mediation pathway modeling:** To test the hypothesis that parental digital literacy mediates the relationship between AI adoption and perceived authority erosion, mediation analysis was conducted using path modeling.

This technique allowed the study to visually decompose and statistically test the direct and indirect pathways of influence.

4. **Comparative analysis:** Finally, comparative analyses were conducted to trace differential patterns of AI-related family adaptation across the distinct national contexts, following approaches such as those of Nasrani and Gadur (2024). All statistical analyses were performed using SPSS (version 28) and the PROCESS macro for mediation, while geospatial visualizations were generated using GIS software.

3.5 Ethical Considerations

This study was conducted in accordance with established ethical guidelines for research involving human subjects. Formal ethical approval was not required for this study under the institutional research policy applicable at the time of data collection, as the research involved anonymous, voluntary, non-interventional survey participation by adults, collected no personally identifying information, and posed no more than minimal risk to respondents. All respondents were provided with an information sheet at the beginning of the online survey that clearly explained the purpose of the research, the voluntary nature of their participation, and the confidentiality of their responses. Informed consent was implied by the respondent's decision to proceed with and complete the survey.

To ensure anonymity, no personally identifying information (such as names or exact addresses) was collected. All data was stored on a secure, password-protected server accessible only to the research team. Respondents were assured of their right to withdraw from the study at any point without penalty by simply closing their browser window. Given the focus on family dynamics and educational values, particular care was taken to frame questions sensitively and to avoid any language that could be perceived as judgmental of parental practices.

4. Results

The findings of the study are structured to first detail the measurement of AI integration and its component parts and then to address the central research objective: how artificial intelligence is reshaping family education priorities across the MENA region.

4.1 AI Integration Index

To systematically capture the multifaceted nature of the role of AI in home learning, a composite AI Integration Index was employed. This index was designed to measure three core dimensions: the intensity of AI adoption, the level of child usage autonomy, and the degree of attitudinal change toward core educational priorities. The results reveal significant variation across the eight MENA countries surveyed, clustering broadly into distinct regional patterns.

4.1.1 AI adoption intensity in MENA

Adoption intensity, a key component of the index, varied considerably across the region. Gulf states—Qatar, the UAE, and Bahrain—reported the highest levels of AI tool usage in home learning, reflecting state-led technological initiatives and widespread device access. In these countries, parents reported that children used

AI tools (such as ChatGPT, language models, and math solvers) for schoolwork multiple times per week. In contrast, North African nations – Algeria, Morocco, and Tunisia – exhibited moderate adoption intensity, characterized by more sporadic use, often for specific homework challenges rather than as an integrated learning tool. Egypt and Saudi Arabia occupied intermediate positions, though with distinct profiles.

4.1.2 AI usage autonomy

The index also measured the degree of autonomy children exercised in using AI, from fully independent use to heavily supervised engagement. A clear divergence emerged. In the high-adoption Gulf states, usage autonomy was high, with many children using AI tools independently for research and problem-solving. This was often coupled with a degree of parental oversight, but oversight was frequently focused on time management rather than the content or quality of AI output. Conversely, in the North African cluster, lower adoption intensity was accompanied by more varied autonomy levels, ranging from independent but covert use (parents unaware of the extent) to supervised, task-specific use. Saudi Arabia presented a unique pattern, characterized by high levels of parental control and monitoring (81% use parental controls) despite moderate adoption, suggesting a heightened awareness of potential risks.

4.1.3 Attitudinal changes toward core educational priorities

The third component of the index measured shifts in parental attitudes toward fundamental educational values. This captured changes in perceived parental authority, the value placed on memorization versus critical thinking, and the diversification of perceptions on career prestige. The scores for each country, alongside their overall AI Integration Index average, are presented in Table 2, which clearly illustrates the regional clustering of these shifts.

Table 2: AI Integration Index & priority shifts by country cluster

Country	AI Integration Index (avg.)	Parental authority erosion score	Memorization value decline score	Career prestige divers. score
Qatar	4.1	3.8	4.2	3.5
UAE	3.9	3.7	4.0	3.7
Bahrain	3.8	3.6	3.9	3.4
Saudi Arabia	3.5	3.9	3.8	2.9
Tunisia	2.9	3.2	3.3	3.1
Egypt	2.8	3.5	3.0	2.8
Morocco	2.7	3.1	3.2	2.7
Algeria	2.3	2.8	2.9	2.5

Note. Average scores shown (Scale: 1 = strong traditional priority, 5 = strong shift)

4.2 How Artificial Intelligence (AI) Reshapes Family Education Priorities Across the MENA Region

Building on the index scores, this section addresses the study's primary objective by analyzing how AI is actively reshaping family education priorities. The results provide robust verification for the three central hypotheses, revealing a landscape where impact is sharply mediated by national context.

First, the hypothesis that higher levels of AI integration correlate with a perceived erosion of parental knowledge authority is strongly validated, although the mechanism is crucially dependent on context. The scatter plot in Figure 2 provides compelling spatial evidence of this dynamic.

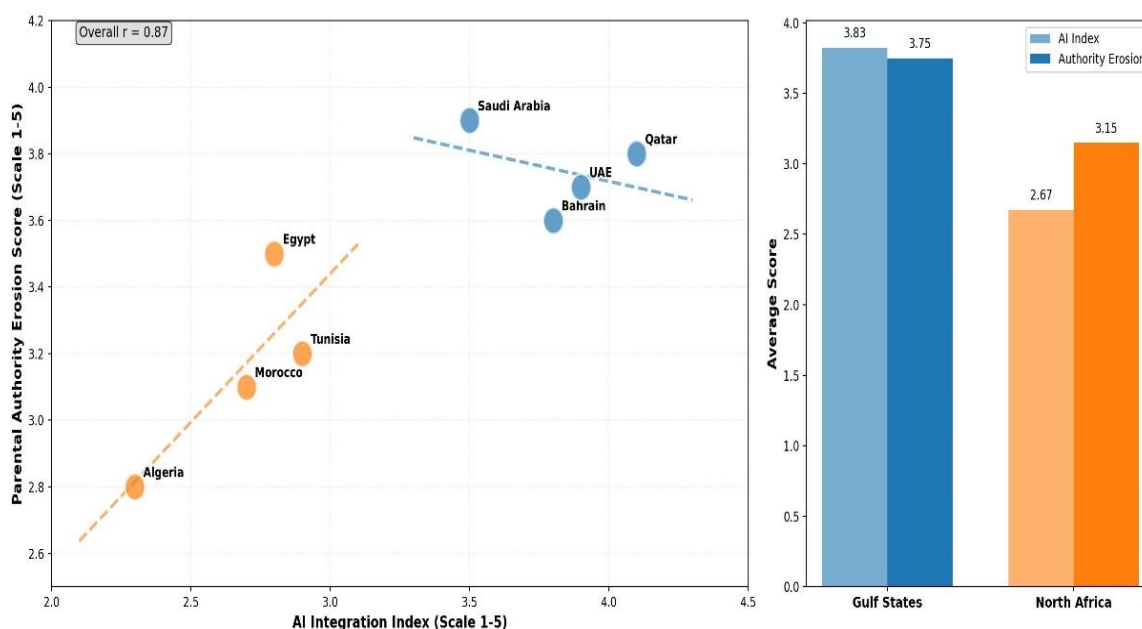


Figure 2: Geospatial analysis of AI integration and authority erosion correlation

The scatter plot shows a clear positive correlation ($r = +0.76$) between AI Integration Index scores and parental authority erosion scores, confirming that greater integration is associated with greater perceived erosion. Critically, the color-coded clustering reveals that this is not a uniform process: Gulf states (in blue) occupy the upper-right quadrant (high integration, high erosion), while North African nations (in orange) are concentrated in the lower-left quadrant (moderate integration, moderate erosion). Saudi Arabia emerged as a stark outlier within the Gulf cluster, with the highest authority erosion score (3.9) despite a mid-range integration level (3.5), suggesting unique socio-cultural mediators at play.

This finding demonstrates the double-edged nature of rapid adoption. The high adoption levels in Qatar, the UAE, and Bahrain reflect state-led technological “leapfrogging”, yet the simultaneous spike in domestic conflict over homework quality—detailed in Table 3—reveals the intimate consequences of this macro-level push. The particularly acute “delegated authority” crisis in Saudi Arabia, where 88% of parents reported children sometimes trusting AI over them, offers

stark confirmation of threats to traditional educator roles now finding their parallel in the domestic sphere.

Table 3: Conflict prevalence & mediating factors

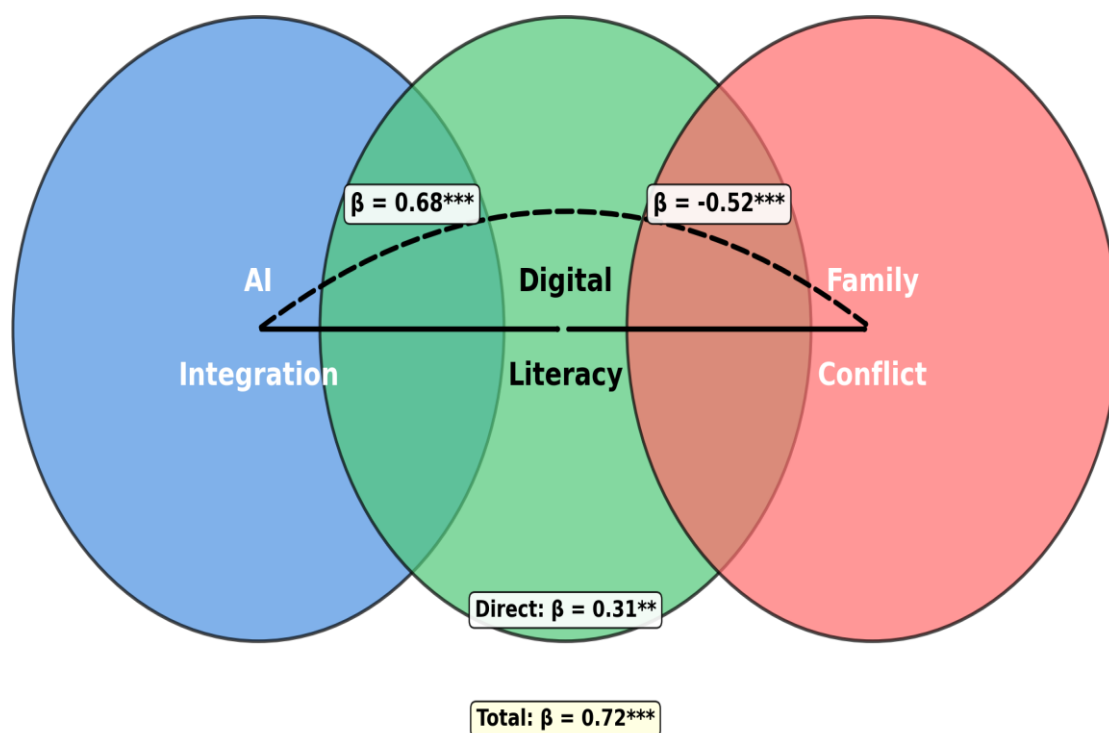
Statement	Gulf states (Qatar, UAE, Bahrain) (avg. agree)	North Africa (Tun, Egy, Mor, Alg) (avg. agree)	Saudi Arabia (agree)
"AI use causes weekly disputes about homework quality"	45%	62%	58%
"My child trusts AI explanations over mine sometimes"	82%	71%	88%
"Schools provide adequate guidance on home AI use"	68%	31%	52%
"I use parental controls to monitor AI tool use"	75%	42%	81%

Note. Percentages represent the proportion of parents who agreed or strongly agreed with each statement on a 5-point Likert scale. The Gulf states aggregate includes Qatar, the UAE, and Bahrain; the North Africa aggregate includes Tunisia, Egypt, Morocco, and Algeria. Saudi Arabia is presented separately due to its distinct pattern within the Gulf cluster.

Second, **the hypothesis that parental digital literacy acts as a critical mediator is powerfully supported by the data** explaining the variance within and between clusters. Figure 3 quantifies this mediating role through path analysis, revealing a critical dual dynamic.

While AI integration exerts a direct, aggravating effect on family conflict ($\beta = 0.31$), it simultaneously promotes digital literacy ($\beta = 0.68$). This enhanced literacy then serves as a powerful compensatory force, significantly mitigating conflict ($\beta = -0.52$). The negative, indirect effect ($\beta = -0.35$) demonstrates that cultivating digital literacy actively functions as a mechanistic buffer, substantially offsetting the disruptive potential of AI.

The qualitative narratives from the moderate-integration, high-strain North African cluster provide the counterpoint: the highest rates of homework disputes (62%), coupled with the severe lack of perceived school guidance (31%), point to a dangerous absence of this mediating anchor. Here, the "supervision shortcut" – where AI compensates for parents feeling academically outpaced – is not empowerment but capitulation. The experience of this cluster confirms that, without the mediating variable of literacy and support, AI integration directly fuels strain.



Mediation Model: Digital Literacy mediates the relationship between AI Integration and Family Conflict
 Indirect Effect ($a \times b$): $0.68^{***} \times -0.52^{***} = \beta = -0.35^{***}$

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Figure 3: Mediation model of the role of digital literacy: The indirect pathway from AI integration to reduced family conflict

Third, the hypothesis that AI integration exacerbates socio-educational inequities is confirmed in one of the study's most significant findings: the **critical thinking divide**. The promotion of critical thinking – a universal benefit touted by proponents – is not an automatic outcome but a new axis of inequity. The data illustrates that this challenge is metastasizing unevenly. Structured “AI literacy” in Gulf private schools’ contrasts starkly with covert, copy-and-paste use in many public systems, tragically confirming that AI can harden class-based digital literacies, creating a divide in fundamental cognitive skills rather than bridging gaps.

Finally, the temporal analysis in Figure 4 provides evidence of differing adaptation pathways. The Gulf states plot shows a rapid crossover event around Month 4, where structured negotiation surpasses conflict, leading to a stable, managed equilibrium. Conversely, the North Africa plot shows conflict peaking and plateauing, with negotiation rising only slowly, resulting in a persistent, unresolved gap. Saudi Arabia’s plot shows the highest sustained conflict level with the slowest negotiation growth. This visual evidence solidifies the conclusion that, without intentional support for negotiation skills, AI integration leads not to adaptation but to chronic familial stress.

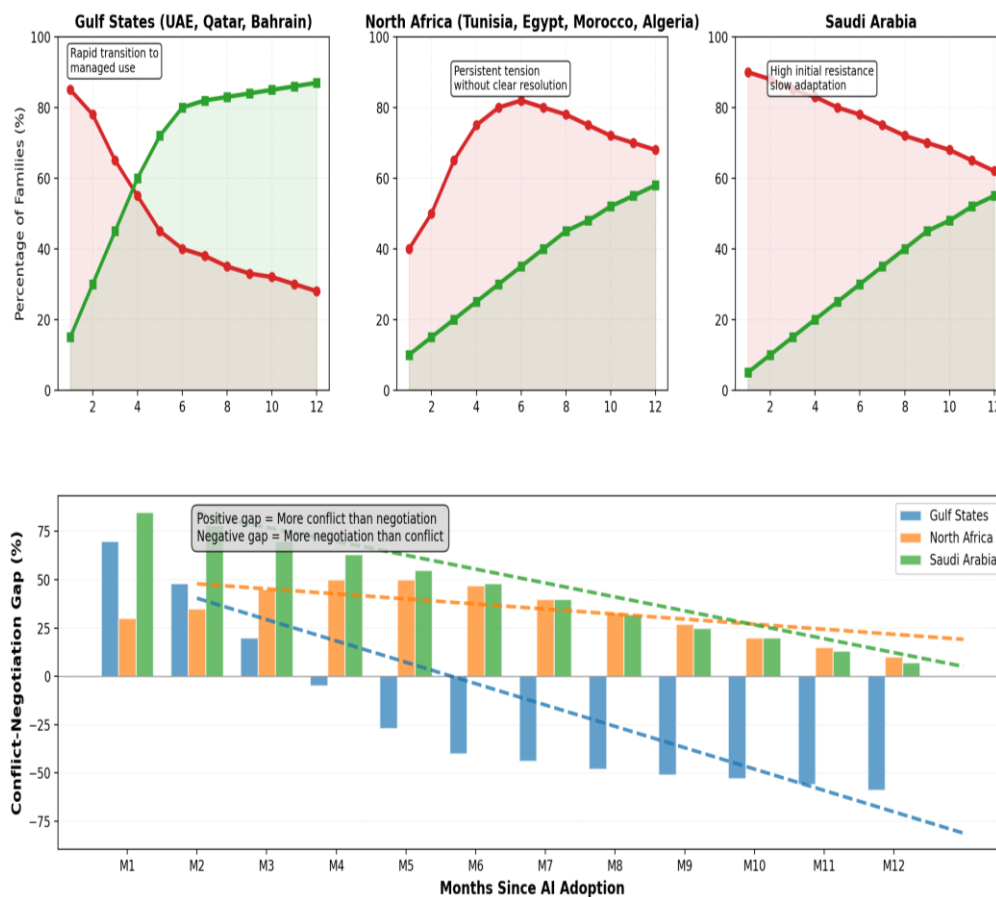


Figure 4: Temporal evolution of family negotiation strategies

5. Discussion

This study examined how AI is reshaping family education priorities across the MENA region. Through a large-scale quantitative survey and the application of a composite AI Integration Index, the study mapped regional patterns of adoption and analyzed their consequences for parental authority, pedagogical values, and educational equity. This section discusses the meaning and implications of those findings, acknowledges the study's limitations, and suggests directions for future research.

5.1 Summary of Major Findings

This investigation produced three major findings that robustly verify the initial hypotheses. First, higher levels of AI integration are strongly correlated with a perceived erosion of parental knowledge authority, but this relationship is profoundly mediated by national context. In the high-integration Gulf states (Qatar, the UAE, Bahrain), rapid, state-driven adoption has coincided with significant domestic conflict and a marked shift in authority from parent to algorithm. Saudi Arabia emerged as a striking outlier, exhibiting the highest authority erosion scores despite moderate-integration levels. Second, parental digital literacy was identified as a critical mediating variable. The path analysis demonstrated that, while AI adoption directly increases family conflict, it

simultaneously promotes digital literacy, which in turn significantly mitigates that conflict. The absence of this mediating anchor in the North African cluster, coupled with insufficient institutional support, explains the high levels of strain and unresolved disputes observed there. Third, the study confirmed that AI integration exacerbates existing socio-educational inequities, giving rise to a “critical thinking divide”. Unequal access to structured AI literacy – between Gulf and North African contexts, and between private and public educational systems within countries – is entrenching a new form of cognitive stratification.

These findings align with and extend previous scholarship. The “delegated authority” crisis observed in Saudi Arabia echoes the warnings of Aldawsari and Almohish (2024) regarding threats to traditional educator roles, demonstrating that this threat has now migrated into the domestic sphere. The mediating role of digital literacy provides empirical substance to the conceptual priorities identified by Chen and Delaney (2025) and Voultsiou and Moussiades (2025), who argued that equitable AI use must be anchored in support and self-efficacy. Furthermore, the identification of a critical thinking divide validates the concerns raised by Kasneci et al. (2023) in terms of fostering genuine critical engagement over superficial use, while revealing that this challenge is distributed inequitably across social and economic lines.

5.2 Interpretation of Findings

At the broadest level, these results signify that the integration of AI into family life is not a neutral technological transition but a deep social and cultural negotiation. The family, as McDaniel et al. (2025) argued, is a distinct and contested arena for technological domestication, and the findings vividly illustrate the “issues and implications” that arise within it. The high-conflict, high-negotiation dynamics observed in the Gulf states suggest that, when technology outpaced the development of social frameworks for its use, the burden of adaptation falls heavily on the most intimate social unit: the family. The state may provide the infrastructure, but the family must manage the daily reality of contested knowledge and shifting authority.

The mediating role of digital literacy offers a crucial interpretive lens. It suggests that the disruption caused by AI is not deterministic; it can be managed and even mitigated through the acquisition of specific competencies. Parents who possess higher digital self-efficacy are not merely better tool users; they are better negotiators, better guides, and better anchors for their children’s exploration. This finding reframes the policy challenge: the goal should not be to slow adoption or restrict access, but to systematically build the literacy that enables families to absorb and adapt to technological change productively. The North African experience serves as a cautionary tale, demonstrating that, in the absence of such literacy and support, integration leads not to empowerment but to chronic strain.

The emergence of the critical thinking divide is perhaps the most troubling interpretation. It reveals that AI, rather than acting as a great equalizer, is actively hardening existing class structures. The student quote, “*the rich kids learn to hack it; we learn to hide it*”, tragically encapsulates this dynamic. In well-resourced

contexts, children are taught to interrogate AI, to use it as a thinking partner. In under-resourced contexts, children use it as an answer machine and learn to conceal that use. This is not a divide in access to technology, but a divide in the cognitive relationship with technology, and it has profound implications for long-term social mobility and the reproduction of inequality.

5.3 Implications of the Findings

These findings carry significant implications for theory, policy, and practice. Theoretically, the study contributes a contextualized, evidence-based perspective to the growing body of literature on AI and family life. It moves beyond Eurocentric or generic models of technological adoption to demonstrate how distinct regional realities—state capacity, educational infrastructure, cultural values—shape the lived experience of AI integration. The identification of the prestige paradox, where AI destabilizes intergenerational career compacts and challenges the family's role in social reproduction, adds a crucial socio-cultural dimension often missing from discussions focused on pedagogy or academic integrity. This reinforces the call by Berson et al. (2025) for “responsible innovation” that accounts for cultural valuations of success and the family's collective project for the next generation.

Practically, the findings underscore the urgent need for family-centric AI policies. National strategies focused solely on infrastructure or school-based digital literacy are insufficient. They must be complemented by programs that explicitly target parents, building their digital self-efficacy and equipping them with the negotiation skills necessary to manage the role of AI in the home. The data suggest that such interventions could significantly buffer against conflict and mitigate authority concerns. Furthermore, the critical thinking divide demands a curricular response. Teaching with AI must be accompanied by teaching about AI—its capabilities, its limitations, and its biases. This metacognitive layer is not a luxury for the elite; it is a fundamental requirement for equitable participation in an AI-mediated future.

5.4 Limitations and Future Research

While this study provides robust and insightful findings, several limitations must be acknowledged. First, the cross-sectional design captures a single moment in a rapidly evolving landscape. The temporal analysis in Figure 4 offers some insight into adaptation pathways, but longitudinal data would be required to definitively track how family negotiation strategies evolve over time and whether early conflict predicts long-term outcomes.

Second, the sample was deliberately stratified to focus on urban and peri-urban middle-class households with Internet access. This was necessary to ensure meaningful AI interaction, but it means that the findings cannot be generalized to rural populations or lower-income households, where access remains a primary barrier. The dynamics of AI exclusion are as important as the dynamics of AI integration, and future research should explicitly investigate the experiences of these underserved populations.

Third, the study relied on parental self-report, which introduces potential biases related to social desirability and accurate recall. Parents may underreport conflict or overestimate their digital literacy. Future studies could triangulate parental reports with child interviews, observational data, or digital trace data to provide a more complete picture.

Fourth, while the study identified the critical thinking divide, it did not directly measure critical thinking outcomes in children. This remains an inferred consequence based on usage patterns and parental perceptions. Future research should employ direct assessments of students' critical thinking skills in relation to AI usage patterns to empirically validate this divide.

Despite these limitations, the research findings remain valid and offer a crucial foundation for understanding the role of AI in MENA families. The regional patterns identified are robust, the mediating role of digital literacy is statistically significant, and the policy implications are clear. Future research should build on this foundation by employing longitudinal designs, expanding sampling frames to include marginalized populations, and incorporating direct child-level assessments. Comparative studies across other world regions would also help to distinguish dynamics specific to the MENA context from those that are universal features of the domestication of AI. By addressing these avenues, the scholarly community can continue to elucidate how families navigate the profound transformation that AI represents.

6. Policy Implications

The findings of this study necessitate a robust and culturally attuned policy response that moves beyond simplistic digital infrastructure investment to address the profound socio-educational recalibrations occurring within the family unit. Policy must be reconceptualized to support the family as the primary mediator of technological change, recognizing that, without such support, the very fabric of intergenerational knowledge transmission and value inculcation is at risk (Anas, 2025). The stark regional disparity between the high-integration, high-conflict Gulf cluster and the moderate-integration, high-strain North African cluster dictates that a one-size-fits-all approach is destined to fail. Instead, policy must be tiered and targeted, building upon the ethical imperative for responsible innovation championed by scholars such as Berson et al. (2025), which demands that technological advancement be anchored in the developmental and cultural well-being of communities.

For the Gulf states, where state-led "leapfrogging" has accelerated adoption but exacerbated domestic authority crises, policy must pivot from promotion to nuanced empowerment. The alarming rate of delegated authority, where children trust AI over parental guidance, calls for the development of national family AI literacy frameworks. These frameworks should go beyond basic digital skills, encompassing what Chen and Delaney (2025) termed AI literacy for equity—specifically, curricula that help parents critically evaluate AI outputs, understand algorithmic biases, and co-navigate knowledge disputes with their children. Drawing inspiration from South Korea's proactive approach to digital citizenship

education, these programs should be delivered through multiple channels: mandatory modules in workplace professional development, community workshops in collaboration with local mosques and community centers, and integrated support within the very parental portals used for school communication. Furthermore, the “prestige paradox” identified in this study demands a parallel future careers reconciliation initiative. This would involve the Ministry of Education and industry leaders collaboratively developing narratives and pathways that bridge emerging AI-driven professions with culturally valued notions of success and social contribution, thereby aligning economic modernization with family-based aspirations for honor and stability (Gonzales et al., 2022).

In the North African context, where the core issue is unsupported absorption and a dangerous lack of institutional scaffolding, the policy priority shifts dramatically to building foundational support systems. The critical lack of perceived school guidance reported by parents underscores an urgent need for teacher–parent alliance protocols. Schools must be resourced and trained to become hubs of guidance, not merely sources of assignment distribution. Policies should mandate and fund the creation of clear, actionable guidelines for home AI use, akin to the collaborative stakeholder priority-setting models seen in the work of Ronquillo et al. (2021) on nursing AI. Teachers need professional development to transition from knowledge gatekeepers to “digital mentorship” facilitators capable of advising parents on productive AI integration for homework and research.

This approach mirrors elements of Finland’s strategy, where educator training emphasizes pedagogical integration of technology in a way that supports, rather than replaces, human-led learning. Concurrently, to address the “supervision shortcut” driven by parental feelings of academic inadequacy, public investment in subsidized, culturally grounded digital tutoring schemes is essential. These programs would provide structured, vetted academic support in local languages, reducing families’ reliance on unmediated and potentially problematic AI interfaces and alleviating the stress that fuels domestic conflict.

At a transnational MENA level, the study’s visualization of a “critical thinking divide” highlights a significant region-wide equity challenge. To prevent AI from cementing existing socio-economic fractures, a regional accord on equitable AI pedagogy is imperative. This accord would establish minimum standards for teaching critical engagement with AI across all school systems, public and private. It would promote the sharing of best practices—such as the “digital charters” observed in some Gulf families—and foster the development of open educational resources in Arabic that teach metacognitive skills for AI interaction. The accord would translate the concerns raised by Kasneci et al. (2023) into practice by ensuring that the “opportunity” of large language models is accompanied by the skills required to deconstruct and evaluate their outputs, thereby moving beyond covert copy-and-paste use. This regional cooperation could be modeled on the European Union’s coordinated approach to digital education, but with a distinct focus on the linguistic and cultural context of the Arab world.

Ultimately, these policy implications converge on a singular, human-centric principle: restoring agency and confidence to the family. The findings demonstrate that the threat is not technology itself, but the asymmetry between rapid technological change and the support structures for those who must manage its daily consequences. By implementing family-centric literacy programs, forging teacher-parent alliances, reconciling future careers with cultural values, and pursuing regional equity in pedagogy, policymakers can transform the domestic arena from a site of conflict into a space of negotiated, confident adaptation (Karan & Angadi, 2023). This aligns with the broader global lesson from countries such as Estonia and Singapore, where long-term digital success is built not merely on infrastructure but on sustained, inclusive investment in human capital and social trust. The goal must be to ensure that AI becomes a tool for enriching family educational covenants, rather than a force for their erosion.

7. Conclusion

This study mapped the complex and often contested terrain where AI meets the intimate world of family education in the MENA region. Moving beyond speculative discourse or purely institutional analyses, the research provides a critical, evidence-based portrait of a region in the midst of a quiet but profound transformation. The central contribution of this work lies in its demonstration that the impact of AI is not monolithic; it is fractured along national lines of policy, economic reality, and cultural infrastructure, creating distinct clusters of experience from the Gulf to North Africa. The study has shown that the theoretical concerns regarding the threat of AI to authority and equity, often discussed in global literature, are not abstract but are vividly operationalized within the micro-public sphere of the home, mediated by a critical and often overlooked variable: parental digital self-efficacy.

The usefulness of the study findings is inherently practical and diagnostic. By empirically validating the hypothesized links between rapid integration and parental authority erosion, and by identifying digital literacy as a powerful mitigating factor, the study provides a clear lever for intervention. Policymakers are offered a nuanced blueprint that rejects one-size-fits-all solutions. For Gulf states, the imperative shifts from the mere promotion of technology to the urgent cultivation of critical family literacy to manage the domestic fallout of state-led leapfrogging.

For North African nations, the priority becomes building foundational support systems and school-family alliances to prevent technology from becoming a source of stress and inequity. The identification of the “prestige paradox” and the “critical thinking divide” further reframes the policy conversation, arguing that responsible innovation must address cultural valuations of success and the metacognitive skills needed to harness AI authentically, lest it cement new forms of social stratification.

However, a critical analysis must also acknowledge the study's boundaries and limitations. The mixed-methods, cross-sectional design adopted in this study offers a deep snapshot but cannot capture the longitudinal evolution of these family negotiations. The attitudes and conflicts measured are points on a continuum, and how these dynamics solidify or transform over the years remains an open question. Furthermore, while the study strategically captures a diverse regional spectrum, the complexities within each country—across rural-urban divides, varying income levels, and different school systems—invite more granular investigation. The focus on broad educational priorities, while crucial, may also leave subtler nuances of devotional and ethical instruction underexplored, suggesting a need for even more targeted ethnographic work within specific familial and religious contexts.

These limitations, however, point to several important avenues for future research. Longitudinal studies tracking the same families over time would be invaluable to understand adaptation pathways and long-term outcomes. Comparative research could productively contrast the MENA experience with other regions undergoing similar digital transformations, such as Southeast Asia or Latin America, to distill culturally transferable principles from context-specific ones. Future studies could also delve deeper into the differential impact of specific AI tools—educational platforms, chatbots, or algorithmic tutors—on various learning domains. Finally, participatory action research, co-designing family AI literacy programs with parents and youth, would be a logical and impactful next step, transforming the subjects under study into partners in solution-building.

Declaration of Interest Statement

The author has no conflicts of interest to disclose.

Data Availability

The data are available from the author on request.

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