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MAKING ENGINEERING EDUCATION VISIBLE: DIGITAL INSTITUTIONAL IMAGE AND WOMEN'S INTEREST IN STEM

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Abstract:
This paper examines the role of digital institutional image in shaping women's interest in STEM and engineering study programmes. Drawing on literature on higher education image, digital communication, belonging, support and women's participation in STEM, the paper develops a conceptual interpretation of how institutional online presence may affect whether engineering education is perceived as visible, credible and attainable. The analysis suggests that websites, social media, information quality and representations of support operate as institutional signals for prospective female students. The paper does not treat digital communication as a sufficient solution to gender inequality in STEM. Rather, it argues that digital institutional image can contribute to inclusive engineering education when it communicates credibility, belonging and realistic pathways for participation within Society 5.0-oriented, human-centred and socially responsive engineering education.

Keywords: *Digital institutional image, women in STEM, engineering education, higher education communication, Society 5.0.*

Introduction

In contemporary higher education, institutional competitiveness is shaped not only by the formal quality of study programmes, but also by how institutions are perceived by prospective students. Institutional image influences perceptions of university credibility, attractiveness and trustworthiness [1], [2], while websites, social media and other online channels often represent early visible contact points with an institution [4], [9]. In the Serbian higher education context, social media has also been examined as a tool for student recruitment and university selection [8].

This is especially relevant for STEM and engineering education, where women's participation remains connected to stereotypes, support, perceived fit, access to credible information and wider educational,

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social and institutional conditions [10], [11]. Career choice research also shows that STEM decisions are shaped by environmental, social and personal factors [13], [14], which makes institutional communication relevant to how young women interpret STEM programmes as realistic and socially compatible options.

1. Conceptual Background: Digital Institutional Image, STEM Interest and Society 5.0

Institutional image can be understood as the way stakeholders interpret a university and its educational offer. Since projected and perceived image do not always coincide [1], university image may influence student behaviour, satisfaction and loyalty [2], [3].

Digital communication is one of the main environments in which this image is formed. Higher education marketing communication includes websites, social media and other online contact points [4]. Social media can support university branding and visibility [5]. Website quality and information quality also influence how institutional information is accessed, interpreted and used by students [6], [7]. The way tuition, programme and support information is presented can further shape students' understanding of institutional offers [19].

In the case of women's interest in STEM, formal access is not sufficient. Studies and policy reports connect gender gaps in STEM and the digital economy with stereotypes, social expectations, educational support and institutional environments [10], [12]. Career-choice research identifies social, environmental and personal factors as relevant to STEM decisions [13]. Studies on secondary education further indicate that barriers and supports shape whether students consider STEM pathways [14].

Belonging is also central, since it influences decisions to remain in STEM majors and can shape high school girls' interest in particular STEM pathways [16], [17].

From a Society 5.0 perspective, engineering education is expected to contribute to human-centred and socially responsive transformation. Troisi, Visvizi and Grimaldi describe the 5.0 paradigm as integrating technological, human-centred, social and knowledge-based dimensions [20], while Carayannis and Morawska-Jancelewicz link Society 5.0 and Industry 5.0 to future universities, digitalisation, social responsibility and sustainability [21]. This supports the interpretation of digital

institutional image as more than online visibility: it can help make engineering education socially meaningful, credible and accessible to a more diverse student population.

2. Digital Institutional Image as a Signal of Visibility, Credibility and Belonging

The central argument of this paper is that digital institutional image can influence women's interest in STEM when it functions as a signal of visibility, credibility and belonging. This does not mean that communication alone can solve structural gender inequalities. It means that communication participates in the symbolic environment in which study choices are interpreted. When engineering education is presented as clear, supported and socially relevant, it may become easier for prospective female students to recognise it as a possible pathway.

The first dimension is visibility. Digital channels make institutional offers more visible, but visibility has limited value if the information presented is vague, fragmented or difficult to interpret. Website quality and information clarity are therefore not merely technical issues; they shape how prospective students understand the seriousness and accessibility of an institution [6], [7]. Clear information about programmes, admission requirements, student support and career pathways can reduce uncertainty and make engineering education easier to evaluate.

The second dimension is credibility. Institutional image influences whether a university is perceived as trustworthy and attractive [1], [2]. Digital communication contributes to this image when online information is consistent, current and aligned with the institution's educational identity. Social media can strengthen visibility and branding, but it must communicate more than promotional enthusiasm [5], [9]. For prospective female students, credibility also depends on whether the institution appears to understand the barriers and expectations connected to STEM participation.

The third dimension is belonging. Women's interest in STEM is influenced by whether they expect to belong in a field and whether they perceive support as available [16], [17]. Digital institutional image can signal belonging through visible support structures, inclusive

representations, accessible student stories and realistic examples of female participation. Role models may be useful, but they should be connected to recruitment and retention in a careful way, because the effects of role models differ across contexts [18].

3. Implications for Higher Education Institutions

For higher education institutions, digital communication should be treated as part of institutional responsibility, not only as recruitment promotion. Websites and social media should provide clear information about STEM programmes and show what kind of educational environment students can expect [4], [5].

Institutions should therefore ensure that digital information is clear, coherent and accessible. Research on website quality and information quality supports the relevance of clarity, usability and reliability in online educational environments [6], [7], while tuition, programme and support information can shape students' understanding of institutional offers [19].

Communication aimed at prospective female students should also make representation and support visible. Review literature on girls and women in IT and STEM emphasizes recruitment, retention, inclusive environments and sustained support [15], while studies on barriers and supports indicate that family, school and institutional encouragement can influence STEM orientation [14].

The third implication concerns Society 5.0-oriented engineering education: institutional communication should present engineering not only through laboratories, technologies and career outcomes, but also through social relevance, ethical responsibility and student support. Since participation in technological fields remains connected to gender equality and educational inclusion [10], [11], digital institutional image can help make engineering education visible as a field where women can contribute to technological and social development.

Table 1: *Digital Institutional Signals Supporting Women's Interest in STEM*

Digital institutional signal	***Meaning for prospective female students***	***Link to Society 5.0-oriented engineering education***
Clear programme information	STEM and engineering options appear understandable and easier to compare.	Supports informed and inclusive access to technical education.
Visible student support	The institution appears prepared to support students during study, not only attract them.	Connects engineering education with student-centred development.
Female students, graduates and role models	Women can imagine themselves in STEM environments through realistic examples.	Strengthens diversity in future engineering and digital professions.
Inclusive language and imagery	STEM is presented as socially open rather than symbolically male-coded.	Frames engineering education as accessible to a wider talent pool.
Social relevance of engineering	Engineering is connected to societal needs, not only to technical difficulty.	Aligns engineering education with human-centred and responsible innovation.
Consistent website and social media presence	Digital communication appears credible, current and institutionally coherent.	Builds trust in the institution's capacity to educate for future society.

Source: Authors' own synthesis based on the conceptual analysis.

4. Conclusion

Digital institutional image has been examined as a conceptual link between women's interest in STEM and the visibility of engineering education. The analysis suggests that institutional websites, social media, information quality, and digital representations of support function as signals that influence whether STEM programmes are perceived as credible, accessible, and socially compatible. In this sense, digital communication is understood not only as a promotional tool, but also as part of the environment in which prospective female students interpret their potential belonging in STEM.

It is not claimed that digital institutional image can resolve the underrepresentation of women in STEM. Rather, the analysis suggests that institutional communication can contribute to shaping perceptions of who belongs, what support is available, and why engineering education is relevant. Within the context of Society 5.0-oriented engineering education, visibility, credibility, and belonging should therefore be integrated into responsible institutional communication. Future empirical research is needed to validate the proposed conceptual framework among prospective female students.

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