

Preparing a Fuzzy Map of Factors Affecting the Increase of Students' Information Literacy (Case study: Postgraduate Students in Technical Fields at Lorestan University)

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Abstract

Purpose: Higher education institutions, in the process of equipping students with the knowledge and skills they need, engage in activities—both directly and indirectly—related to information and its use, including fostering information literacy. Through various supportive factors, higher education institutions seek to facilitate the process of enhancing students' information literacy. Accordingly, the present study aimed to prepare a fuzzy map of the factors affecting the improvement of students' information literacy.

Methodology: This study is applied in terms of its purpose and exploratory in terms of its data collection method. The statistical population consisted of postgraduate students in electrical engineering and computer science at Lorestan University, from which 20 individuals were selected as sample members using purposive sampling based on the principle of theoretical saturation. Data collection tools included interviews in the qualitative phase and a questionnaire in the quantitative phase. For data analysis, the qualitative phase employed content analysis and coding using Maxqda software, while the quantitative phase utilized the fuzzy cognitive map method.

Findings: The research findings revealed that the most important factors affecting the improvement of students' information literacy are: creating awareness and understanding the importance of information literacy in academic and research success; independent external motivations; the existence of appropriate policies at the university level to promote information literacy; access to advanced information and communication technology devices; and the level of trust in the Internet.

Conclusion: Overall, the results indicated that improving students' information literacy is a multidimensional phenomenon influenced by the simultaneous interaction of individual, organizational, and technological factors. Students' awareness of the importance of information literacy and its role in academic and research success, along with external motivations, university supportive policies, access to advanced information and communication technology infrastructure and equipment, and the level of trust in the Internet, collectively exert the greatest impact on enhancing information literacy.

Value: The present study is among the first to examine the factors affecting the improvement of students' information literacy using a mixed-methods approach and the fuzzy cognitive map method.

Keywords: *Information Literacy, Students' Information Literacy, Theme Analysis, Fuzzy Cognitive Map.*

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Extended Abstract

Introduction: In the context of rapid change, 21st-century teachers face significant challenges arising from the swift development of artificial intelligence, virtual reality, and the expansion of social, economic, and cultural relations through the Internet. In this sense, society is organized around a new paradigm of communication mediated by networks and the Internet, which represents another revolution for humanity. According to Inamorato et al. (2023), assessing and discussing the levels of digital competence and digital literacy that students and teachers achieve is crucial for creating educational policies appropriate to the needs of their environment.

As an important part of the higher education system, the literacy needs and structure of the university student body are facing new opportunities for change. The ability to use appropriate methods to accurately access desired information, classify and logically manage information, and transfer it across vast information resources is a fundamental skill that university students must master. Individuals with information literacy skills know when to obtain information, understand the organization of knowledge, and are better equipped to acquire information, comprehend it, and solve problems more effectively and efficiently. Evidence has shown that many students, even after graduation, possess limited knowledge about information search and retrieval, completing their courses with this insufficient knowledge.

The existence of obstacles—such as students' lack of familiarity with locating and correctly evaluating information, and on the other hand, information professionals' lack of awareness of students' performance when searching for information—leads to students' failure to access the information they need. One of the core components of today's educational systems is the higher education and university system, which is responsible for improving the level of education and research in society. Higher education institutions, in the process of equipping students with the knowledge and skills they need, engage in activities related to information and its use—either directly or indirectly—including fostering information literacy. Through various factors, higher education institutions strive to facilitate the process of teaching information literacy to students.

Purpose: Given the significance of the subject, the present study sought to identify the factors affecting the improvement of students' information literacy and to determine their prioritization.

Methodology: This study is applied in terms of its purpose and exploratory in terms of its data collection method. The statistical population consisted of postgraduate students in electrical engineering and computer science at Lorestan University, from which 20 individuals were selected as sample members using purposive sampling based on the principle of theoretical saturation. Data collection tools included interviews in the qualitative phase and a questionnaire in the quantitative phase. For data analysis, the qualitative phase employed content analysis and coding using Maxqda software, while the quantitative phase utilized the fuzzy cognitive map method. The validity of the research interviews was confirmed using the relative content validity method, and their reliability was confirmed through intra-coder and inter-coder reliability procedures, as well as Cohen's Kappa test. The validity and reliability of the research questionnaire were also measured using content validity and the test-retest method.



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Findings: The research findings consisted of two parts: qualitative and quantitative. In the qualitative phase, the factors affecting the improvement of students' information literacy were identified, while in the quantitative phase, the priorities of these components were determined. The findings of the qualitative phase revealed that the factors affecting the improvement of students' information literacy include: having advanced information and communication technology devices; students' internal motivation and attitude; training in research and information analysis skills; critical thinking ability; active learning ability; independent external motivations; emotional intelligence infrastructures; allocating sufficient budget and facilities to develop information literacy infrastructures; creating interactive opportunities between students and information professionals; creating awareness and understanding of the importance of information literacy in academic and research success; the level of access to information resources; the existence of appropriate policies at the university level to promote information literacy; continuous evaluation and updating of educational programs and content; designing and implementing interdisciplinary programs in the field of information literacy; and the level of trust in the Internet. The findings of the quantitative phase indicated the prioritization of factors affecting the improvement of students' information literacy. The most important factors were: creating awareness and understanding the importance of information literacy in academic and research success; independent external motivations; the existence of appropriate policies at the university level to promote information literacy; having advanced information and communication technology devices; and the level of trust in the Internet.

Table 1: Indegree, Outdegree and Centrality

	Indegree	Outdegree	Outdegree
Having advanced information and communication technology devices	6.81	7.61	14.42
Training in research and information analysis skills	7.25	6.82	14.07
Ability to active learning	7.18	6.4525	13.6325
Emotional intelligence infrastructure	7.285	6.1625	13.4475
Creating interactive opportunities between students and information professionals	7.2325	6.4075	13.64
Level of access to information resources	6.6425	5.92	12.5625
Continuous evaluation and updating of educational programs and content	7.2925	7.0225	14.315
The level of trust in the Internet	7.2375	7.18	14.4175
Students' intrinsic motivation and attitude	6.71	7.0275	13.7375
Critical thinking ability	6.6575	7.37	14.0275
Independent external motivations	7.1225	7.4925	14.615
Allocating sufficient budget and facilities to develop information literacy infrastructure	6.3375	7.615	13.9525
Creating awareness and understanding of the importance of information literacy in academic and research success	6.8925	7.89	14.7825
The existence of appropriate policies at the university level to promote information literacy	7.6025	6.92	14.5225
Designing and implementing interdisciplinary programs in the field of information literacy	6.9775	7.34	14.3175

Conclusion: In general, the results of this study indicated that improving students' information literacy is a multidimensional phenomenon influenced by the simultaneous interaction of individual, organizational, and technological factors. Students' awareness of the importance of information literacy and its role in academic and research success, along with external motivations, university supportive policies, access to advanced information and communication technology infrastructure and equipment, and the level of trust in the Internet, collectively exert the greatest impact on enhancing information literacy.

Value: The present study is among the first to examine the factors affecting the improvement of students' information literacy using a mixed-methods approach and the fuzzy cognitive map method.

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