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Piotr Sliż

Justyna Berniak-Woźny

Edyta Brzychczy

Renata Gabryelczyk

Katarzyna Gdowska

Marzena Grzesiak

Aneta Napieraj

Marta Podobińska-Staniec

Natalia R. Potoczek

Marek Szelągowski

Piotr Senkus

Krzysztof Kluza

Business Process Management education in Poland: A manifesto for academic teaching

Abstract

This paper critically assesses Business Process Management (BPM) education in Poland and provides evidence-based recommendations for improvement. Through a survey of 44 BPM educators, the study evaluates BPM lifecycle coverage, IT tool utilization, and incorporation of the Six Core Elements of BPM. The findings reveal a focus on process modeling and analysis, identifying gaps in the way the entire BPM lifecycle is addressed. Despite the utilization of various IT tools, there is a notable absence of coverage for emerging topics such as process mining, AI, and Robotic Process Automation. Only 12% of courses cover all Six Core Elements of BPM, and there is a critical gap in student education, which is the underrepresentation of the People and Culture elements. The paper concludes with a manifesto for greater alignment between academic education and industry needs through comprehensive BPM curricula, dedicated software tools, and more robust coverage of the strategic and governance aspects of BPM. This will bridge the gap between academic education and real-world BPM applications, so that graduates can be better prepared for the challenges of the modern business landscape, which can enhance the quality and effectiveness of BPM education, thereby aligning it with the evolving demands of the business environment and contributing to the growth and competitiveness of organizations in Poland.

Keywords: BPM education, Business Process Management, technologies in BPM education, academic teaching, manifesto

Introduction

Higher Education Institutions (HEIs) aim to equip students and graduates with a future-proof skillset, which will enable them to adapt to and fit into the swift digital transformation of Industry 4.0 and effectively develop intellectual capital in line with Industry 5.0. Teaching Business Process Management is crucial for ensuring preparation for the challenges of the modern economy. It prepares for the use in economic practice of constantly developing new technologies that have an increasing impact on

Piotr Sliż, Gdańsk University of Technology, Poland, https://orcid.org/0000-0001-6776-3369
Justyna Berniak-Woźny, Systems Research Institute of the Polish Academy of Sciences, Poland, https://orcid.org/0000-0002-3156-5755
Edyta Brzychczy, AGH University of Krakow, Poland, https://orcid.org/0000-0002-0315-5636
Renata Gabryelczyk, University of Warsaw, Poland, https://orcid.org/0000-0002-3506-7438
Katarzyna Gdowska, AGH University of Krakow, Poland, https://orcid.org/0000-0002-7964-3724
Marzena Grzesiak, Gdańsk University of Technology, Poland, https://orcid.org/0000-0001-5217-1061
Aneta Napieraj, AGH University of Krakow, Poland, https://orcid.org/0000-0002-0437-7273
Marta Podobińska-Staniec, AGH University of Krakow, Poland, 0000-0002-3250-0646
Natalia R. Potoczek, Institute of Economics of the Polish Academy of Sciences, Poland, https://orcid.org/0000-0002-7288-0321
Marek Szelągowski, Systems Research Institute of the Polish Academy of Sciences, Poland, https://orcid.org/0000-0002-5114-6793
Piotr Senkus, University of Warsaw, Poland, https://orcid.org/0000-0001-9033-6437
Krzysztof Kluza, University of Gdańsk, Poland, https://orcid.org/0000-0003-1876-9603

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the efficiency and competitive position of enterprises. In evolving industries, proficiency in comprehending, optimizing, and streamlining business processes is becoming essential for navigating dynamic and interconnected business environments. Perhaps more importantly, BPM education supports an approach to management that uses the knowledge and dynamism of employees on a daily basis, necessary for the effective implementation and continuous improvement of business processes. Investing in people's BPM competences is vital to maintain economic growth and prepare for the jobs of the future, especially in the face of the rapid development of AI, but also due to the potential slowdown due to factors like an aging population, geopolitical tensions, and the need to meet decarbonization commitments.

In Poland, an emerging trend is observed in assessments of organizational maturity, highlighting a focus on the implementation of BPM by organizations. Consequently, BPM is gaining in importance, and this leads to its increasing operationalization and a growing demand in the Polish economy for specialists in this field (Sliż et al., 2023). As a result, competencies associated with BPM have emerged as valuable assets in the job market, compelling universities to offer up-to-date practical knowledge, encompassing areas such as process modeling and process mining (Senkus et al., 2023). This trend has generated a series of questions within the academic community, prompting this paper's primary aim, being to critically assess the state of BPM education in Poland and propose evidence-based recommendations for improvement.

- **Main research question**: Is BPM taught holistically and practically?
- **Detailed research questions** (DRQ) include:
  - **DRQ1**: To what extent does BPM education cover the BPM lifecycle?
  - **DRQ2**: What supporting information systems for each phase of the BPM lifecycle are used in teaching?
  - **DRQ3**: To what extent does BPM education incorporate the Six Core Elements of the BPM framework?
  - **DRQ4**: Is BPM education in Poland of interdisciplinary nature?
  - **DRQ5**: Does the academic community adequately prepare students for BPMN certification?

This article helps to expand the knowledge of BPM by providing a comprehensive overview and diagnosing the current state of BPM education in Poland. It presents a manifesto for enhancing holistic BPM education and proposes recommendations for bridging the gap between academic theory and industry practice. Addressing the main research question involves referencing two prominent BPM frameworks: the BPM lifecycle (Dumas et al., 2018; Szelągowski, 2019), and the Six Core Elements of Business Process Management (Kerpedzhiev et al., 2021; Rosemann & vom Brocke, 2014). The research employs research methods such as a comprehensive literature review and a survey-based opinion research study, the former providing an overview of the current state of BPM education by examining publications in Polish and international contexts, and the latter gauging the practical aspects of BPM education in Poland based on gathered insights and opinions expressed by educators, practitioners, and students.

Context of the study

The history of process management covers a period spanning more than a century, with its formal inclusion in university curricula occurring in the late 1990s. Predominantly integrated into computer science and business management study programs (Koch et al., 2022), BPM has been found to be useful in diverse sectors such as healthcare (Mang et al., 2009). Over the past five years, teaching BPM has gained prominence through the International Conference on BPM, a key annual event for BPM researchers, educators, and practitioners, notably featuring the Educators Forum as a platform to share global teaching know-how. For instance, insights from Australia have focused on university program design in process management (Syed et al., 2023) and the application of active learning methods with efficient assessment of intended learning outcomes (Evans et al., 2023), as well as German good practices such as project-based approaches to holistic BPM teaching based on real-world implementations (Weber & vom Brocke, 2023) and the use of interactive Moodle and H5P plugin-based activities for project-based learning (Groher & Dietschweiler, 2023).

In Poland, while BPM courses have long been taught at HEIs, a comprehensive and interdisciplinary approach to BPM issues aligned with international standards has been present for less than twenty years. The Higher Education Act of July 27, 2005 (Ustawa, 2005), the Regulation issued by the Minister of Science and Higher Education of July 12, 2007, on education standards and the content and effects of education in all fields of study (Rozporządzenie, 2007), were the only two pieces of legislation to define the educational content in this field A holistic approach to managing processes in organizations is included in the educational content of Master's programs in Management. The curricula of Bachelor's and Master's programs in Logistics, Transport, Production Management, and Engineering as well as technical fields, particularly IT system development, include elements of BPM education focused on selected groups of processes. Nowadays, education standards in Poland are aligned with the European Qualifications Framework, granting HEIs the autonomy to create their own study programs, and thus independently configure course syllabi. This direction was pursued in Poland under the Regulation issued by the Minister of Science and Higher Education of November 2, 2011, on the Polish Qualifications Framework for Higher Education (Rozporządzenie, 2011). Over the past decade, it has

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become evident that the emphasis of academic communities on ensuring students' appropriate qualifications has had a beneficial effect on development of the courses offered by HEIs. The research to which this paper refers showcases significant differences in BPM teaching programs at universities, across the multitude of fields of study. Management fields naturally develop a holistic approach to BPM, while technical fields more often refer to technological support for business processes. Universities have now embraced a practical approach to education, an idea that has been advocated for many years.

Legal requirements have been established for the development of practical orientation in education through minimum standards, as well as through various possibilities (Ustawa, 2018). According to Article 62 of this 2018 act on higher education, universities may offer dual studies, which are programs with a practical orientation conducted in collaboration with employers. Additionally, Article 64.2 stipulates that programs with a practical focus should allocate more than half of the ECTS points to classes that enhance practical skills, whereas programs with a general academic focus should allocate more than half of the ECTS points to classes related to scientific activities conducted at the university. These legal provisions provide ample opportunity for universities to collaborate with businesses in enhancing students' practical skills. Universities may choose to increase the role played by professionals in their study programs or to forge scientific and research partnerships between academic staff and various enterprises and institutions to varying extents.

Within the BPM community in Poland, the substantial discourse on this subject includes optimal teaching methodology, good practices, and challenges encountered in BPM education. These subjects were prominent items on the agendas of the BPM Symposia and the BPM Day Conference – recurring meetings of researchers, teachers, and business representatives devoted to the process-oriented approach in management. The multitude of BPM education-related topics raised by participants at the BPM Symposia resulted in a dedicated session at which BPM educators share experiences and address challenges. The key challenges of BPM education in Poland include:

1. Designing and implementing courses and study programs centered on BPM, enabling effective teaching of up-to-date and applicable issues in this field.
2. Enhancing certified competencies in process modeling and proficiency in various notational methods, e.g. in BPMN.
3. Utilizing engaging pedagogical methods, e.g., a flipped classroom, to facilitate the learning process on process management issues (second Symposium; third Symposium, BPM Day Conference).

These discussions underscore the commitment of the Polish BPM community to refining BPM education and addressing the associated evolving challenges.

Theoretical background

Addressing the research question regarding holistic BPM education involves referencing two well-known BPM frameworks: the BPM lifecycle (Dumas et al., 2018) and the Six Core Elements of BPM (Rosemann & vom Brocke, 2014).

The BPM lifecycle (Dumas et al. 2018, p. 23), a widely-known framework in BPM education, is a basis for BPM-related courses at more than 300 universities around the world. The stages of the BPM cycle lifecycle include process identification, process discovery, process analysis, process redesign, process implementation, and process monitoring and control. The BPM lifecycle stresses close cooperation between process analysts, system analysts, and domain experts as a key factor for successful improvement initiatives. A more holistic approach to the BPM lifecycle can be further emphasized from the perspective of dynamic BPM (Szelągowski, 2018).

The Six Core Elements of BPM proposal were developed in 2014 by Rosemann and vom Brocke (2012) based on earlier work by de Bruin and Rosemann (2007). A thorough revision of the Six Core Elements to address the requirements of Industry 4.0 was proposed by Kerpedzhiev et al. (2021). The Six Core Elements of the BPM framework serve as a foundation for assessing holistic BPM education for two main reasons. Firstly, this model represents a contemporary understanding of BPM as a holistic management approach, extending beyond process optimization to strategic management. Secondly, the Six Core Elements encapsulate all facets of BPM in an organization: strategic alignment, governance, methods, information technology, people, and culture. This is the comprehensive scope of BPM. The Six Core Elements provide a comprehensive framework for BPM, useful for managing complexity, guiding projects, standardization, and strategy. This model has been applied and proven useful for assessing BPM maturity and guiding process improvement initiatives in numerous case studies (vom Brocke et al., 2021). The direction of further development of this tool and its adaptation to the requirements of Industry 5.0 was proposed by Szelągowski and Berniak-Woźny (2024).

Thus, we advocate for its incorporation into educational programs, as it provides an excellent basis for structuring knowledge about BPM and includes all the facets of BPM.

Study design

This study utilized a three-step process to collect exploratory survey data on teaching BPM at HEIs in Poland. The survey questionnaire consisted of fifteen questions covering various aspects of BPM courses, including topics taught, tools used, teaching methods, and respondents' backgrounds. Both open-ended and closed-ended questions were included. The study was prepared in the following steps a pilot study, a paper-based survey, and an online survey.

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In summary, this non-representative, exploratory survey employed multiple distribution methods to maximize participation. However, the sample was limited to those with direct access or referral. The multi-phase approach made it possible to refine the questionnaire and expand the non-probabilistic sample. While not representative, the data provides initial insights into BPM education from the perspectives of educators at major Polish universities.

As the study focuses on evaluating the state of BPM education in Poland, emphasizing a holistic and practical approach, the authors first defined these concepts through a critical literature review and developed the research tool–a survey questionnaire. Detailed Research Questions (DRQs) were used as a guide for analyzing the empirical study results. The DRQs addressed issues such as the courses' content from the perspective of BPM lifecycle phases, IT tools used, adherence to the Six Core Elements of the BPM framework, management and technical issues, and certifications covered in courses. The detailed research questions and the approach used to analyze the collected data are presented in Figure 1.

BPM Education in Poland – empirical results

The study involved teachers associated with the BPM community in Poland, representing 22 Polish scientific institutions. Among the 44 respondents, there were three professors, fifteen associate professors, 23 assistant professors, and three assistants, with quite diverse work experience ranging from 3–10 years among assistants, 3–20 years among assistant professors, and 5–25 years among professors and associate professors. The largest group was research and teaching staff (80%), followed by teaching staff (14%) and persons in research positions (7%).

In our sample, we collected responses about 91 BPM-related courses. The number of courses offered by scientific institutions is different. In Figure 2, we present TOP10 universities with the highest number of BPM-related courses.

The highest number of courses is offered by two major technical universities: AGH University of Krakow (17) and Warsaw University of Technology (16). The University of Warsaw is the third institution, with nine courses offered. Teachers of the offered courses represent various scientific disciplines. Most of the courses are elements of management and quality studies, information and communication technology, mechanical engineering, and economics and finance. Courses are offered as first cycle studies (48) and second-cycle studies (with 42 courses).

The classes are predominantly lectures (65 courses) and laboratory classes (45). In the analyzed dataset, 54 courses featured at least two different forms of classes.

The number of lecture hours in one course ranges between four and thirty, but usually this is from fifteen (51%) to thirty (31%). Conversatory classes often span around fifteen hours (53%), but this number varies between six and sixty hours in different courses. The number of hours allocated to laboratory activities ranges between six and thirty, but most often it is thirty hours (28%), while there are fifteen hours (80%)

Figure 1
Research model

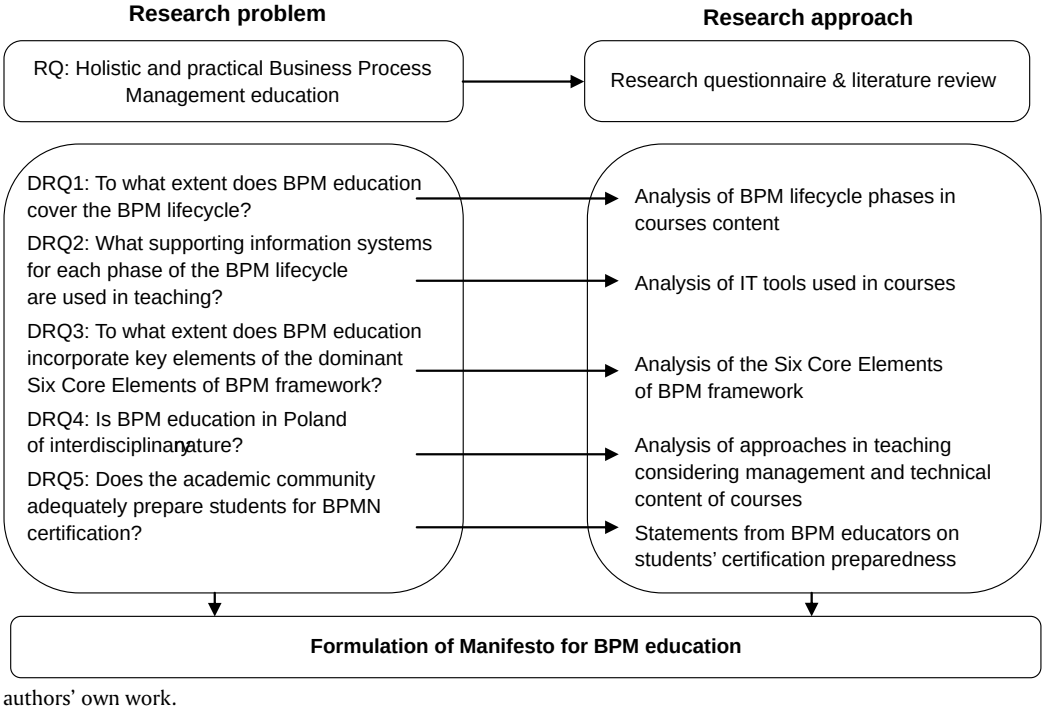

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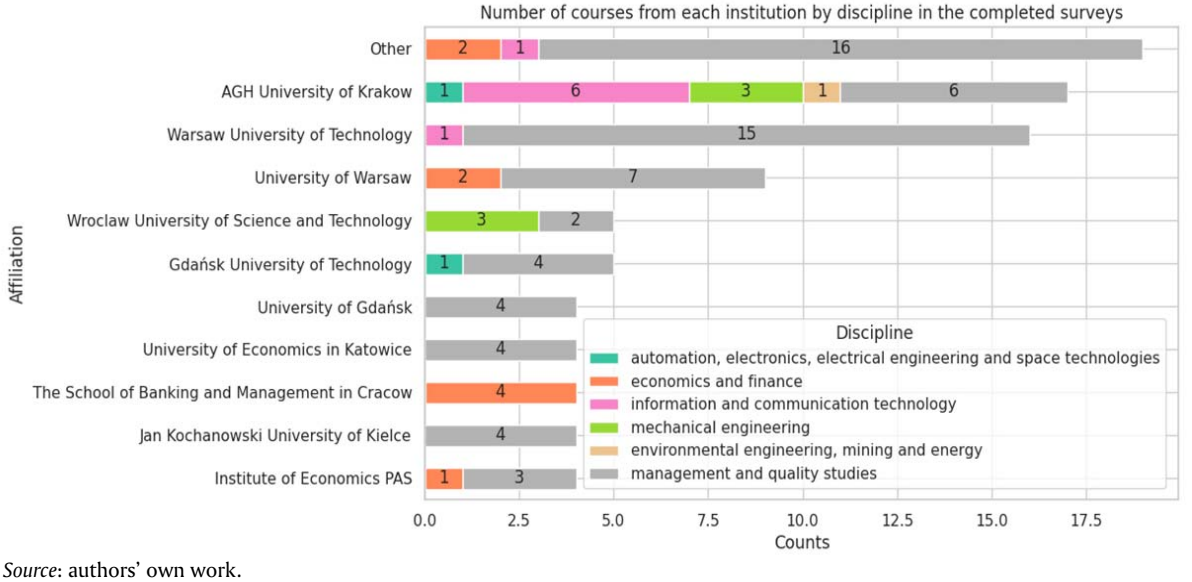
Figure 2
TOP 10 universities with the highest number of BPM-related courses in the context of scientific disciplines



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of auditorium exercises. The total number of hours for an entire course varies greatly and ranges between four and eighty, but most often it is thirty (30%).

In the context of the formulated DRQ1, we analyzed the content of courses regarding defined stages of the BPM lifecycle. The most frequent course content includes process modeling (85%) and process analysis (85%). These two phases of the BPM lifecycle are most often taught together in offered courses. Other BPM lifecycle phases appear less often in the content covered during classes: process identification is mentioned in 69% of courses, process redesign in 68% of courses, and process monitoring and control in 47% of courses. The process implementation phase is included in 37% of courses, resulting probably from a lack of technical competencies and business experience of teaching staff. Only 27% of courses consider full BPM lifecycle content (Fig. 3). Thus, in the majority of courses, the BPM lifecycle is taught in a fragmentary way without providing a bigger picture of the whole process improvement concept. This fact requires deeper consideration, and the necessary actions need to be taken to expand the existing courses to include the missing content related to the BPM lifecycle (for instance based on the developed core curriculum for BPM-related courses).

In the context of the formulated DRQ2, we analyzed responses related to supporting IT system usage in teaching BPM-related courses. The IT tools used in the offered courses feature various open-source and commercial types of software (Figure 4).

When analyzing the lifecycle, the most popular tools are modeling and analysis tools. Looking at actual development directions in process analytics and innovations in BPM, surprisingly, only eighteen courses offer content related to process mining. Also, in most of the offered courses, content related to process prediction (thirteen responses), AI (twelve), or RPA (eight) is not included.

In our study, we planned to address DRQ3 based on the Six Core Elements of the BPM framework (Rosemann & vom Brocke, 2014). This comprehensive

Figure 3
Results of the analysis of the inclusion of BPM Lifecycle's phases in BPM education

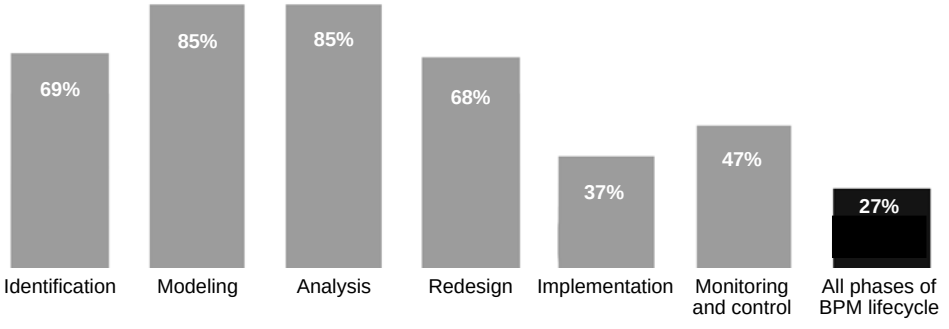

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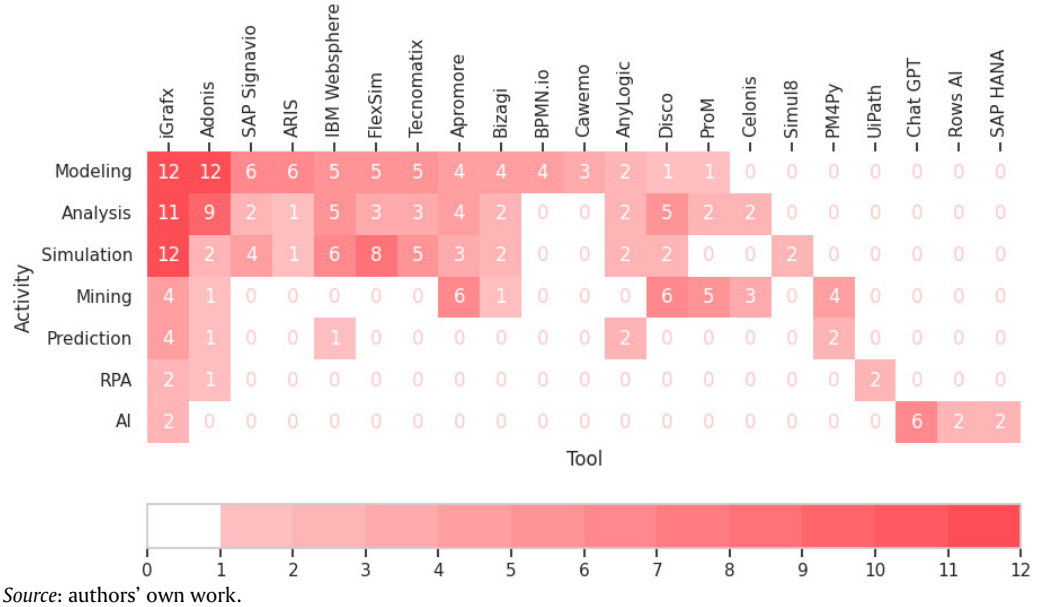
Figure 4
Results of the analysis of IT tools used in BPM education (only software for which three or more responses were given is presented)



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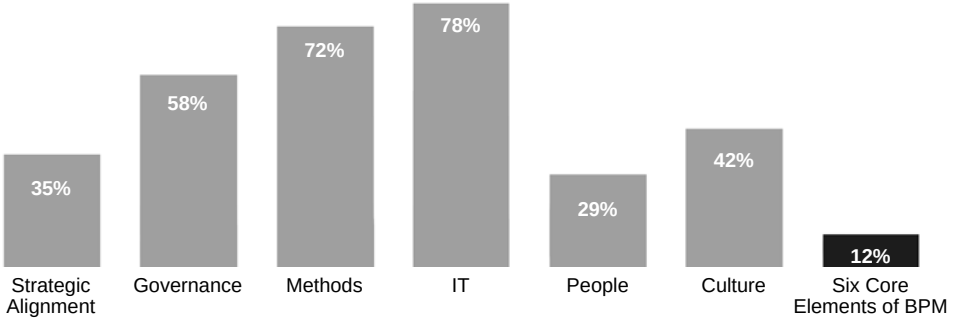
approach is essential for organizations to achieve sustained business process improvement, and ensures that all essential success factors for BPM adoption are included in the education programs. As all elements interact with each other, a deficiency in even one of them can significantly disrupt successful BPM. For this reason, this knowledge needs to be conveyed to students by emphasizing that the six key factors are interconnected. The results of the BPM education analysis from the perspective of the Six Core BPM Elements are presented in Figure 5.

Educating students on the People element of BPM ensures that they will understand how to implement and continually enhance and use process and process management skills, fostering continuous improvement and innovation within the organization.

Understanding the People and Culture elements of BPM helps in creating and facilitating an environment that complements various BPM initiatives, fostering a culture that values and supports process improvement and BPM initiatives. It is also important to provide them with the skills to manage change and build a culture of communication, without which resistance emerges and BPM efforts fail.

In our study, respondents rated the aspect of teaching IT technologies supporting BPM surprisingly highly (78%), even though a large portion of BPM-related subjects do not use practical IT tools. As digitalization continues to transform business processes, new and enhanced BPM capabilities are required to drive corporate success in this context (Kerpedzhiev et al., 2021). Furthermore, the digital transformation and technologies that enable intelligent and comprehensive automation, such as RPA, AI, and ML create new challenges, highlighting the need for continuous evolution and adaptation in BPM practices (Antonucci et al., 2020; Gabryelczyk et al., 2022; Madakam et al., 2022). Awareness among educators, and teaching about key technologies in the BPM lifecycle, is very welcome and beneficial.

Figure 5
Results of the analysis of the inclusion of six key elements of BPM in BPM education



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The Methods element is also largely included in BPM teaching. We assessed this aspect mainly from the perspective of using business process modeling methods. BPMN 2.0 is the leading modeling notation used by 89% of respondents for practical process modeling classes, followed by EPC (Event-driven Process Chain) (17%) and UML (Unified Modeling Language) (11%), with notations like Petri nets and IDEF0 being rare. The dominance in recent years of BPMN 2.0 as a process modeling standard stems from its versatility, industry acceptance, extensive modeling capabilities, integration with tools, and community and industry support (Gabryelczyk & Jurczuk, 2015). The increasing incorporation of the BPMN 2.0 standard into BPM education bodes well for both the certification we propose in this manifesto and the enhanced preparation of future analysts and process architects in organizations (Szelągowski et al., 2021). The low level of incorporation of the Strategic Alignment element into BPM teaching (35%) may indicate that BPM educators do not present BPM as a concept related to the strategy of the entire organization. Strategic alignment provides direction and priorities that shape governance mechanisms, guide method and IT selections, and provide information for people and culture initiatives.

Educators refer to the Governance element (58%) slightly more often than to strategy, but the result is not satisfactory. Unclear allocation of responsibility lead to confusion, duplication of work, and lack of coordination across process initiatives. Without well-defined process roles, responsibilities get overlooked and there is a lack of ownership for processes. Students should understand that strong governance is critical for aligning BPM with corporate objectives.

In addressing the formulated DRQ4, it is evident that the wide array of courses offered by different universities in Poland spans a multitude of scientific disciplines, as depicted in Figure 2. Moreover, the use of a variety of IT tools in BPM education, as shown in Figure 4, underscores the participation of teachers from diverse scientific backgrounds, thereby emphasizing the extensive range of course content. This amalgamation of disciplines and educational tools unequivocally affirms the interdisciplinary nature of BPM education in Poland.

Furthermore, most software companies provide academic licenses for educational use. Also, web-based, widely available solutions like bpmn.io or draw.io are used in several courses for process modeling. In some courses, IT tools are not used in BPM teaching.

Taking into consideration the development of process modeling, process mining, and the RPA software market, implementation in the education process of widely recognized or popular dedicated tools is necessary to equip students with practical competencies needed in process improvement initiatives in organizations.

When addressing DRQ5, the predominance of the BPMN 2.0 standard in BPM education is clear, yet many courses fall short of covering the full BPM lifecycle and in offering a comprehensive approach that encompasses all fundamental aspects of BPM. This partial and segmented educational scope may have a subtle impact on the preparedness of students for BPMN certification.

To summarize, a lack of structured BPM education covering concepts, methods, technologies, and behaviors severely limits an organization's ability to successfully implement and sustain BPM across all core elements. A comprehensive BPM curriculum is thus critical for the preparation and continuous development of specialist staff in line with the needs of the Polish economy.

Manifesto

The manifesto aims to enhance the landscape of Business Process Management (BPM) education in Poland by emphasizing heightened practical orientation. Through advocacy for a curriculum encompassing comprehensive coverage of BPM lifecycle stages, the integration of emerging IT tools into didactic processes, and a nuanced exploration of the Six Core Elements of BPM, the manifesto seeks to reconcile the disparities between theoretical constructs and their pragmatic application within the holistic framework of BPM education. The inclusion of dedicated software tools, aligning education with the demands of the contemporary business environment, is imperative.

Manifesto for Advancing BPM Education in Poland

1. BPM common understanding:

We endorse publishing educational materials and scientific articles in both Polish and English simultaneously. This ensures uniform terminology, fostering a common understanding among students, educators, and practitioners. This shared language facilitates effective communication and collaboration in BPM initiatives, promoting alignment in terms of goals, strategies, and best practices. Standardized terminology prevents confusion, ensuring clarity and precision in discussions and documentation.

2. Holistic learning approach:

BPM education must embrace a holistic approach, recognizing the dynamic evolution of BPM concepts and technological trends. This requires constant enhancement of educators' competencies in new BPM concepts, technologies, and practical skills. Acknowledging the evolving BPM landscape, educators should involve students in analyzing shifting dimensions within the discipline, offering perspectives on established and emerging principles and practices. This ensures adaptive BPM education, preparing students for the evolving demands of the business environment.

3. Knowledge exchange platforms for BPM education:

Recognizing the constantly growing group of Polish representatives at the International Conference on BPM, the launch of the Educators Forum at that conference, and the BPM symposia initiative in Poland, we underscore the importance of knowledge-sharing platforms in BPM education. Building on this

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idea, participation in the mentioned events should be encouraged, as it undoubtedly facilitates the sharing of know-how in designing, implementing, and updating educational programs, and encourages fostering a collaborative and supportive academic community.

4. Diverse, but always up-to-date learning programs across disciplines:

The study highlighted the variety of disciplines within which BPM is taught. A concerted effort is required to provide a holistic view of BPM. We therefore call for interdisciplinary cooperation between BPM educators at various faculties and universities. This approach will, for example, enable technical universities to benefit from the knowledge of BPM culture and management faculties, and classic universities to benefit from the skills of advanced analysis and automation/robotization, which are more often available at technical universities. Such collaboration will equip graduates from various institutions with competencies that are useful in the labor market.

5. Progressive skill development throughout studies:

To address the question of BPM skills not being emphasized until the second-cycle degree level (master's degree supplementary studies), we propose the integration of BPM concepts and methods, particularly process management, in first-cycle degree programs (bachelor's or engineering studies). This approach aims to introduce students to BPM early in their academic journey and enhance the number and variety of classes, including laboratory activities and exercises. This adjustment is crucial to meet the practical challenges of the business landscape in the BPM context.

6. IT tools facilitating BPM education:

While recognizing diverse BPM tool usage throughout the BPM lifecycle, especially in non-technical universities, we propose a standardized approach. Addressing gaps, particularly in tools for instance for process mining and automation, and adaptation to Industry 4.0 and 5.0, is crucial. It is essential to integrate dedicated tools to equip students with practical competencies for successful BPM initiatives. Given the role played by technology, educators should incorporate modern BPM tools into their curricula, emphasizing practical, hands-on elements for real-world application understanding. We advocate a platform for sharing knowledge and teaching materials on these tools to enhance BPM education. Regular course updates are necessary, reflecting emerging trends such as machine learning and artificial intelligence in BPM.

7. Wider use of BPMN certification in Poland

The rise of BPM has prompted the introduction of the "Modeling and Analysing Business Processes in accordance with BPMN" certification, which is now incorporated into the Integrated Qualifications System. This certification validates BPMN knowledge as a universal language for clear process communication. To align education with industry needs, a referential syllabus for "Modeling Business Processes in BPMN" was proposed by IBS PAN for university courses, aiming to bridge the gap between academic learning and practical BPMN application. This initiative ensures that professionals have essential skills for effective BPM in today's evolving business landscape. Collaborative efforts are crucial to enhance BPM education in Poland, fostering knowledge-sharing and international insights. Developing an online course on this subject would be valuable for rapid teacher training and wider accessibility, enhancing the educational offer to meet market demands. For businesses, certified employees are essential in the era of rapid IT adoption, ensuring effective and innovative BPM aligned with the organizational context.

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