

Promoting Statistical Literacy in UAE: Cohesive Society and Preserved Identity

(Executive Summary)

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1. Introduction

Study Background:

Over the last few decades, there has been an increasing attention to data and information accompanied with significant efforts to emphasize the role of statistics in advancement and prosperity of modern societies. In light of this, there is a remarkable consensus among educators and policy makers on the integration of statistical literacy and skills in data processing and interpretation into modern education (Engel, 2017). As emphasized by Johannssen et al. (2021), statistical literacy became a paramount across all walks of life in our data-driven society especially as a result of COVID-19 pandemic (Franklin, 2021; Kahlenberg et al., 2023). According to Gal (2002), statistical literacy is defined as “people’s ability to interpret and critically evaluate statistical information and data-based arguments appearing in diverse media channels, and their ability to discuss or communicate their reactions to such statistical information.” As noted by Rumsey (2002), being statistically literate means having the ability to consume and critically “digest” the vast wealth of information produced in modern society. On the other hand, Wallman (1993) stressed that lack of

statistical literacy can lead to misunderstandings, misperceptions, mistrust, and doubts about the role of statistics in public and private decisions.

A few years ago, the United Arab Emirates (UAE) cabinet announced the Centennial 2071 plan as a strategic roadmap for the government's sustained efforts to promote the nation's reputation, with excellent education and building a happy and cohesive society as fundamental pillars (UAE Government, 2017). In modern societies, citizens should be well-informed and able to understand important social issues, discuss them and contribute to public decision-making (Engel et al., 2019). Hence, statistical literacy holds immense importance for the UAE society and citizens. In a rapidly evolving landscape shaped by economic diversification, demographic shifts, sustainability initiatives, and technological advancements, understanding statistics equips individuals with the ability to critically analyze information, make informed decisions, and actively participate in shaping policies that affect their lives. From interpreting economic indicators to evaluating public health data or understanding social trends, statistical literacy empowers citizens to contribute positively to the nation's development. Moreover, in an era characterized by the spread of misinformation and data-driven informed decisions, a data literate society serves as a safeguard against the spread of falsehoods and ensures that decisions are grounded in evidence. This fosters a society that is not only more informed but also more resilient.

Research Objective:

Developing statistical literacy and promoting civic statistics in societies is a shared responsibility among various stakeholders including educational institutions, statistics agencies and professional statistical bodies. Therefore, the purpose of this study is to assess the alignment of statistics curriculum in UAE with the best international practices in developing statistical literacy and explore the engagement of statistics agencies of disseminating statistical literacy in UAE.

2. Research Question(s)

This study aims to assess the alignment of the UAE's statistics curriculum with international best practices in fostering statistical literacy and to explore the involvement of statistics agencies in promoting civic statistics. Additionally, the study will evaluate the extent to which social studies curricula incorporate civic statistics to support informed citizenship. The findings are expected to provide valuable insights for improving both the educational system and public engagement with data.

- i. How well does the UAE's statistics curriculum align with international best practices for developing statistical literacy?

- ii. To what extent do the UAE's social studies curricula incorporate civic statistics to promote societal awareness and informed citizenship?
- iii. What role do UAE statistics agencies and educational institutions play in disseminating statistical literacy and promoting civic statistics?

3. Research Methods

Developing statistical literacy requires not only suitable curricula and appropriate textbooks but also well-prepared teachers. This study aims to evaluate the potential of the UAE's high school statistics curricula (Grades 9–12), as a leading educational model, to foster statistical literacy. Specifically, it will review and assess the statistical content in high school textbooks through the lens of statistical literacy and examine teachers' readiness to support students in developing these essential skills. Furthermore, the study will evaluate the inclusion of Civic Statistics in social studies textbooks for the same grades, focusing on how these elements shape students' understanding of societal, national, and global issues.

The mathematics framework identified four major domains covering the new K–12 curriculum: Numbers & Operations, Algebra & Functions, Geometry & Measurement, and Data Analysis & Probability. The framework adopted the learning outcomes developed by the National Council of Teachers of Mathematics (2000). The content of data analysis and probability spans over the K–12 levels except Grade 9 and Grade 12 (for advanced stream). Probability is covered in Grades 7, 10, 11, and partially in Grade 12, while the data analysis component is covered in grades 1 through 6 and 8. By the end of the secondary stage, as described in the Ministry of Education (2017), students should be able to calculate interpret descriptive statistics and interpret their significance in life situations, conduct correlation and regression analysis, and find the prediction error and its life applications.

For this study, a mixed-methods approach will be employed to address the research objectives. Firstly, a content analysis of textbooks from grades 9 to 12 will be conducted to explore the integration of civic statistics and statistical literacy within the curricula of both mathematics and social studies. The selection of these grades is justified as they represent the final stage of secondary education, where students are expected to have developed more advanced analytical skills and a deeper understanding of societal issues. The inclusion of the statistics component from the mathematics curricula is essential, as it provides the foundation for students to interpret and analyze data, which is crucial for making informed decisions about social and civic matters. Additionally, examining the social studies curriculum is necessary to understand how students are exposed to the application of statistics in real-world contexts, particularly in addressing societal challenges. This combination will offer a comprehensive view of how statistical literacy is integrated across subjects and its potential impact on students' civic engagement. Secondly, representatives

from statistics agencies across will be interviewed to gain insights into current initiatives, challenges, and opportunities related to disseminating statistical literacy in the UAE.

4. Key Findings

Based on the preliminary analysis, the key findings are highlighted below:

- i. **Outdated data in social studies curriculum:** The social studies textbooks are rich in civic statistics. The curriculum for Grade 10 includes sustainable development topics such as health, education, and economic development, but the data used is largely outdated, often from before 2008. Similar issues are observed in other subjects, including energy, water and food security, which use data from 2014 and earlier. This limits the relevance and application of the information for current issues.
- ii. **Lack of continuity in statistics curriculum:** The statistics curriculum lacks continuity and coherence, with many real-life scenarios are either irrelevant or do not fit the UAE context. This creates a disconnect between global statistical practices and the UAE context, further hindering the development of statistical literacy in students.
- iii. **Challenges in teacher preparation:** A significant issue is the inadequate preparation of mathematics teachers to teach statistics and social studies teachers to effectively address civic statistics. This hampers students' ability to understand and apply statistical concepts in real-world contexts, particularly in terms of societal issues.
- iv. **Limited engagement with statistical practices:** There are no large-scale projects undertaken by the Statistics Center-Abu Dhabi (SCAD) to engage students with statistical practices. While a small number of students are introduced to these practices during summer programs, these initiatives are not widespread, reducing opportunities for students to gain hands-on experience in statistics. Recent initiatives, such as the Community of Practice and training programs for local and federal governments, show promise in enhancing statistical literacy and civic engagement. However, these efforts have yet to be expanded to have a broader impact on education and public engagement.

5. Implications

Based on the preliminary analysis, several recommendations and policy reforms can be implemented. First, the curriculum should incorporate up-to-date and locally relevant data, ensuring that students have access to the most current information on sustainable development, energy, water, food security, and demographics. Collaborating with national statistics agencies, such as The Federal Competitiveness and

Statistics Centre (FCSC) and the local statistics centers (SCAD, Dubai Statistics Center, etc.), would help ensure that textbooks and teaching materials reflect real-world issues and trends (Ho, 2005). To support this, a policy should be established mandating regular reviews and updates of curriculum content, making sure that students are learning from the most relevant and timely data (Gal et al., 2023).

Second, the statistics curriculum needs to be revised for greater continuity and relevance. The current reliance on US-based content should be reduced in favor of more locally relevant examples, especially in areas like public health, economics, and environmental sustainability (Lipič and Ovsenik, 2020). Establishing a curriculum review committee, consisting of educators, statisticians, and representatives from local statistics agencies, would help create a more cohesive and locally applicable curriculum. This committee would ensure the curriculum reflects international best practices while also aligning with the specific needs and realities of the UAE.

Improving teacher preparation is also crucial. Mathematics teachers should receive targeted professional development in teaching statistics, while social studies teachers should be trained to incorporate civic statistics into their lessons (Ridgway, 2023; Podworny et al., 2023). This would help develop statistical literacy across subjects and promote the understanding of how data informs civic life. A national professional development program should be implemented, with support from universities and statistics agencies, to equip teachers with the skills they need to deliver effective, data-driven education.

Additionally, there should be greater emphasis on hands-on engagement with statistical practices. This could involve partnerships with statistics agencies to provide students with opportunities to participate in real-world data collection, internships, and research projects (Ho, 2005). By offering these practical experiences, students will gain a deeper understanding of the role of statistics in society. A national program promoting such opportunities should be established, with collaboration from schools, statistics agencies, and government bodies, to ensure students can directly apply their statistical knowledge in meaningful ways.

The current initiatives, such as the Community of Practice and training programs for local and federal governments (Baniyas, 2017), should be expanded to include educational institutions. Schools could be actively involved in these programs, which would help create a stronger connection between statistics education and public sector initiatives. A national framework for promoting statistical literacy, which links government data initiatives with educational programs, should be developed to facilitate this collaboration especially in key national agenda such as the 20250 Net Zero and demographic composition.

Finally, public awareness of civic statistics should be promoted through outreach programs and user-friendly platforms. Statistics agencies can create accessible tools, dashboards, and reports that highlight the relevance of statistics in addressing societal issues. A national policy on civic statistics could be

implemented, emphasizing the importance of making public data accessible and understandable, empowering citizens to engage with data and make informed decisions on societal issues.

6. Conclusion

The findings of this study highlight critical gaps in the UAE's educational and institutional approaches to fostering statistical literacy and promoting civic statistics. Outdated curriculum content, a lack of coherence in the statistics curriculum, and insufficient teacher preparation pose significant barriers to equipping students with the skills necessary for data-informed decision-making. Additionally, the limited engagement of students with real-world statistical practices further hampers the development of practical statistical competencies.

To address these challenges, targeted reforms are essential. Updating and localizing curriculum content, improving teacher training, and fostering hands-on engagement with statistical practices are key steps to bridging these gaps. Expanding existing initiatives, such as the Community of Practice, and developing national frameworks for collaboration between educational institutions and statistics agencies will further support these efforts. Moreover, promoting public awareness of civic statistics through accessible tools and outreach programs can empower citizens to actively engage with societal issues using data.

By implementing these recommendations, the UAE can strengthen its commitment to developing statistical literacy and fostering a data-literate society, ensuring that both students and citizens are prepared to meet the demands of an increasingly data-driven world. These efforts will not only enhance educational outcomes but also contribute to broader societal and economic advancements. Future research should explore the long-term impacts of curriculum reforms and teacher training initiatives on students' statistical literacy and civic engagement. Studies could also investigate how localized and up-to-date content influences students' ability to apply statistical knowledge to real-world problems. Furthermore, evaluating the effectiveness of partnerships between educational institutions and statistics agencies, such as FCSC and SCAD, in promoting hands-on learning opportunities would provide valuable insights. Additional research is needed to assess the integration of civic statistics into social studies curricula and across other school curricula and its role in fostering data-driven decision-making among students (Engel et al., 2023). Such studies would help inform policy adjustments and ensure sustained progress in enhancing statistical literacy in the UAE.

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