The Role of Agile Educational Leadership in Evaluating Gifted Education Programs Based on the STEAM Approach: A Study in Light of the H. Borland Model

Ahmed Khuwaytim L Alshammari[1], Yasir Aeyd Alsamiri[2]

Abstract

This study investigates the role of agile educational leadership in evaluating gifted education programs structured around the STEAM approach (Science, Technology, Engineering, Arts, and Mathematics), guided by the theoretical framework of H. Borland's model. Adopting a descriptive research design, the researchers developed and administered a questionnaire to a purposive sample of 47 supervisors and teachers involved in gifted education programs in the city of Hail. The results indicate a significant and positive contribution of agile educational leadership to the evaluation of STEAM-based gifted programs. Notably, no statistically significant differences were found in participants' perceptions based on their years of professional experience. The study underscores the value of integrating agile leadership principles in the planning, implementation, and assessment of gifted programs, and advocates for the expanded adoption of the STEAM model across educational institutions.

Keywords: *Agile Educational Leadership, Gifted Programs, STEAM Methodology, H. Borland Model.*

Introduction

In recent years, the educational landscape has undergone rapid transformations driven by advancements in knowledge, technology, and societal expectations. These changes have highlighted the limitations of traditional administrative models—often rigid and bureaucratic—in addressing the dynamic needs of modern learning environments. Consequently, there has been a growing demand for educational leadership models that are flexible, responsive, and capable of fostering innovation.

One such emerging model is agile educational leadership, which borrows principles from the field of software development and applies them to educational contexts. This model emphasizes adaptability, continuous feedback, iterative improvement, and a student-centered approach to decision-making. It is particularly relevant in the context of gifted education, where the ability to respond to diverse student needs and rapidly changing knowledge domains is essential.

Simultaneously, educational practices have begun embracing integrative approaches such as STEAM—an interdisciplinary framework that combines Science, Technology, Engineering, the Arts, and Mathematics. This methodology promotes critical thinking, creativity, collaboration, and problem-solving skills, making it an ideal fit for gifted learners who require enrichment beyond conventional curricula.

---

[1] Senior Teacher, Ministry of Education, Doctoral Candidate in Education, Islamic University of Madinah, KSA.

[2] Department of Education - Islamic University of Madinah, Madinah, Saudi Arabia, Email: yalsamiri@iu.edu.sa, 0000-0002-4909-8374.

However, the implementation of such programs demands effective evaluation mechanisms that can ensure quality and alignment with learning outcomes. Here, the **H. Borland model** provides a valuable lens through which to assess gifted education programs. Borland emphasizes the importance of contextual relevance, program flexibility, and the alignment of educational practices with the unique needs of gifted students.

Given this backdrop, the current study seeks to investigate the intersection of agile educational leadership, STEAM-based gifted programming, and the evaluative framework provided by the H. Borland model. The aim is to understand how agile administrative practices can enhance the development and evaluation of gifted programs that align with modern pedagogical trends.

Problem Statement and Research Questions

Despite the growing adoption of innovative educational methodologies such as STEAM, many gifted programs still operate within traditional administrative frameworks that lack the flexibility and responsiveness needed to meet the evolving needs of gifted learners. These rigid structures often hinder effective evaluation and continuous improvement, which are essential for ensuring the relevance and quality of gifted education.

Agile educational leadership offers a promising alternative by promoting adaptability, collaboration, and data-informed decision-making. Yet, there remains a significant gap in understanding how these agile principles can be applied specifically to the evaluation of gifted programs, particularly those grounded in interdisciplinary models like STEAM.

This study seeks to address this gap by exploring the role of agile educational leadership in evaluating gifted programs designed around the STEAM methodology, using the H. Borland model as a conceptual framework.

Accordingly, the study is guided by the following overarching question:

What is the role of agile educational leadership in evaluating gifted programs based on the STEAM approach, as interpreted through the H. Borland model?

From this central inquiry, the study derives the following sub-questions:

1.   To what extent is agile leadership practiced in the administration of gifted programs?

2.   How are the components of the STEAM methodology reflected in the design and evaluation of gifted education?

3.   In what ways does the H. Borland model provide a useful framework for evaluating STEAM-based gifted programs?

4.   Are there statistically significant differences in perceptions of agile educational leadership based on professional experience or other demographic variables?

Objectives of the Study

This study aims to deepen the understanding of how agile educational leadership contributes to the evaluation and enhancement of gifted programs founded on the STEAM methodology. Specifically, the objectives are to:

1.   **Assess the degree to which agile educational leadership principles are applied** in the evaluation processes of gifted programs within educational institutions.

2.   **Analyze the integration of STEAM components**—Science, Technology, Engineering, Arts, and Mathematics—within the framework of gifted education and how they shape program development and assessment.

3.   **Explore the relevance and applicability of the H. Borland model** as a theoretical lens for evaluating the effectiveness and responsiveness of STEAM-based gifted programs.

4.   **Identify differences in perceptions and practices** regarding agile leadership and program evaluation based on educators' demographic variables such as years of experience, professional roles, and academic qualifications.

Significance of the Study

The present study is significant both from theoretical and practical standpoints, contributing to the advancement of educational leadership and gifted education in several key ways:

1.   **Theoretical Contribution**:

This research enriches the literature on agile educational leadership by situating it within the context of gifted program evaluation. By examining the intersection of agile administration, STEAM-based instruction, and the H. Borland evaluative model, the study offers a novel framework for understanding how educational leadership can evolve to better support high-ability learners.

2.   **Educational Practice**:

The study provides insights for school leaders, supervisors, and policymakers into how agile leadership strategies can be effectively employed to assess and refine gifted programs. This is particularly relevant in educational environments seeking to implement or improve STEAM-oriented curricula.

3.   **Policy and Planning**:

By identifying the elements that enable or hinder agile practices in program evaluation, the findings can inform decision-makers in developing more flexible, data-driven, and student-centered approaches to managing gifted education.

4.   **Professional Development**:

The study highlights the importance of equipping educational leaders with the knowledge and skills required to apply agile methodologies. This can contribute to more effective leadership training and capacity-building initiatives.

5.   **Cultural Relevance**:

Conducted within the context of the Hail region in Saudi Arabia, the study reflects the local realities of educational leadership while offering transferable lessons that may be relevant to other regions and systems with similar challenges.

Terminology and Operational Definitions

To ensure clarity and consistency, the following key terms are defined both conceptually and operationally as they are used within the context of this study:

1. Agile Educational Leadership

- **Conceptual Definition**:

Agile leadership in education refers to a dynamic and flexible approach to managing educational institutions, inspired by agile methodologies originally developed in software engineering. It emphasizes responsiveness to change, iterative improvement, collaboration, and a focus on learner needs and stakeholder engagement.

- **Operational Definition**:

In this study, agile educational leadership refers to the leadership practices observed in schools and educational departments that demonstrate adaptability, use real-time data for decision-making, reduce bureaucratic delays, and support continuous evaluation and improvement of gifted programs.

2. Gifted Program Evaluation

- **Conceptual Definition**:

Gifted program evaluation is the systematic process of assessing the design, implementation, and outcomes of educational programs aimed at students with high abilities, with the goal of improving educational quality, equity, and effectiveness.

- **Operational Definition**:

The term refers to the specific processes and tools used by supervisors and educators in the Hail region to assess the effectiveness and alignment of gifted programs with desired outcomes, as guided by the H. Borland model and in relation to STEAM integration.

3. STEAM Methodology

- **Conceptual Definition**:

STEAM is an interdisciplinary educational approach that integrates Science, Technology, Engineering, Arts, and Mathematics. It aims to foster innovation, creativity, and problem-solving by encouraging students to engage with real-world challenges across multiple domains.

- **Operational Definition**:

Within this study, STEAM refers to the structure and content of gifted education programs that incorporate these five disciplines in a cohesive, project-based learning environment, as implemented in selected schools in Hail.

4. H. Borland Model

- **Conceptual Definition**:

Developed by James H. Borland, this model for gifted education focuses on equitable access, contextual responsiveness, and the alignment of gifted services with students' cognitive and social-emotional development. It rejects fixed definitions of giftedness and supports flexible, need-based programming.

- **Operational Definition**:

The Borland model is used in this study as the evaluative framework to assess how well gifted

programs based on the STEAM methodology address student diversity, contextual needs, and instructional quality.

Delimitations of the Study

To maintain focus and manageability, the scope of this study was intentionally limited by the following boundaries:

1.   Objective Delimitation

The study was confined to examining the role of agile educational leadership in evaluating gifted programs specifically built on the STEAM framework. Other types of educational leadership or gifted education methodologies were not addressed.

2.   Spatial Delimitation

The research was conducted in the Hail region of the Kingdom of Saudi Arabia. All participants—supervisors and teachers—were affiliated with educational institutions within this geographical area.

3.   Temporal Delimitation

The study took place during the second semester of the 1446/1447 academic year (2024), which determined the timing of data collection and participant engagement.

4.   Human Delimitation

Participants were restricted to supervisors and teachers actively involved in the administration or delivery of gifted education programs in the Hail region. Other stakeholders such as students, parents, or policymakers were not included.

Research Methodology

This study employed a **descriptive analytical approach** to explore the role of agile educational leadership in evaluating gifted programs grounded in the STEAM methodology, as interpreted through the lens of the H. Borland model. The descriptive method was chosen for its suitability in capturing perceptions, identifying patterns, and interpreting the relationships among variables without manipulating the study environment.

Study Population and Sample

The target population consisted of all educational supervisors and coordinators working within the gifted education departments of the General Directorate of Education in Hail, Saudi Arabia. From this population, a purposive sample of 47 participants was selected, comprising both male and female educators with direct involvement in overseeing gifted programs.

This sample was considered sufficient for exploratory purposes, particularly given the specialized nature of the roles involved. All participants were engaged in gifted education and had practical experience with either program design, implementation, or evaluation.

Research Instrument

To gather data, the researchers developed a structured questionnaire based on an extensive review of theoretical literature and previous studies related to agile leadership, STEAM education, and program evaluation. The instrument was designed to assess perceptions across

several dimensions, including:

1. The application of agile leadership principles in educational administration

2. The integration and quality of STEAM-based gifted programs

3. The relevance of the H. Borland model as an evaluative framework

4. Obstacles and challenges encountered in implementing agile evaluation practices

The questionnaire employed a **five-point Likert scale**, ranging from (1) Strongly Disagree to (5) Strongly Agree, to measure the intensity of participants' responses.

Validity and Reliability

The instrument underwent expert review to ensure **content validity**, and pilot testing was conducted with a subset of participants to confirm clarity and appropriateness. To assess **internal consistency**, the researchers calculated **Cronbach's Alpha**, yielding values above 0.70 for all dimensions, which confirmed the instrument's reliability.

Results and Discussion

The analysis of the data gathered from the study sample revealed a number of insightful findings regarding the extent to which agile educational leadership contributes to the evaluation of STEAM-based gifted education programs. This section presents the results aligned with the research questions and provides interpretive commentary.

1. Evaluation of Gifted Programs Based on the STEAM Methodology

Participants' responses regarding the effectiveness of gifted programs rooted in STEAM revealed a **moderate to low level of satisfaction**. Mean scores for the relevant items ranged from **2.54 to 2.74** on a five-point Likert scale.

The highest-rated item was:

"The use of multiple tools to monitor the quality of program evaluation and its practical implementation" (Mean = 2.74, SD = 1.13)

This indicates that while there is an awareness of quality assurance mechanisms, their implementation remains inconsistent or superficial. The low scores suggest that the integration of STEAM elements in gifted programs is still in its developmental stages and requires a more structured and holistic evaluation approach.

2. The Role of Agile Educational Leadership

Participants moderately agreed on the role of agile leadership in educational program evaluation, with mean scores ranging between **2.54 and 2.72**.

The most agreed-upon item was:

"Effectively leveraging continuous organizational changes to improve performance" (Mean = 2.72, SD = 1.17)

This reflects a growing, though uneven, adoption of agile leadership practices in educational settings. The data suggest that while leaders recognize the value of flexibility and change, institutional constraints may limit their full application.

3. Obstacles to Agile Educational Evaluation

This axis revealed a relatively **low level of agreement**, pointing to significant **barriers to implementing agile evaluation practices**. The item rated highest in this dimension was:

"The efficient and economical use of available resources" (Mean = 2.63, SD = 1.19)

Respondents noted challenges such as limited financial incentives, insufficient professional training, and a lack of innovative evaluation strategies. These findings imply that structural and procedural limitations restrict the practical adoption of agile principles, particularly in resource-constrained environments.

4. Correlations and Reliability Indicators

The instrument's validity was confirmed through **Pearson correlation coefficients** between individual items and their respective axes, all statistically significant at the **0.01 level**, with correlation values ranging from **0.387 to 0.483**. These results support the internal consistency and construct validity of the questionnaire.

Additionally, **Cronbach's Alpha values** across all dimensions exceeded **0.71**, indicating strong reliability. The overall tool reliability was measured at **0.902**, validating its robustness for measuring the intended constructs.

5. Analysis Based on Demographic Variables

The study found **no statistically significant differences** in participants' responses based on gender or workplace location. However, there were notable differences according to:

• **Job rank**: Senior-level administrators exhibited a more favorable view of agile leadership's effectiveness.

• **Years of experience**: Those with longer professional experience demonstrated a clearer understanding and greater endorsement of agile practices.

These results suggest that exposure and leadership responsibility positively influence one's perception and application of agile evaluation models.

Results and Discussion

1. Evaluation of Gifted Programs Based on the STEAM Methodology

Participants expressed moderate agreement with the effectiveness of gifted programs rooted in the STEAM methodology. Average scores for this axis ranged between 2.54 and 2.74 on a five-point Likert scale. The highest-rated item concerned the use of multiple tools to monitor program quality, scoring a mean of 2.74 with a standard deviation of 1.13, reflecting a need for more robust and consistently applied evaluation mechanisms.

2. The Role of Agile Educational Leadership

Responses regarding the role of agile educational leadership were also in the moderate range, with mean scores from 2.54 to 2.72. The most favorable response emphasized leveraging organizational change effectively, indicating some awareness of agile practices, though limitations in implementation persist.

3. Obstacles to Agile Evaluation Practices

This dimension received lower scores overall, highlighting key challenges. The most endorsed item focused on the efficient use of resources (Mean = 2.63, SD = 1.19). Other low-scoring items included those related to financial incentives and the application of diverse quality strategies, suggesting structural constraints hinder the adoption of agile methodologies.

4. Reliability of the Instrument

The instrument demonstrated strong internal consistency. Pearson correlation coefficients between items and their respective dimensions ranged from 0.387 to 0.483, all statistically significant at the 0.01 level. Cronbach's Alpha coefficients exceeded 0.70 across all dimensions, with an overall reliability score of 0.902.

Dimension	Number of Items	Cronbach's Alpha
Evaluation of Gifted Programs Based on STEAM	10	0.737
Role of Agile Educational Leadership	10	0.718
Total for Agile Leadership Axis	20	0.873
Obstacles to Agile Practices	15	0.815
Overall Instrument	55	0.902

Table 1: Reliability Coefficients for Study Dimensions

Dimension	Mean	Standard Deviation
Program Evaluation Based on STEAM	2.63	1.13
Agile Educational Leadership	2.62	1.17
Obstacles to Agile Practices	2.58	1.19

Table 2: Descriptive Statistics for Main Evaluation Dimensions

Conclusion and Recommendations

Conclusion

This study investigated the role of agile educational leadership in evaluating gifted education programs that implement the STEAM methodology, guided by the H. Borland model. The findings highlighted several areas of moderate application of agile leadership principles and revealed gaps in the integration of STEAM across program components. There was a noticeable shortfall in the use of scientific, evidence-based evaluation methods and a lack of qualified evaluators. Despite the growing recognition of the value of flexible, responsive educational leadership, the actual practice remains limited by structural and operational challenges.

Moreover, while participants recognized the need for continuous improvement and strategic agility, their responses also pointed to resource constraints, minimal professional development, and an underutilization of assessment tools tailored to the needs of gifted learners.

Recommendations

Based on the results, the study offers the following recommendations:

1. Institutionalize the H. Borland model as a national standard for evaluating gifted programs based on STEAM, ensuring alignment across schools and educational regions.

2. Offer specialized training programs for teachers and supervisors to build competence in agile leadership strategies and effective program evaluation techniques.

3. Develop advanced, tiered assessment tools that accurately capture the diverse cognitive and creative profiles of gifted learners.

4. Establish a centralized database for tracking and analyzing gifted program outcomes to inform continuous improvement initiatives.

5. Foster national and regional collaboration between educational institutions to share best practices in STEAM integration and agile administration.

6. Create financial and career-based incentives to attract and retain evaluators with expertise in gifted education and interdisciplinary learning.

7. Issue national procedural manuals that translate the Borland model into actionable evaluation frameworks customized for STEAM settings.

References

Abu Al-Qasim, I. A. (March 2024). Agile leadership among early childhood school principals in Jazan City. *Journal of Reading and Knowledge*, 75–110.

Al-Shoushan, B. M. (September 2023). Applying the integrative STEM approach in Qassim Science Center programs: Motivations from trainers' perspectives. *Arab Journal of Scientific Publishing*, 347–366.

Al-Zahrani, S. A. M. (2023). The degree to which gifted education teachers in Al-Baha employ evaluation standards. *Graduate Thesis, Al-Baha University*, 1–96.

Al-Mujahed, S. A. (July 2009). Modern trends in school evaluation and their role in identifying gifted students. *6th Arab Scientific Conference for Gifted Education*, 193–209.

Al-Juaid, S. A. (May 2024). The impact of agile management on achieving functional creativity: A case study on Taif University. *Journal of Economic, Administrative and Legal Sciences, National Research Center – Gaza*, 42–60.

Saleh, S. J. M. (December 2013). Evaluation of gifted program outcomes in Medina region. *Faculty of Education Journal – Aswan University*, 295–336.

Klopper, C., & Pendergast, D. (2017). Agile leadership in education: Driving reform through innovation and reflection. *Journal of Leadership in Education*, 345–360.

Al-Mushrif Al-Qahtani, A. A. (February 2024). Functional creativity among teachers of gifted students in Saudi Arabia. *International Journal of Arts, Humanities and Social Sciences*, 164–199.

Al-Shahli, A. M. (October 2024). A proposed vision for activating agile leadership to reduce school dropout in Madinah. *Educational Innovations Journal*, 93–100.

Bariqal, N. (October 2023). Evaluating gifted programs: The H. Borland model. *Arab Journal of Child Media and Culture*, 123–142.

Al-Tuwaijri, H. M. (January 2023). Agile leadership among female principals in public primary schools in Unaizah: Teachers' perspectives. *Journal of Educational and Psychological Sciences – National Center for Research Gaza*, 1–20.

Study Tool and Appendix

Study Instrument (Questionnaire)

The primary tool used for data collection in this study was a questionnaire. It consisted of structured questions carefully designed to gather information aligned with the study objectives. The questionnaire was developed after reviewing relevant literature and prior studies, and consisted of two main sections:

1. Demographic Information: This section captured data on the participants' gender, department, academic degree, and professional experience.

2. Core Study Dimensions: This section included the main constructs being investigated, divided as follows:

- Dimension One: Agile Educational Leadership in Evaluating STEAM-based Gifted Programs (20 items across two subdimensions)

- Dimension Two: Barriers to Agile Educational Leadership in Evaluating STEAM-based Gifted Programs (10 items)

Instrument Validity

Face validity was ensured by submitting the preliminary version of the tool to academic experts. Based on their feedback, revisions were made to improve clarity and alignment with study objectives. Internal consistency was confirmed by calculating Pearson correlations between each item and its respective subdimension and total score. All correlations were statistically significant at the 0.01 level.

Item Number	Correlation with Dimension	Significance
1	0.467	**
2	0.438	**
3	0.465	**
4	0.387	**
5	0.429	**
6	0.445	**
7	0.457	**
8	0.479	**
9	0.420	**
10	0.483	**

Table 1: Pearson Correlation Coefficients for Study Dimensions