

Content and Skills for Teaching BPM in Computer Science Courses: a Systematic Mapping Study

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Abstract. *This study investigates the content and skills explored in the teaching of Business Process Management (BPM). Through a systematic literature review, we aim to understand and highlight the trends and gaps in BPM education. The results offer valuable insights to enhance education and align professionals with market demands.*

1. Introduction

The teaching of Business Process Management (BPM) encounters challenges in delivering necessary content and skills due to the dynamic nature of processes (Moormann and Bandara, 2012; Dumas et al., 2012). Despite BPM's maturity, persistent challenges such as misalignment between education and job market skills underscore the need to align curricula with BPM professional requirements (Delavari et al., 2010). Addressing these gaps is crucial for institutions and individuals, highlighting the importance of defining curricula aligned with practical realities.

This study aims to address the absence of consensus in defining a standardized BPM curriculum and challenges in aligning programs with industry dynamics, emphasizing the necessity for thorough investigation. The research follows a clear methodological structure, beginning with background and related works (Section 2), followed by methodology application (Section 3). Results are systematically presented (Section 4), leading into a discussion comparing methodologies with curriculum guidelines (Section 5). Finally, the conclusion summarizes contributions, addresses limitations, and outlines a research agenda for future studies, providing a comprehensive investigation into BPM education in computer science courses.

2. Background

The study identified a lack of comprehensive investigation in BPM education, contrasting with four literature reviews that addressed various aspects such as guidelines for BPM success and the shortage of qualified professionals (Moormann and Bandara, 2012; Dumas et al., 2012; Delavari et al., 2010). Distinguishing itself from previous studies, this research proposes a detailed analysis of content, skills, teaching methods, and technological impact in BPM education.

In terms of teaching methodology, different approaches are classified, ranging from collective, group, individualized, to socialized-individualized methods (Brighenti et al., 2015). In the field of BPM education, the use of Bloom's taxonomy to articulate learning objectives is illustrated, categorizing them within the cognitive domain (Pasha, 2013).

3. Methodology

The study conducted a Systematic Mapping Study (SMS) to comprehensively gather information on BPM education, aiming to understand how BPM concepts are taught. (Kitchenham and Charters, 2007) Research questions were specified, which will be presented with the results; to guide the study, focusing on content, skills, teaching methods, technological support and challenges in teaching BPM.

The search strategy involved automated searches across multiple databases using relevant keywords. Selection criteria were applied to identify relevant primary studies, with a focus on publications from 2013 to 2023. Quality assessment criteria were established to evaluate the selected studies. Data collection and synthesis involved organizing variables such as title and authors, incorporating quality criteria for result synthesis. Finally, a repository was established to present the findings in line with scientific standards for data sharing.

4. Results

Implementing the search strategy detailed in subsection 3.3, the data collection process progressed. The selected research sources, ACM DL, IEEEExplore, ScienceDirect, and Scopus, yielded a total of 1674 initially identified articles. After applying inclusion and exclusion criteria and conducting filters on titles, abstracts, introductions, and conclusions, 35 articles were considered in the final phase of selection. Applying quality criteria, 21 papers were ultimately qualified for analysis, ensuring the methodological robustness and reliability of the selected papers.

RQ1: What is the main content covered in BPM education? The SMS uncovered diverse content covered in BPM education, documented in qualified articles. Among twenty articles directly addressing this, five main contents are identified: introduction to BPM, business process modeling, business processes in technologies, performance in business processes, and interdisciplinarity in BPM. These articles explore traditional teaching content alongside innovative methods like Serious Games, integration of analytics, Digital Game-Based Learning, and interdisciplinary challenges.

RQ2: What are the key skills developed in BPM education? BPM education focuses on developing fundamental competencies essential for students' academic and professional growth. Out of twenty articles addressing this, six key competencies are identified. These include understanding the BPM project lifecycle, process modeling skills, and the use of simulation games like the Paper Game and BPMN Wheel. Additionally, hands-on practice with BPM support tools such as Signavio Academic and Signavio Process Editor is emphasized, along with the development of interpersonal skills necessary for Business Process Analysts. Interdisciplinary skills are highlighted to bridge gaps in BPM training, while managing business processes and observing organizational processes are emphasized for real-world BPM challenges.

RQ3: What are the teaching methods for conveying BPM knowledge? Various methods are utilized for teaching and assessing BPM knowledge, as discussed in nineteen articles. Brighenti et al.'s (2015) classification guides the analysis of these methods, ensuring effective BPM knowledge transmission. Socialized-individualizing teaching methods emphasize hands-on tasks and pre/post-tests, while group methods include innovative exercises and gamified approaches. Collective methods advocate for interdisciplinary training, and individualized methods involve self-learning programs and integrated flipped classroom and Problem-Based Learning (PBL) approaches. These diverse strategies facilitate effective BPM education and assessment.

RQ4: How do technologies support BPM education? Technological advancements have significantly transformed BPM education. Among 16 articles addressing this, four main technologies supporting BPM teaching are identified: Serious Games, Business Process Modeling Software, E-learning, and Frameworks. Serious Games enhance learning and motivation, while Business Process Modeling Software combines various tools with pedagogical approaches. E-learning platforms contribute to understanding BPM logic, and frameworks like aCHAT-WF improve user-friendliness. These technologies offer practical experiences and deeper understanding, marking an innovative evolution in BPM education.

RQ5: What are the main challenges in the training of BPM professionals? The study highlights a gap in research regarding the alignment between BPM education at universities and technical market requirements. Three perspectives are outlined: the increasing demand for Information Systems professionals with skills in business process analysis, the prioritization of interpersonal skills by employers over technical skills in BPM, and the need to incorporate BPM knowledge into university curricula. These studies underscore the importance of educational innovations, such as simulation games, for BPM professional training, highlighting challenges in adapting teaching to meet digital demands.

5. Discussions And Conclusions

To compare the results of this SMS with the curriculum guidelines for BPM education, we relied on the Training References for Undergraduate Computing Courses 2017 provided by the Brazilian Computing Society (SBC). These references cover general and specific competencies aligned with the management of information systems and technology. It emphasizes the need for diversified approaches and innovative methodologies to address dynamic demands effectively, ensuring students are prepared for real-world challenges. A comparative analysis reveals a good correspondence between the contents covered in BPM education and the established guidelines.

Furthermore, the study compares its findings with established guidelines like the BPM CBOOK and SBC's specific content, offering insights into BPM education's alignment with industry practices. It identifies limitations such as potential geographic biases and subjective article selection criteria. The study proposes a research agenda to enhance BPM education, focusing on interpersonal competencies, emerging technologies' impact, innovative methodologies, comparative research between national contexts, and developing dynamic BPM curricula to meet evolving business needs.

6. References

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