Using Learning Analytics to Strengthen Digital Skills in Higher Education: Insights from South Korea for Morocco

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Abstract. Digital skills have become crucial for securing employment, fostering innovation and achieving academic excellence. To equip students for a data-centric economy, universities across the globe are incorporating digital competencies into their curricula (Redecker, 2017). In Morocco, institutions of higher education are starting to weave multidisciplinary digital skills courses, such as programming, artificial intelligence, data analysis, cybersecurity, cloud computing, and digital entrepreneurship into their engineering, business, social sciences, and humanities programs. Centers such as Code 212, located at universities such as Ibn Tofail of Kenitra and Ibn Zohr of Agadir, play a pivotal role in these efforts by providing organized training programs, practical projects, and collaborations with industry, all aimed at narrowing the divide between academic education and the needs of the labor market. This study suggests a conceptual Learning Analytics framework to direct the tracking and improvement of digital competencies among Moroccan university students, based on a comparative analysis of the Moroccan and Korean experiences. The data utilized encompasses student enrollment and completion statistics from various programs at Code 212 centers, records of certification achievements, and surveys that evaluate self-assessed digital skills. The predictive factors include engagement with online learning platforms, involvement in labs and projects, certifications earned, and previous experience with digital technologies. Insights drawn from Korea's experiences inform the analysis of results and aid in developing recommendations for Morocco's higher education landscape. Initial analysis indicates that while Morocco's initiatives to enhance digital skills are encouraging, they remain disjointed. A systematic implementation of Learning Analytics can empower universities to track student engagement, pinpoint skills deficiencies early on, and adjust curricula to optimize learning outcomes. Additionally, collaboration between Morocco and Korea could promote faculty exchanges, foster joint curriculum development, and create co-designed micro-credentials, thereby enhancing digital skills acquisition across various fields.
This extended abstract illustrates that the integration of well-structured digital skills programs into higher education, coupled with the application of learning analytics, presents a strategic opportunity for Morocco to boost employability, innovation, and competitiveness. Insights from

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South Korea provide a framework for institutionalizing these practices and advocating for evidence-based educational policies at the national level.

Keywords: Digital skills, Digital competency, Higher Education, Learning Analytics

1 Introduction

Digital competencies have become a key component of educational systems towards innovation and competitiveness in an era where technological transformation is increasingly growing. Integrating Learning Analytics (LA) provides important insights to how digital skills can have positive impact on higher educational systems in order to adjust to the fast global digital development. This comparative study seeks into how South Korea and Morocco are using LA to advance education through opposing phrases of maturity and similar prospects.

1.1 Litterature Review

The 21st century has witnessed major transformations in which digitalization has become a crucial pillar for innovation, employability, and lifelong learning. Universities worldwide are reshaping their curricula to align with the digital transformation of societies and labor markets (Ghomi & Redecker, 2019). The European Commission's Digital Education Action Plan (2018) emphasizes the need to foster digital competencies and promote innovative teaching and learning environments across all levels of education.

In Morocco, the integration of digital skills into higher education has accelerated over the last decade, particularly after the COVID-19 pandemic (Ghazali & Benbrahim, 2024). Teachers' needs assessments reveal strong interest but limited competencies in Learning Analytics (LA) and digital pedagogy (Zine & Kaaouachi, 2024). Infrastructure constraints continue to exacerbate inequalities in access to e-learning platforms (Ghazali & Benbrahim, 2024). Conceptual studies and literature reviews (Ferouali & Ouhadi, n.d.) point to fragmented policies and uneven institutional readiness. AI-based case studies identifying at-risk students represent early yet promising attempts to leverage LA in the Moroccan context. Several universities have introduced cross-disciplinary digital skills courses accessible to students from all academic fields, including digital culture, programming, artificial intelligence (AI), data analysis, cybersecurity, cloud computing, and digital entrepreneurship. In parallel, specialized centers such as Code212, established at Ibn Tofail University of Kenitra and Ibn Zohr University of Agadir, act as catalysts for digital transformation by offering structured programs, hands-on training, and industry-linked certifications aligned with labor market demands (Code212, 2024).

In contrast, South Korea presents a more mature ecosystem. Higher education institutions benefit from advanced digital infrastructures, strong national digital

and AI policies, and structured faculty development programs (E. Choi et al., n.d.; Pak et al., 2022). Research conducted during the pandemic indicates that perceived learning performance, participation in discussions, and digital learning environments significantly influenced student satisfaction. Initiatives such as the development of learning data collection platforms for large-scale Learning Analytics deployment (Pak et al., 2022) demonstrate systemic institutional commitment. Moreover, empirical studies document students' willingness to adopt emerging AI tools in academic contexts (MAGHNI & KHANNOUSS, 2024). The contrast between Morocco's emerging initiatives and South Korea's systemic integration highlights the importance of institutional coordination and data governance. The overarching purpose of this research is to provide a comparative analysis between Morocco and South Korea, examining how Learning Analytics can serve as a strategic framework for strengthening digital skills education in Morocco. The study also proposes a conceptual LA-based framework tailored to the Moroccan higher education context.

2 Theoretical Framework and Research Gap

2.1 Digital Competencies and Employability

Digital competence is increasingly linked to innovation and graduate employability. The DigCompEdu framework (Redecker & Punie, 2017) conceptualizes educator digital competence across domains such as professional engagement, digital resources, assessment, and empowering learners. Integrating digital skills across disciplines thus becomes both a pedagogical priority and a strategic lever for economic development.

2.2 Learning Analytics and Data-Informed Education

Learning Analytics (LA) refers to the measurement, collection, analysis, and reporting of data about learners and their contexts to understand and optimize learning (Siemens, 2013). Emerging from educational data mining and statistical modeling, LA supports data-informed pedagogy and student-centered systems. In advanced contexts such as South Korea, LA is embedded within broader smart education and data-driven university strategies, informing curriculum design and institutional decision-making.

2.3 Institutional Readiness and Digital Transformation

Effective digital transformation requires more than technology adoption. It depends on faculty preparedness, infrastructure, governance alignment, and ethical data management. Concepts such as smart education and digital transformation governance highlight the systemic nature of educational innovation.

3 Research Gap and Problem Statement

While substantial research addresses digital skills and Learning Analytics within individual countries, comparative cross-national studies remain limited. No prior work has systematically contrasted Morocco's emerging initiatives with South Korea's mature ecosystem in terms of policy coherence, infrastructure, faculty capacity, and LA deployment. Morocco faces structural challenges in coordination and institutional readiness, whereas South Korea demonstrates systematic integration. This study therefore seeks to identify transferable lessons that can support Morocco's transition toward a more data-informed and digitally integrated higher education system.

3.1 Research Questions

Q1: How can Learning Analytics support the systematic development and monitoring of digital competencies in Moroccan higher education institutions?
Q2: What institutional and pedagogical factors explain South Korea's effective integration of digital skills, and how can Morocco adapt these practices through Learning Analytics?

4 Methodology

The study combines comparative analysis(Collier, D. 1993) with conceptual framework development. It examines the structural, pedagogical and technological dimensions of digital skills in Morocco and South Korea. The comparison focuses on four dimensions:

- Policy and governance (national strategy, instructional commitment);
- Curricular integration (extent and diversity of digital courses);
- Pedagogical innovation (use of LA, data-driven teaching);
- Institutional capacity (Resources, training and infrastructure).

Data were analyzed through a cross-case synthesis, identifying convergences, divergences and transferable practices. The study also proposes a conceptual LA framework tailored for Moroccan Higher Education, through Korean practices and global LA models (Siemens,2013).
Findings are interpretative and do not measure causal impacts.

5 Comparative Analysis

Table 1. Comparative Analysis of Learning Analytics Implementation: Morocco vs South Korea

Dimension	Morocco	South Korea	Comparative Insight
Policy and Governance	Uncoordinated strategies; National initiatives post-COVID emphasizing digital transformation. Yet, a limited national LA policy. MAGHNI, A., & EL KHANNOUSS, A. (2024).	Clear national policies namely Smart Education strategy; Strong coordination between government and universities (Pak et al., 2022)	Morocco is in a developmental phase; would benefit from stronger governance coordination
Curricular Integration	Recent introduction of digital skills modules in Higher Education programs; Localized initiatives in different universities (Code 212, 2024)	Digital competencies embedded across myriad levels if not all. Nationwide curriculum reform post 2015 (Nilaphruek & Charoenporn, 2023)	Korea's early start in curriculum digitization offers a scalable model for the Moroccan experience.
Pedagogical Innovation	Initial experimentation with LA and AI to identify at risk students. (S. Choi et al., n.d.)	Advanced LA systems using big data to personalize learning; (S. Choi et al., n.d.)	Morocco can start following and adapting Korean models for scalable data ecosystems.
Institutional Capacity	Unequal digital infrastructure; Limited Professor/Teacher availability and readiness; Emerging Coding centers and EdTech ecosystems (Zine & Kaaouachi, 2024)	High faculty enthusiasm; Professional development and state funding for tech upgrades Lee, H. J., Lee, E. H., & Kwon, H. J. (2024).	Faculty development and data governance remain Morocco's most critical gaps.

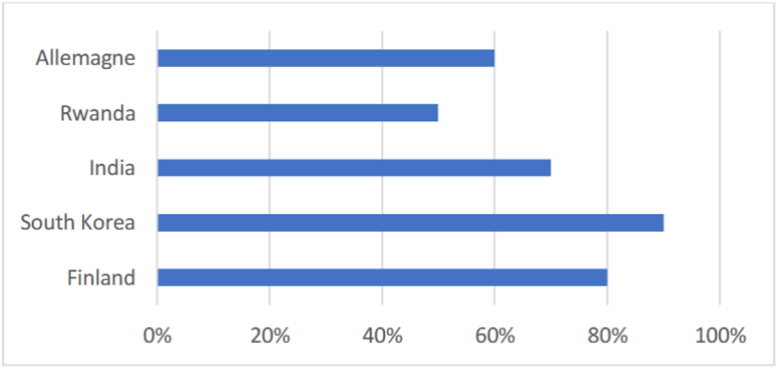
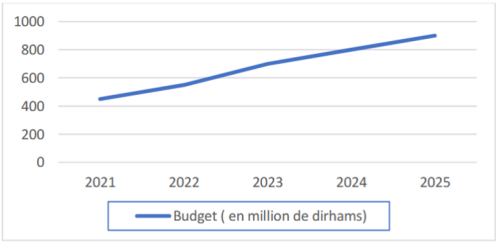


Fig. 1. Integrating Digital skills in Higher Education 2021–2023 (Dahman & Douieb, 2025)

This chart illustrates the integration level of Digital skills across different country including South Korea (see fig. 1). The latter stands out with nearly 90% proving an advanced integration of digital education initiatives into Higher education

systems. Meanwhile, lower levels are significantly detected in other countries, highlighting the gap in digital transformation and marking the need for better and stronger institutional strategies. This is to promote digital competencies among students alongside educators.



TOUHAMI, L., & MARINI, S. (2023). La Digitalisation De l'Enseignement Public Au Maroc. International Journal of Strategic Management and Economic Studies (IJSMES), 2(3), 768-791.

Fig. 2. Planned investments in technological infrastructure for Education in Morocco

On another level, Morocco has allocated up to 1,000 million Dirhams to strengthen its digital educational system (see fig. 2). This figure is derived from a policy and budget analysis, based on governmental investment plans and official financial allocations rather than survey data. The investment reflects the country's commitment to upgrading digital infrastructure in higher education through initiatives such as digital resources, e-learning platforms, coding centers, and improved connectivity.

Compared to South Korea's advanced digital integration (nearly 90%), this allocation signals Morocco's growing awareness of the need to accelerate digital transformation (see table 1). However, infrastructure investment alone is insufficient; it must be complemented by pedagogical innovation and institutional reforms to ensure sustainable and effective implementation.

6 Conceptual Framework: Towards a Moroccan Learning Analytics Model

Based on Siemens' (2013) LA paradigm and Korea's institutional practices, this study suggests a three-tiered framework for Morocco (see fig. 3):

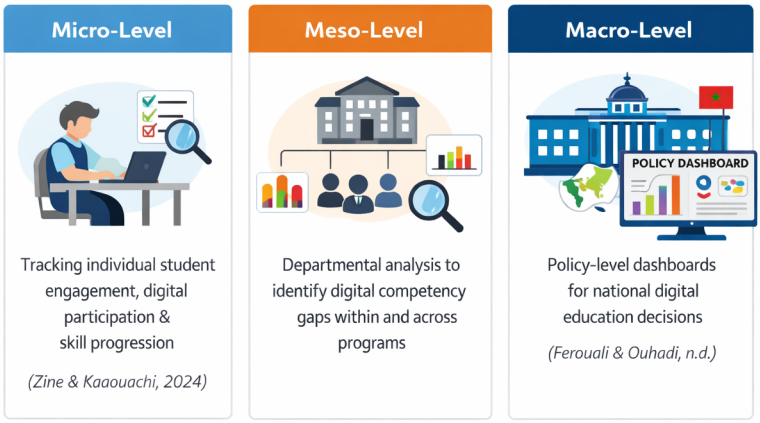


Fig. 3. Multi-Level Learning Analytics Governance Framework

This framework fosters predictive analytics and early identification of possible at-risk students and learners in general, as well as iterative improvement of digital curricula through evidence-based decisions.
It enables early identification of skill gaps and supports evidence-based curriculum reform.

7 Discussion

The results and findings confirm that South Korea's success comes mainly from its ecosystem alignment: a synergy among policy, pedagogy and technology. This is also shaped by the important influence of cultural and institutional norms emphasizing collective learning and discipline. These cultural traits have historically supported structured, data-driven and collaborative approaches to education in South Korea.
However, Morocco's trajectory reflects a grassroots evolution, driven by university initiatives embraced by important national coordination.
The introduction of centers like Code212 (Dahman & Douieb, 2025) demonstrates Morocco's willing and capacity for innovation. Yet, sustainability relies on institutional data infrastructures and teaching training (Zine & Kaaouachi, 2024).
South Korean universities do leverage big data ecosystems for adaptive learning and employ continuous faculty digital upskilling programs (Lee, H.J., Lee, E.H., & Kwon, H.J., 2024). These elements remain in the evolving level in Morocco, where many instructors lack adequate exposure to LA tools and digital pedagogy (Ghazali & Benbrahim, 2024).

Adapting South Korean data-driven model to the Moroccan context, may consider establishing a National Learning Analytics Observatory to connect universities, ministries, and EdTech partners, an initiative that would align with (Redecker & Punie, n.d.; Siemens, 2013) vision of intelligent, student dedicated systems.

8 Conclusion

This paper identifies key lessons that Morocco can draw from South Korea's advanced digital ecosystem. A structured comparison between the two contexts clarifies pathways for strengthening Morocco's higher education system and enhancing its digital maturity. Learning Analytics can significantly improve equity, student outcomes, and digital skills integration in higher education when supported by adequate infrastructure, coherent policy frameworks, and institutional preparedness (Maghni & Khannouss, 2024). Beyond the Moroccan case, these findings offer transferable insights for countries facing similar challenges in the global digital transformation of education (Dahman & Douieb, 2025). Learning Analytics thus represents a strategic lever for transforming digital skills development through evidence-based educational governance.

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