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Research Article

Global Research Trends on Integrating Moral Reasoning in the Education of Future IT Professionals: A Bibliometric Analysis

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ABSTRACT

This paper is a bibliometric review of literature on integrating moral reasoning in information Technology (IT) education that aims to explore its publication situation, significant sources, research topic, temporal trends, and gaps in the literature. Through bibliometric techniques, the research reviewed 334 articles published in 179 sources in 1983-2025 from Scopus database. The results indicate that the sector has shown progressive growth with a rate of 4.63 per year and on average the documents are 7.37 years of age. The literature is highly conference-oriented as the majority of publications are through conference papers, which shows the rapid and practice-driven nature of knowledge dissemination. Most of the publication come from ASEE, FIE, ITICSE, ACM conference proceedings, and SIGCSE-related journals, which means that the discipline is largely influenced by engineering and computing education communities. Term-frequency output reveals that the most common terms are students, ethics, curriculum, computing education, and computer science education, indicating that the area is main concern with the incorporation of ethical knowledge and reasoning into formal education of technology. Themes that develop based on artificial intelligence, machine learning and AI ethics also show how the field reacts to modern technological trends. Some of gaps in the analysis are low international collaboration and inadequacy of research on effective pedagogical strategies to teach ethics. Overall, the findings indicate that integrating moral reasoning in IT education is an emerging and developing discipline that is relevant in equipping students with ethical consciousness, critical thinking, and professional accountability in a technological society.

Keywords: *Depigmentation, whitening, lightening, skin whitening, bleaching, fairness*

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Introduction

Moral intelligence helps to shape a person's role in the society. This context has grown globally, but they remain underexplored in specialized field like IT education which is a rapidly growing field (Puspitasari et al., 2022). Technology profession is one of the high-growth occupations worldwide (Li et al., 2021) and the reason for the increase in the number of enrollees every year in the IT programs. Consequently, there is also a bigger responsibility to train these aspiring IT professionals to inculcate moral reasoning to ensure in shaping future professionals with high moral standards in using digital technologies. Teaching them with the core programming courses, software design, machine learning algorithms and theories in technology with the integration of moral reasoning in decision making will uphold high standard of professionalism and trust among IT professionals (Danaher & Sætra, 2022). Within the context of teaching the students under technology programs, the ethical aspects in use of technology, particularly Artificial Intelligence (AI) are shaped by varying standards and institutional regulations (de Almeida et al., 2021). With this there are proposed frameworks which assist to provide guidance to future software developers to make ethical and responsible decisions. In addition, the framework aims to cultivate ethical awareness and support human dignity, wellbeing and to prevent harm (Reis et al., 2023). In this study the literature indicates that there has been a growing interest in moral reasoning, moral education and ethical integration in education in general.

Objectives of the study

This bibliometric analysis aims to examine and analyze the global research trends on the integration of moral reasoning in the education of future IT Professionals. The specific objectives are as follows:

1. Map global research outputs related to integrating in moral reasoning in technology-orientated education.
2. Determine the most productive publication sources where moral reasoning is integrated into IT education literature.

3. Identify the most frequently occurring terms and conceptual focus areas in the literature on integrating moral reasoning in IT education.
4. Reveal chronological patterns and emerging research directions.
5. Identify gaps that future IT-education researchers can address.

Materials and Methods

Study Design

This study focused on examining research on integrating moral reasoning in teaching and learning in IT education. The data for this study were extracted from the Scopus database and analyzed using R Bibliometric tools and VOSviewer for visual mapping. This method helps to understand the dominance of research, the most productive publications, key topics, and emerging areas of research.

Define Scope

Defining scope is the preliminary stage conducted to identify the topic, objectives, time range, keywords, and database source.

Data Collection

Data extraction was performed by retrieving data from the Scopus database. The data covered the range from 1983–2025, retrieved on February 27, 2026, using the following query: *TITLE-ABS-KEY (("moral reasoning" OR "ethical reasoning" OR ethics OR "professional ethics") AND ("IT education" OR "information technology education" OR "computing education" OR "computer science education" OR "IT curriculum" OR "technology student*"))* This query was designed to ensure that other similar terminologies related to Information Technology, Computing Education, and Moral Reasoning are covered.

Data Cleaning

In this process, the data retrieved from Scopus were filtered and cleaned using `distinct()` and `str_trim()` functions in R software. These functions were used to remove duplicates and extra spaces at the beginning and end of text entries. There were no data duplications; however, trimming spaces from the data ensured the database remained consistent and standardized.

Data Analysis

Several bibliometric techniques were applied using historical data to analyze patterns. The data analysis techniques implemented include yearly publication trends, core sources by Bradford's Law, and keyword co-occurrence analysis.

Data Visualization

In this phase, results are presented clearly to make data easy to understand. Biblioshiny and VOSviewer were used to produce data visualizations such as relationships, networks, charts, and patterns of the bibliometric results.

Result and Discussion

Overview aof the Dataset

Table 1. Summary of statistics of the bibliometric dataset

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1983:2025
Sources (Journals, Books, etc)	179
Documents	334
Annual Growth Rate %	4.63
Document Average Age	7.37
Average citations per doc	9.234
References	0
DOCUMENT CONTENTS	
Keywords Plus (ID)	1650
Author's Keywords (DE)	736
AUTHORS	
Authors	943
Authors of single-authored docs	64
AUTHORS COLLABORATION	
Single-authored docs	70
Co-Authors per Doc	3.33
International co-authorships %	10.78
DOCUMENT TYPES	
article	60
book	6
book chapter	14
conference paper	226
conference review	25
review	3

The bibliometric dataset comprised 334 publications indexed in 179 sources covering the period 1983-2025. The annual growth rate was 4.63% with an average document age of 7.37 years and 9.23 citations per document. The dataset includes 943 authors, averaging

3.33 co-authors per documents, while international co-authorship account for 10.78%. Conference papers (226) represented the largest document type, followed by journal articles (60), conference reviews (25), book chapters (6), and review articles (3).

suggests sustained scholarly interest and reflects the gradual maturation of the field. Publication productivity, citation indicators, and source distribution are widely recognized as measures of research development and intellectual growth in bibliometric studies (Donchu et al., 2021). In the same, bibliometric indicators provide valuable evidence for understanding the evolution and maturity of scientific fields (Aria & Cuccurullo, 2017; Kanbach et al., 2024).

The predominance of conference proceedings demonstrates that ethics education in computing is disseminated primarily through conference-based communities, where pedagogical innovations and emerging technologies are rapidly exchanged. This publication pattern is consistent with the important role of conference proceedings in scientific communication within computing discipline (Lochetkov et al., 2022). Furthermore, the emergence of artificial intelligence, machine learning, and AI ethics among the most frequent terms reflect the field's growing response to contemporary ethical challenges associated with intelligent technologies, supporting observations by Kazim and Koshiyama (2021) that AI ethics has become an increasingly significant area of scholarly inquiry.

Research Gaps and Future Research

The bibliometric findings reveal several opportunities for future research. Existing studies predominantly emphasize students, curricula, and instructional context, which comparatively few investigate the effectiveness of instructional approaches for cultivating ethical reasoning. Future studies should evaluate teaching strategies such as case-based learning, project-based learning, simulations, reflective writing, and ethics-focused modules using empirical outcome measures.

Another notable gap is the limited attention given to ethical issues surrounding emerging technologies. Although artificial intelligence, machine learning, and generative AI are increasingly represented in recent publications, further research is needed to examine algorithmic bias, transparency, accountability, privacy, and responsible AI within IT education. Finally, the relatively low percentage of international co-authorship indicates limited global collaboration. Comparative cross-country studies and multinational research partnerships could provide broader perspectives on integrating moral reasoning across different educational systems, institutional context, and cultural environments, thereby strengthening the global relevance of ethics education for future IT professionals.

Conclusion

This bibliometric analysis demonstrates that the research on integrating moral reasoning into the education of future IT professionals has experienced steady growth over the past four decades. The literature is primarily disseminated through engineering and computing education conferences, highlighting the importance of conference venues in advancing ethical discussion within technology education. The thematic analysis further shows that the field is centered on ethics, curriculum development, computing education, and student learning which increasingly incorporating topics related to artificial intelligence and responsible technology.

Although the field continues to expand, opportunities remain to strengthen evidence on effective ethics instruction, address emerging AI-related ethical issues, and encourage greater international collaboration. In general, these findings provide a comprehensive overview of the current intellectual

landscape and offer valuable directions for educators, researchers, and curriculum developers seeking to strengthen moral reasoning and professional responsibility in future IT professionals.

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