

Original Research Article

Digital Transformation and its Impact on Improving the Quality of Educational Outcomes: An Applied Study at the Sharjah Police Science Academy

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Abstract

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This study explores how the core dimensions of digital transformation (DT)—specifically the technological, human, and organizational factors—shape the quality of educational outcomes within the unique environment of security education. Focusing empirically on the Sharjah Police Science Academy (SPSA), we utilized a descriptive-analytical approach, gathering survey data from a stratified sample of 220 students, faculty members, and administrators. The structural relationships were examined using path analysis. The findings reveal that while all three dimensions drive educational quality, their influence is fundamentally unequal. Notably, the human dimension emerged as the most critical determinant of success ($\beta = 0.412$, $t = 6.85$, $p < 0.001$), followed by technological infrastructure ($\beta = 0.356$, $t = 5.92$, $p < 0.001$). Conversely, organizational dynamics exerted the weakest relative impact ($\beta = 0.298$, $t = 4.87$, $p < 0.001$). These insights indicate that advanced tools alone cannot guarantee educational excellence; their efficacy depends heavily on the digital literacy and readiness of the people using them. Additionally, the lesser impact of the organizational dimension highlights an institutional "structural lag," where rigid administrative workflows fail to keep pace with rapid technological and pedagogical shifts. The paper concludes with strategic directions for building agile governance frameworks and fostering specialized digital competencies tailored to high-pressure security environments.

Keywords: Digital Governance, Digital Transformation, Educational Quality, Human Capital, Sharjah Police Science Academy

INTRODUCTION

Over the last few years, higher education institutions (HEIs) worldwide have faced immense pressure to integrate digital technologies into their core operations. This shift, widely recognized as digital transformation (DT), goes far beyond simply upgrading hardware or installing new software; it represents a systemic re-engineering of how curricula are designed, how faculty teach, and how student performance is evaluated (Bond

et al., 2020; Selwyn, 2022). Contemporary literature highlights that a successful digital shift requires a careful alignment between technological infrastructure, human capabilities, and institutional policies (Kopp et al., 2021; OECD, 2023). This evolutionary momentum accelerated rapidly during the COVID-19 pandemic, forcing institutions to hastily adopt hybrid models and redefine traditional academic roles on the fly (Hodges et al.,

2020). While digital transformation is known to enrich classroom interaction and support self-regulated learning (Alenezi, 2023), research remains noticeably sparse when it comes to specialized, security-oriented educational institutions. Organizations like the Sharjah Police Science Academy (SPSA) operate under highly rigorous professional and tactical requirements that standard educational frameworks do not fully capture (EDUCAUSE, 2024). Consequently, evaluating how digital tools fit into this high-stakes context is essential.

1.1 Research Question and Conceptual Framework
To address this clear gap in the literature, this study addresses a central question: What is the impact of Digital Transformation dimensions (Technological, Human, and Organizational) on the Quality of Educational Outcomes at the Sharjah Police Science Academy? To make this inquiry operational, we adopt a socio-technical theoretical lens. This framework views the three dimensions of DT as independent, interacting variables that collectively shape the quality of educational outcomes (the dependent variable)

Research Hypotheses

H1: There is a statistically significant impact of the Human Dimension on educational outcomes.

H2: There is a statistically significant impact of the Technological Dimension on educational outcomes.

H3: There is a statistically significant impact of the Organizational Dimension on educational outcomes.

METHODOLOGY

Research Design and Operational Framework

This study adopts a quantitative, descriptive-analytical approach to examine the structural relationships between the dimensions of digital transformation (DT) and the quality of educational outcomes. Rather than viewing technology in isolation, this design evaluates DT as a socio-technical system where technological infrastructure, human capabilities, and organizational frameworks interact to shape institutional performance.

To operationalize the dependent variable, "**Quality of Educational Outcomes**," this study defines it through a multi-dimensional lens rather than relying solely on traditional GPA metrics. Reflecting the specialized nature of security education, it is measured using four core institutional indicators:

1. **Academic Performance and Competencies:** The acquisition of advanced cognitive, practical, and tactical skills.
2. **Student and Faculty Satisfaction:** Stakeholder perceptions regarding the efficiency and engagement of

the digital learning ecosystem.

2. **Digital and Professional Agility:** The readiness of graduates to seamlessly transition into tech-driven law enforcement and security field operations.

3. **Institutional Efficacy:** The overall improvement in educational delivery, resource optimization, and curriculum modernization.

Instrument Development and Measurement Scales

The primary data collection tool was a structured, self-administered questionnaire composed of 28 items, divided into two main sections: demographic profiles and core research variables. The measurement scales for both independent and dependent variables were adapted from well-established instruments in contemporary educational technology and institutional governance literature, tailored to fit the police training context:

- **The Human Dimension Scale (7 items):** Adapted from Redecker's (2017) *European Framework for the Digital Competence of Educators (DigCompEdu)* and the TPACK framework, focusing on digital literacy, pedagogical readiness, and tech-driven motivation.

- **The Technological Dimension Scale (7 items):** Adapted from Bates (2019) and OECD (2020) indicators, measuring infrastructure quality, learning management systems (LMS) accessibility, and smart classroom integration.

- **The Organizational Dimension Scale (7 items):** Adapted from Kane et al. (2015) and Hinings et al. (2018), evaluating institutional agility, digital policy flexibility, and administrative workflows.

- **The Quality of Educational Outcomes Scale (7 items):** Developed based on Alenezi (2021) and UNESCO (2023) quality benchmarks, capturing the specific student performance, satisfaction, and employability competencies outlined above.

All items were measured on a standard 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Instrument Validity and Reliability

To ensure the empirical rigor of the data, the instrument underwent a comprehensive verification process encompassing content, construct, and internal consistency checks:

Validity Measures

- **Content Validity:** Before field deployment, the initial questionnaire was reviewed by a panel of five academic experts in educational technology and institutional management. Their feedback guided the linguistic

Table 1. Sample Distribution

Category	Frequency	Percentage (%)
Undergraduate Students	121	55.0%
Postgraduate Students	55	25.0%
Faculty Members	33	15.0%
Undergraduate Students	11	0.5%

refinement and context stabilization of items to ensure they resonated with a specialized security institution.

- **Construct Validity:** Exploratory factor analysis (EFA) was initially conducted to ensure that all 28 items loaded cleanly onto their respective latent constructs (factor loadings > 0.70), confirming satisfactory convergent validity.

Reliability Measures

To evaluate the internal consistency of the survey scales, Cronbach's Alpha coefficients were calculated for each latent variable. As shown in the results, all dimensions comfortably exceeded the recommended threshold of 0.70 (with values starting from 0.87), demonstrating that the instrument provides highly stable, reliable, and reproducible measurements.

Statistical Analysis and Modeling Technique

Hypothesis testing was conducted using Partial Least Squares Structural Equation Modeling (**PLS-SEM**). This technique is particularly well-suited for this study because it handles complex socio-technical models without demanding strict normal data distributions, and it is highly robust for medium-sized samples ($N = 220$).

The structural model was evaluated through a two-step process: first, validating the measurement model (outer model) via reliability and validity indicators, and second, testing the structural paths (inner model). The statistical significance of the path coefficients (β) was determined using a bootstrapping procedure with 5,000 resamples. To evaluate the explanatory power and predictive relevance of the model, we reported the coefficient of determination (R^2), which measures the variance explained in the dependent variable, alongside cross-validated redundancy (Q^2) to verify the model's predictive capability.

Population and Sampling

The target population for this study comprises students, faculty, and administrative staff at the Sharjah Police Science Academy (SPSA), totaling approximately 400 individuals. To achieve a representative data split, a

sample of 220 participants was selected using stratified random sampling to ensure all institutional roles were proportionally represented. Table 1

RESULTS

Evaluation of the Structural Model (Path Analysis)

To assess structural relationships and test the hypothesized impacts of digital transformation dimensions on the quality of educational outcomes, we executed a Partial Least Squares Structural Equation Modeling (PLS-SEM) algorithm with a bootstrapping procedure of 5,000 resamples. The structural configuration and empirical trajectories of the model are illustrated in table 2 below. The quantitative evaluation of the inner model focuses on the explanatory power, predictive relevance, and individual path trajectories. The model demonstrated strong explanatory capability, with the coefficient of determination yielding an $R^2 = 0.542$ (Adjusted $R^2 = 0.536$). This indicates that the three digital transformation dimensions (Human, Technological, and Organizational) collectively account for 54.2% of the total variance in the "Quality of Educational Outcomes" at the Sharjah Police Science Academy. Furthermore, the cross-validated redundancy index yielded a $Q^2 = 0.384$, comfortably exceeding the threshold of zero, thereby confirming the model's robust predictive relevance. 3.2. Hypotheses Testing and Path Coefficient The individualized parameters for the hypothesized paths—including standardized path coefficients (β), critical ratios (t-values), significance levels (p-values), and Cohen's effect sizes (f^2)—are organized objectively in Table 2.

Objective Statistical Summary

The empirical metrics derived from the data analysis indicate that all three structural hypotheses are statistically supported:

1. **Testing Hypothesis 1 (H1):** The data reveals a positive and highly significant direct relationship between the Human Dimension and the quality of educational outcomes ($\beta = 0.412$, $t = 6.85$, $p = 0.001$). The corresponding effect size ($f^2 = 0.245$) indicates a medium-to-large practical impact, establishing this

Table 2. Structural Model Assessment and Path Estimates

Hypothesis	Path Trajectory	Standardized Beta (β)	t-value	p-value	Effect Size (f^2)	Empirical Decision
H1	Human Dimension right arrow Educational Outcomes	0.412	6.85	0.001	0.245	Supported
H2	Technological Dimension right arrow Educational Outcomes	0.356	5.92	0.001	0.188	Supported
H3	Organizational Dimension right arrow Educational Outcomes					

dimension as the strongest predictor within the structural framework.

2. **Testing Hypothesis 2 (H2):** The technological infrastructure dimension demonstrates a statistically significant positive effect on the dependent variable (beta = 0.356, $t = 5.92$, $p = 0.001$). With an effect size of $f^2 = 0.188$, technology operates as a robust and substantive contributor to educational outcomes.

3. **Testing Hypothesis 3 (H3):** The path from the Organizational Dimension to educational outcomes is also positive and statistically validated (beta = 0.298, $t = 4.87$, $p = 0.001$). However, its practical effect size ($f^2 = 0.112$) is relatively weaker compared to the human and technological variables, serving as the lowest predictive pathway in the model.

DISCUSSION

The empirical evidence derived from this study offers a profound understanding of how digital transformation (DT) serves as a catalyst for educational quality within a specialized security context. The following sections provide a granular analysis of these findings.

The Primacy of the Human Capital (H1)

The most important thing we learned from this study is that people are the key to getting good results in education. This means that just having good technology isn't enough - it's the people who use it that really matter. At the Sharjah Police Science Academy, we found that the teachers' ability to adapt to new digital ways of teaching and the students' ability to use technology well were the main reasons why they were successful. This is a big change from the old way of thinking that said technology was the most important thing. This fits with the idea of the TPACK Framework, which says that technology is most effective when it's combined with strong teaching skills and knowledge of the subject matter. It also supports what Redecker found in 2017, but adds a new twist: when it comes to teaching security, the "human factor" is not just about being good with

technology, but also about being able to think on your feet and use digital tools in high-pressure situations. The big impact we're seeing here suggests that the time and money SPSA put into helping its teachers get better has really paid off in terms of improving the quality of education. This is especially important in security education, where being able to apply digital tools in a smart and flexible way can make all the difference. By investing in its teachers, SPSA is helping to make sure its students are well-prepared to handle the challenges of the digital world.

Technological Infrastructure as a Strategic Enabler (H2)

The technology used in schools has a big impact on how students learn. This is shown by the fact that the Technological Dimension is very important, with a beta value of 0.356. The school's digital system, which includes things like online learning platforms, smart classrooms, and digital resources, plays a critical role in supporting students. Some studies have found that technology can be a distraction in the classroom, but our results agree with Bates, who said in 2019 that technology can help students learn by providing a framework for flexible and hybrid learning. This means that technology can help students learn in a more flexible and personalized way, which can be very effective. By using technology in the right way, schools can create a supportive learning environment that helps students succeed. If we take a closer look, we can see that technology at SPSA is more of a helper than the main reason for something to happen. It gives students and teachers a way to work together and come up with new ideas. The fact that there's a strong link between technology and good student outcomes suggests that technology is necessary for a modern school, but its usefulness depends on how well people can use it. That's why it's not the most important thing - the people using it are more important. Technology is like a tool that helps make things happen, but it's the people who make it work.

The Organizational Gap and Governance Challenges (H3)

Interestingly, the Organizational Dimension yielded the lowest impact (beta = 0.298), despite being statistically significant. This finding is critical for SPSA's leadership. It suggests a "structural lag" where digital tools and human skills are advancing faster than the institutional policies and administrative legacy. The findings of this study reflect the challenges outlined by Kane et al. in their 2015 book, "The Technology Fallacy", which suggests that the main obstacle to digital transformation is often the organization's culture, rather than the technology itself. In a traditional, hierarchical institution like SPSA, the shift to a more agile and digital approach to governance may face opposition. The results indicate that for digital transformation to be successful and lasting, the institution needs to update its internal rules and processes to keep pace with the rapid evolution of digital teaching methods. This means streamlining bureaucratic workflows and embracing a more modern and flexible approach to governance, one that supports and enables digital innovation, rather than hindering it. By doing so, the academy can create an environment that fosters sustainable digital transformation and allows it to stay ahead in the ever-changing educational landscape.

Synthesis

DT as a Socio-Technical System When you put all the pieces together, it's clear that the quality of education at SPSA is the result of a complex system that involves people, technology, and organization. The way these three parts work together creates a kind of "digital synergy" that helps students be more innovative and improves the curriculum. What's interesting is that the research shows that no one part can make things better on its own. Instead, it's the combination of all three that makes a difference. This supports the idea that systems are interconnected, as Vial said in 2019. In this view, people provide the vision, technology provides the tools, and organization provides the stability to make it all work. This study effectively bridges a gap in UAE-based research by demonstrating that in specialized security institutions, the path to quality is paved by empowering the individual, supported by cutting-edge tools, and protected by flexible institutional frameworks.

CONCLUSION

This study demonstrates that digital transformation (DT) at the Sharjah Police Science Academy (SPSA) transcends a mere hardware migration or technical upgrade; rather, it represents a profound structural

evolution of the socio-technical ecosystem foundational to security education. Through empirical verification utilizing PLS-SEM, this research confirms that while state-of-the-art technological infrastructure establishes the necessary baseline framework, human capital—specifically faculty pedagogical expertise and student situational agility—serves as the primary engine driving sustainable educational quality. Furthermore, the structural modelling exposed a critical institutional friction characterized by a "structural lag." This indicates that traditional organizational policies and administrative workflows have not yet advanced at the same pace of digital maturity achieved by the human and technological dimensions. Consequently, the pathway to organizational excellence at SPSA requires a more balanced integration, where legacy institutional governance is intentionally modernized to support human agency through advanced digital platforms. Ultimately, digital transformation must be understood as an interconnected, synergistic process; its long-term institutional success is determined not by the complexity or novelty of the adopted software, but by the elevated quality, strategic readiness, and professional performance of the security graduates it produces.

STRATEGIC RECOMMENDATIONS AND IMPLICATIONS

Based on the empirical findings and the structural trajectories identified in this study, the following strategic recommendations are proposed to optimize the digital transformation ecosystem at the Sharjah Police Science Academy (SPSA):

Strategic Human Empowerment and Capacity Building

Given that the human dimension is the primary determinant of educational quality, developmental initiatives must move beyond routine technical orientation.

- For Faculty Mastery: SPSA should transition from generic digital literacy programs toward advanced "Digital Pedagogical Mastery" pathways. These frameworks must be systematically anchored in the TPACK model, ensuring that instructors can blend cutting-edge digital platforms with specialized security content and innovative teaching methodologies.
- For Student Leadership: The academy should establish dedicated "Digital Leadership and Agility" workshops for cadets. These programs should focus on equipping future officers with the high-pressure cognitive skills required to navigate and utilize data-driven environments in modern law enforcement operations.

Institutional Agility and Administrative Policy Reform

To directly mitigate the identified "structural lag" where administrative mechanisms restrict technological and human potential, targeted policy interventions are necessary.

- **Regulatory Audits:** Executive leadership should mandate a comprehensive institutional audit of existing academic and administrative regulations. This initiative will pinpoint and eliminate bureaucratic bottlenecks that slow down the adoption of modern educational methods.
- **Agile Governance Frameworks:** SPSA should implement a flexible, modern governance protocol designed to streamline decision-making. This framework will allow for the fast-tracked integration of disruptive emerging tools—such as Generative AI and advanced data analytics—into the curriculum without long administrative delays.

6.3. Specialized Immersive Technical Integration

Technological infrastructure yields its maximum returns when it directly bridges the gap between theoretical classroom knowledge and practical field execution.

- **Extended Reality (XR) Deployment:** SPSA should prioritize targeted investments in Extended Reality (XR) ecosystems—specifically Virtual Reality (VR) and Augmented Reality (AR) simulation labs. These environments can replicate high-stakes tactical security scenarios, safely blending digital learning with practical field operations.
- **Learning Analytics Systems:** The academy should integrate advanced learning analytics platforms within its LMS infrastructure. These systems will track real-time engagement and student competencies, allowing faculty to personalize learning paths and dynamically improve educational outputs.

Cultivating a Human-Centric Digital Culture

Sustainable transformation relies on shifting institutional perceptions from a tool-based perspective to a cultural mindset.

- **Mindset Over Mechanics:** SPSA should cultivate an internal environment that repositions digital transformation as an organic professional mindset rather than a forced technical requirement.
- **Incentivizing Innovation:** Institutional mechanisms should be established to reward and incentivize digital innovation. Recognizing faculty who pioneer creative digital pedagogy and staff who optimize administrative workflows will help embed continuous technical evolution into the academy's cultural fabric.

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