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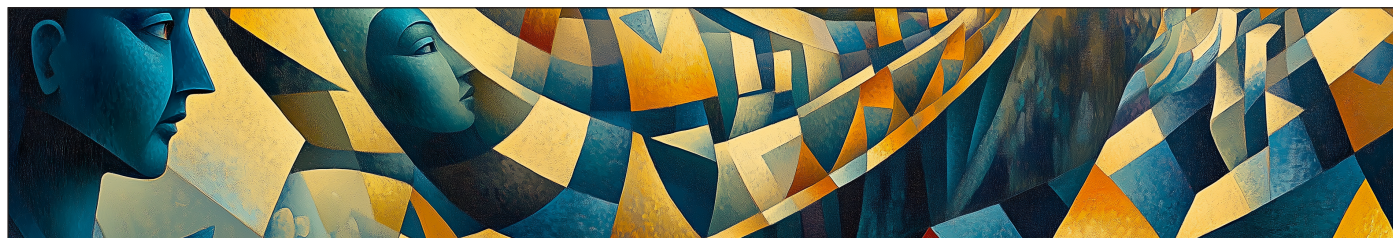
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Navigating contradictions in undergraduate accounting education: An activity theory perspective on the impact of the Fourth Industrial Revolution

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Abstract

This paper explores how undergraduate accounting education in Kazakhstan, is adapting to challenges posed by the Fourth Industrial Revolution (4IR). It investigates the integration of new technologies and societal changes into educational practices. Using an activity system analysis, the study reveals that Kazakhstani accounting programmes have not fully adopted 4IR technologies despite global discussions, highlighting a gap between planning and implementation in education. The study, based on semi-structured interviews with faculty, students, and an employer representative, identifies ongoing challenges such as faculty resistance and differing perceptions of essential skills between educators and students. Addressing these issues requires institutional support for faculty development and leadership in technology integration. This research aims to contribute to the body of literature in the field of accounting education. Future studies could expand on these insights globally across multiple institutions.

1. Introduction

The Fourth Industrial Revolution (4IR) presents a significant shift in how technology affects the world, mixing the physical, digital, and biological aspects (Schwab, 2016).

This study aims to examine the existing approach to teaching accounting to undergraduates in Kazakhstan and evaluate its adequacy in addressing the technological challenges presented by the 4IR, considering the close interconnectedness of 4IR, societal change, and education. Understanding the current alignment between technological challenges and educational practices will help explore the mapping between accounting education and societal development, as these components form an interrelated dynamic system (Figure 1). The motivation for conducting this research stems from the author's transition from an accounting practitioner to an educator and a desire to determine whether accounting education in Kazakhstan aligns with global practices as outlined in existing research. It also seeks to identify points of divergence between various elements of existing accounting educational practice in Kazakhstan and contribute to the ongoing research that explores the dialogue between industry and academia.

Existing literature highlights the broad impact of the 4IR on societal and educational paradigms. Schwab (2016) emphasises that the 4IR's exponential and systemic impact is fundamentally different from previous industrial revolutions. Furthermore, Bazić (2017) highlights that technological advancements inevitably drive societal changes, which are intrinsically linked to educational developments. However, the specific impact on accounting education remains underexplored.

In the context of higher education, Oliver (2022) argues for the necessity of establishing connections and collaborations between higher education institutions (HEIs), society, industry, and government. He highlights the need to produce graduates who are not only proficient in their field but also capable of addressing the 4IR challenges. Nonetheless, research by Karsten et al. (2020), Tsiligiris (2021), and Dangi et al. (2023) reveal that while universities often cover business acumen, they lack sufficient emphasis on digital literacy, interpersonal skills, and effective decision-making in their curricula.

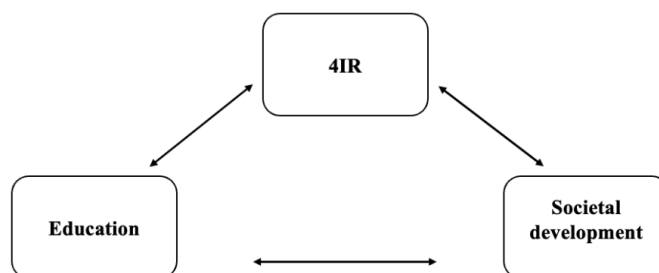
Therefore, three notable gaps in the literature become evident. Firstly, there is insufficient information on the impact of the 4IR on accounting education within higher educational institutions. Secondly, there is a necessity to

analyse and potentially reconcile conflicting perspectives on addressing the challenges posed by the 4IR. Lastly, there is a call for a comprehensive perspective that incorporates multiple stakeholders, including industry, academia, and other relevant groups. This study aims to evaluate how undergraduate accounting education in Kazakhstan navigates the technological challenges posed by the 4IR by analysing contradictions in the existing educational activity system. This study views the 4IR as a complex phenomenon. It includes new technologies in work and life, changes in society due to these technologies, and new skills people need in this era. In the context of this research, 4IR is primarily considered as technological advancements and their integration into various aspects curriculum. It represents a mediating artefact in the activity system. The societal changes resulting from these technological shifts and the evolution of skills required to navigate and thrive in this new era are seen as resulting outcomes embedded in other elements of the activity system. The overarching research aim is thus synthesised in the following research question:

RQ: How do contradictions within the undergraduate accounting education activity system reveal challenges and opportunities for integrating 4IR technologies?

This paper examines the challenges brought about by the 4IR in accounting education, with a specific focus on the interaction between social and historical influences and the use of technology in learning. By employing Cultural-Historical Activity Theory (CHAT) as a framework, the study explores contradictions arising from the integration of 4IR technologies into the existing accounting curriculum, including tensions between traditional teaching methods and new technological requirements, varying perspectives of students, faculty, and industry, and challenges in balancing theoretical knowledge with practical skills demanded by the 4IR. The activity system under examination in this study is the undergraduate accounting education programme at a higher education institution in Kazakhstan. This system

Figure 1. Proposed relationship among the elements of the dynamic system



includes students, faculty, curriculum, teaching methods, and the broader educational and industry context. It is important to note that professional accounting bodies are not included in the scope of the study due to complex procedures required to obtain participation consent. This exclusion is recognised as a limitation of the study, as it may impact the comprehensive understanding of the entire accounting education ecosystem.

The following sections will review key literature, introduce the CHAT framework for analysing the educational system, and outline the research methodology using the Activity-Oriented Design Method (AODM). The findings will draw contradictions within the system, linking them to the broader aim of understanding how social mediation and societal learning motives interact with the technological tools used in accounting education.

2. Literature review

This section provides a critical overview of existing literature. Three main areas of literature under review include undergraduate accounting education, technologies in accounting, and the interaction between industry and higher educational institutions (HEIs) in accounting. The first two areas were selected based on their relevance to evaluating how undergraduate accounting education in Kazakhstan addresses technological challenges. Additionally, to offer a comprehensive analysis of the activity system, existing findings on interactions between industry and HEIs in the field of accounting were incorporated into the literature

review. Topics related to accounting policy, professional qualifications, postgraduate accounting, and non-degree education were excluded from the literature review based on their irrelevance or limited marginal contribution to achieving the study aim.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Page et al., 2021) was used in the process of identifying, screening, assessing, and including relevant academic literature. A total of 560 articles were initially retrieved from Lancaster OneSearch and Google Scholar, which were then reduced to 26 after assessing their relevance to the study's objectives. All elements used in PRISMA are presented in Table 1.

The following themes emerged from the review and are discussed below.

2.1 Preparing students for future job opportunities

One key theme in existing literature discusses the challenges brought by the 4IR to academia and industry. The key points emphasised from the combined arguments include the urgent need for higher education institutions to adapt and evolve in response to the 4IR (Naicker, 2024; Dangi et al., 2023; Paucenau, 2020; Fazial, 2022; Goosen, 2018). This includes prioritising the development of employability skills among students (Naicker, 2024; Fazial, 2022; Goosen, 2018), updating curricula to reflect current and future job market demands (Ortiz, 2022; Mkansi, 2021) and equipping graduates and faculty with practical skills that align with

Table 1. Summary of selection criteria using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Criteria	Includes	Excludes
Year	All publications	N/A
Body of literature	Undergraduate accounting education Technologies in accounting Industry and academia interaction in accounting	Accounting policy Professional qualifications, postgraduate accounting, non-degree education
Source type	All	N/A
Accessibility	Free	Paid
Language	English	Other languages
Sources	Lancaster OneSearch Google Scholar	All other sources

industry needs (Gonçalves et al., 2022; Kosslyn, 2019). Additionally, there is a strong emphasis on integrating educational technology effectively into teaching methodologies to enhance learning outcomes and prepare students for the digital age workforce (Dangi et al., 2023; Frey, 2017).

However, there are persistent barriers within the current educational framework that prevent the timely and effective response to the challenges posed by the 4IR. Naicker (2024) highlights the significant costs associated with implementing curriculum changes, including the procurement of new resources and technology. Moreover, resistance from some educators to adopt new methodologies complicates the process of finding instructors adept with innovative approaches. Skhephe et al. (2020) note widespread reluctance among accounting teachers to embrace technologies, which contributes to slow adaptation rates. Furthermore, researchers (Goosen, 2018; Madsen, 2020; Landsberg, 2022) call for a shift in the focus of accounting education, emphasising the inclusion of essential skills crucial for new realities, despite these skills traditionally falling outside the scope of conventional accounting education.

For the scope of the current study, understanding the challenges and barriers to implementation is crucial for achieving the research aim. Additionally, exploring contradictions in how these challenges should be addressed provides valuable insights into analysing stakeholders' perspectives in Kazakhstan is the existing study. However, the literature lacks representation from a wide range of stakeholders when addressing these challenges and barriers, indicating the need for an expanded sample size.

2.2 Designing a framework for university accounting education

Another major theme identified in existing literature concerns the efforts to establish a structured framework for accounting education that aligns with the challenges and opportunities presented by the 4IR. Some authors highlight the necessity of developing a framework specifically for digital skills (Mbizi et al., 2022), while others focus on re-engineering the composition and skill sets of graduates for the future workforce (De Ruyter et al., 2018; Tan, 2022).

However, Tsiligiris (2021) highlighted the broader role of HEIs, stating that the university's mission is not limited to producing a qualified skilled workforce but also involves contributing to efforts to address global societal change.

Tsiligiris (2021) proposed expanding university accounting education in line with the broader mission of HEIs. This was summarised in a conceptual framework comprising three key areas: skills for success, personal qualities, and global and local citizenship. The framework is presented in Figure 2 and incorporates attempts to formulate a structural approach by other researchers. Therefore, the framework suggests that the development of a specific skill set is not the sole focus in light of 4IR, and HEIs, through their operations, impact graduates' ability to enter the job market with the vision of becoming global citizens. This involves driving changes through sustainable actions and adapting to the existing environment.

While this framework will be used as a good starting point for building the activity system for the current study, the core elements of the framework were identified by consulting only a few stakeholder groups and do not incorporate crucial elements related to the context such as cultural aspects, life standards and technological development.

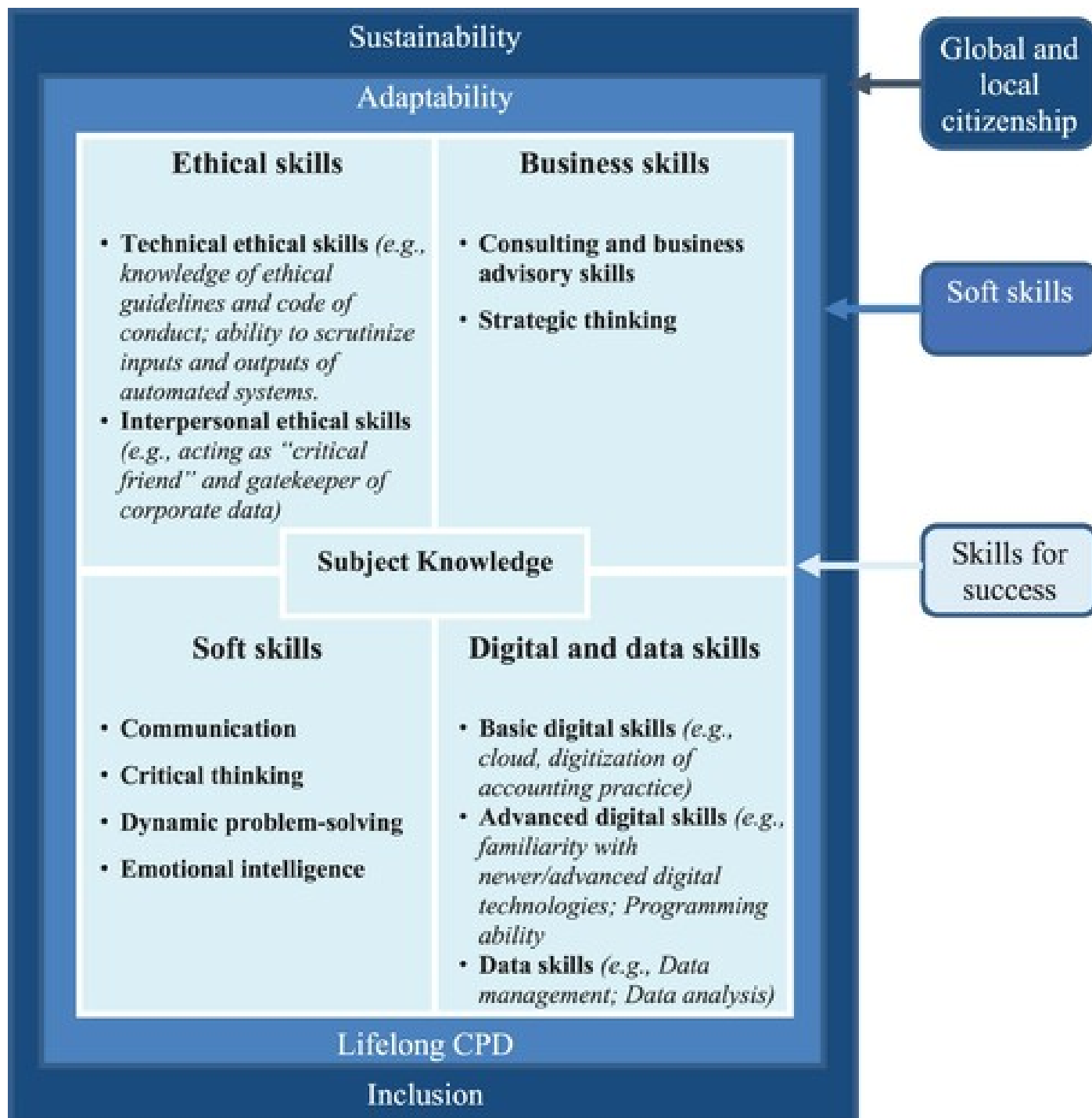
2.3 Research gap

Overall, there are three main areas of focus arising from the existing literature.

First, there are existing contradictory views that researchers adhere to. While some believe that educators should confront the challenges and adapt to new realities, others emphasise technological aspects, highlighting the need for widespread accessibility of technology in HEIs, which can trigger associated costs and change management issues. Thus, there is an opportunity to explore the impact of 4IR in the context of accounting education by incorporating the perspectives of multiple stakeholders, including students, educators, employers, and policymakers.

Furthermore, the need for a holistic examination of the impact of the 4IR on the education system is identified. Although the effect of the 4th industrial revolution itself implies a greater focus on the use of technology per se, this is not the only aspect to be considered in education. In this regard, the application of the framework could be useful to gain a holistic view of the context, as well as to consider existing practices and possible changes in dynamics. Similarly, Tsiligiris (2021) notes the need to consider the different perspectives of all stakeholders in the system in order to understand how existing practices work.

Figure 2. A conceptual framework for university accounting education in the Fourth Industrial Revolution (4IR) by Tsiligris (2021)



Finally, in light of the newness of the current issue, prior research by Goosen (2018), Paucenau et al. (2020), and Tsiligiris (2021) indicate the need for further information gathering from diverse sources to better evaluate the influence of 4IR on the education sector. Additionally, acquiring qualitative data, particularly from case studies involving practitioners actively engaged in this field's daily operations, is essential.

Therefore, the overarching research question in this study addresses three critical gaps by examining contradictions within the activity system to incorporate diverse stakeholder perspectives, providing a holistic view of the 4IR's impact beyond technological aspects, and gathering qualitative data from practitioners to contribute to the information pool on the topic.

3. Theoretical framework

This section provides rationale for choosing a theoretical framework and introduces core concepts and theoretical underpinnings of cultural-historical activity theory that will be used in designing and evaluating the results of the study.

The study is rooted in a social constructivist approach, viewing knowledge as collaboratively built through human interactions.

3.1 Rationale for selecting AODM

To address the opportunities outlined in the earlier section, this study adopts an Activity-Oriented Design Method (AODM) framework by Mwanza-Simwami (2009) rooted in the principles of Cultural-historical activity theory (CHAT) by Vygotsky (1987). The choice of the framework is justified, as it assists in accomplishment of two objectives.

Firstly, it helps to construct a comprehensive view of the existing accounting education system, encompassing not only elements of the curriculum but also the multiple stakeholders who inevitably influence educational delivery. This implies that focusing solely on specific elements or stakeholders within accounting education would not suffice, and the entire system must be explored as a unified entity. Additionally, creating a system to document existing practices could assist in understanding how these practices change when certain or all elements of the dynamic system are altered.

The second aim of the study, focused on filling information gaps identified in previous research, suggests conducting an in-depth case study. The framework is useful in formulating interview questions for the case study and examining various perspectives on current practices, providing valuable insights for further exploration into the impact of 4IR on accounting education and its potential effects on societal development. Considering the conflicting views among different stakeholders shown in existing research, the selected framework helps to consolidate these potential contradictions from various stakeholders into one system and address them accordingly.

3.2 CHAT and activity system

In this study, the activity theory, often known as the third generation of activity theory (Engeström, 2015), is utilised. Cultural-historical activity theory (CHAT) has developed through three generations (Engeström, 2001). Initially, influenced by Vygotsky (1987), it focused on individual mediation, but its drawback was its sole focus on individuals.

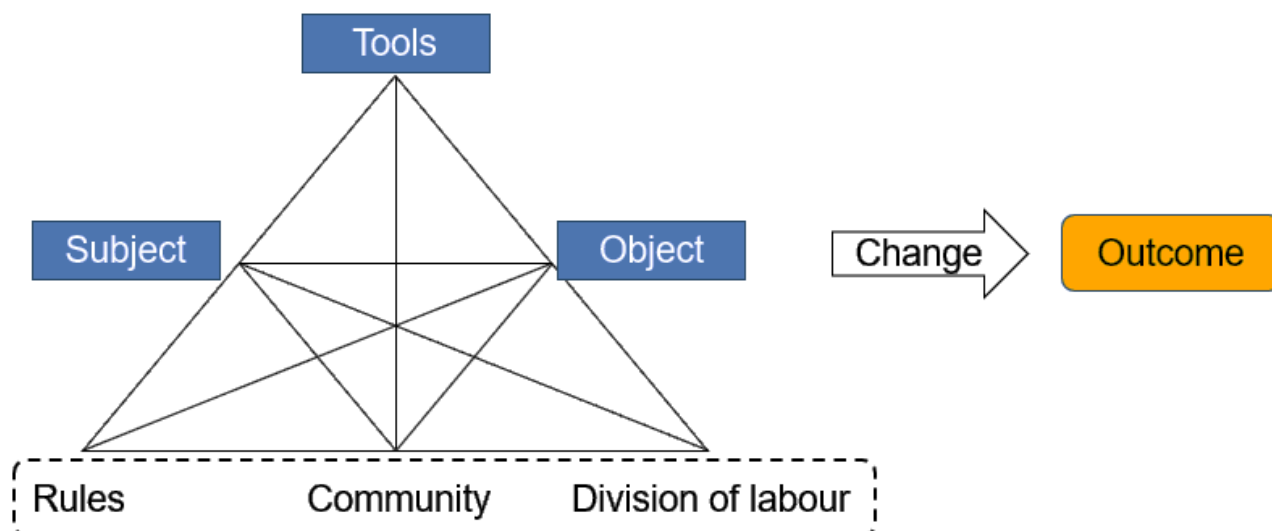
The subsequent generation, inspired by Leont'ev (1981), broadened to include collective activity systems, while the latest generation, emphasises internal contradictions as drivers of change, enabling better understanding of how activity systems interact (Ilyenkov, 1982; Engeström, 1987/2015).

The third-generation activity theory examines an entire work system, called an activity system. It takes into account all its components and their interrelationships (Engeström, 1999). Engeström (1987/2015) describes the collective activity system as comprising subject, object, tools, rules, division of labour, and community. These components are normally depicted in a form of a triangle, and the entire activity system functions towards a specific outcome, as shown on Figure 3.

Table 2 summarises key elements of the collective activity system. Individual elements of the system additionally explained in the later sections.

3.3 Underlying principles

When examining complex systems involving many elements, it is essential to outline key principles underpinning the choice of CHAT and hence AODM. According to Engeström (2001), every activity system follows five basic principles, which are outlined below.

Figure 3. A collective activity system by Engeström (1987/2015)**Table 2. Summary of six elements of the activity system by Engeström (1987/2015)**

Element of the system	Meaning
Subject	An individual or group engaged in the activity, guiding actions that greatly impact its development.
Object	The goal pursued by the subject, guiding engagement and actions.
Tools	Physical and conceptual instruments used to interact with the object and achieve outcomes.
Rules	Norms and regulations, shaping behaviour and coordinating actions.
Division of labour	Assigning tasks based on expertise, enhancing the activity system's effectiveness.
Community	Includes individuals or groups with shared interests, shaping the social context and influencing the activity system's development.

Table 3. Summary of five principles of the activity system by Engeström (2001)

Principle	Description
1	Unit of analysis. The main focus is on a collective activity system where individual and group actions, along with automatic operations, are analysed as relatively independent but subordinate units.
2	Multi-voicedness. Incorporating diverse communities, each contributing unique features seen as both challenges and sources of innovation.
3	Historicity. Activity systems evolve over time, with challenges and opportunities viewed in their historical context.
4	Contradictions. Accumulated tensions within activity systems drive change and development.
5	Expansive transformations. Undergoing cycles of change, intensifying contradictions may force participants to question established norms.

While the study does not include examining joint activity systems, Principles 1, 2, and 4 will be utilised in subsequent sections. Moreover, to achieve the research aim the following sections focus on identifying and exploring contradictions. Within the activity system, there are four levels of contradictions, as outlined by Engeström (1987/2015). Primary contradictions are the main conflicts due to different goals. Resolving these primary issues can give rise to secondary contradictions between elements of the activity system, introducing new tensions. Addressing these secondary contradictions may lead to tertiary contradictions, creating further challenges. Finally, as the system adjusts to changes, quaternary contradictions may emerge. Considering the scope of the research to explore perceptions and experiences of different stakeholders, the focus is on identification of secondary contradictions between elements of the activity system.

3.4 Transitioning from CHAT to AODM

The study uses the Activity-Oriented Design Method (AODM), based on activity theory (Mwanza-Simwami, 2009), to help develop and analyse the activity system. AODM is used to map research questions and theoretical frameworks by identifying connections and contradictions within technology-mediated learning.

The eight-step model (Mwanza-Simwami, 2009), provides a structured approach to understanding activities. It begins by identifying the activity of interest and its purpose, followed by the individuals involved, the tools they use, and any rules or regulations governing their actions. The model also considers the division of labour and the community context in which the activity occurs. Finally, it examines the desired outcome of the activity, offering a comprehensive framework for analysis. Consequently, a set of questions designed to understand the experiences of various stakeholders is created. Once the data collection stage is finished, the findings can be mapped to facilitate the analysis of the activity system.

3.5 Unit of analysis: An activity system

The entire activity system as illustrated in Figure 3 comprises a single unit of analysis according to the CHAT principle (Engeström, 2001). The elements comprising the system are described below.

3.5.1 Subject, object and tools

In the existing activity system, students are positioned as the subjects who are directed towards completing an undergraduate accounting degree, which represents an object.

These students are the main focus, while the research considers 4IR technologies such as accounting software, cloud computing, programming languages, and data management systems as essential mediators representing tools. Artificial intelligence and blockchain are also relevant, if participants mention them in interviews. Furthermore, traditional software like Microsoft Office is acknowledged as a technological tool within the 4IR context.

3.5.2 Rules, community and division of labour

The remaining three elements comprise rules, community, and division of labour. Rules encompass existing policies issued by the Ministry of Education, as well as internal university policies such as academic regulations and course syllabi.

Community encompasses individuals or groups with shared interests, shaping the social context and influencing the development of the activity system Engeström (2001). In the study's context, accounting faculty members, the administration of the Business School, parents, and employers are considered to fulfil the concept of community.

Lastly, the responsibilities of community members, as well as the responsibilities of students, form the division of labour.

3.5.3 Addressing contradictions

Examining the results from these interviews will identify contradictions within the activity system, showing where practices, goals, or understandings diverge. These insights are essential for gaining a better understanding of how the system operates and for further mapping those contradictions to the educational framework by Tsiligiris (2021).

4. Research design

4.1 Research site

The research is conducted at a higher education institution located in Almaty, Kazakhstan. It was chosen for two reasons: first, it has an internationally recognised and accredited academic programme in accounting, allowing the study's results to be used by other researchers. Second, it has a balanced mix of practitioner and theoretical faculty, which, in the author's opinion, provides a more comprehensive understanding when addressing the dialogue between industry and academia.

Participants include faculty members of the Business School who teach undergraduate accounting courses and are involved in curriculum review. Additionally, the study recruits current students and recent graduates of the undergraduate accounting programme. Finally, one external representative of the corporation where graduates are employed is recruited for the study. This is essential to ensure the validity of findings and for the purpose of triangulation (Yin, 2017). The choice of this institution as a case study is justified as it represents a broader phenomenon of delivering undergraduate accounting education. It is geographically

bounded by its location and time bounded by the period from September 2020 to May 2024, which is when the programme is being conducted at this higher education institution.

The rationale for recruiting these participants stems from the department's role in delivering undergraduate degrees and shaping teaching curricula according to industry needs. Therefore, it is essential to assess how accounting education adapts to industry requirements, especially with the 4IR technological skills demands, and these members can provide useful insights from a practical perspective to further inform academic knowledge in the field of accounting education. This study directly explores teaching practices, ensuring graduates are equipped to excel in today's competitive accounting industry. All participants play a crucial role in shaping teaching practices and are key stakeholders within the activity system. Table 4 summarises research participants by roles and provides a mapping of how their practice and experience fit within the activity system outlined in the Data Analysis section. The choice of eight participants was based on the principle of data saturation. This sample size allows for a diverse range of perspectives while remaining manageable for in-depth analysis. The inclusion of only one external employer was due to access constraints and the exploratory nature of this study.

Table 4. Research participants

Category	Number of participants	Mapping to activity system	Anticipated practice insights to explore contradictions within activity system	Principle of CHAT
Faculty members	4	Community	How existing roles are shaping the outcome. How other elements of the activity system influence the way faculty members exercise their functions.	Multi-voicedness Contradictions
Students	3	Subject	How other elements of the activity shape the way students achieve the outcome.	Multi-voicedness Contradictions
Employers	1	Community	How role of employers is exercised within the activity system. To what extent	Multi-voicedness Contradictions + Triangulation (Yin,2017)

4.2 Data collection and analysis

The data collection involved conducting eight semi-structured interviews. The sample selection employed purposeful sampling, targeting individuals with significant expertise or experience relevant to the research question. Questions were developed using the Activity-Oriented Design Method (AODM), with each question focusing on an element of the activity system outlined in Figure 4. These questions include exploration of the tools people use to achieve goals, the rules they follow, how teamwork affects satisfaction with goals, and how tools and rules affect group goals. The answers will help draw existing contradictions within the existing activity system.

Examples of the questions include the following and were modified for each group of stakeholders:

- Can you detail your current role and responsibilities within the accounting department?
- What are the main goals of incorporating 4IR technologies into the accounting curriculum?
- What skills related to 4IR do you expect students to have upon graduation?
- How is the workload related to teaching 4IR skills distributed among your team?

4.3 Alignment of CHAT with research methods

The use of semi-structured interviews aligns with CHAT's emphasis on understanding complex systems through multiple perspectives. Each interview question was designed to explore specific elements of the activity system. While this study examines various aspects of 4IR within a single activity system, it acknowledges the complexity and extensive scope of 4IR technologies and their implications. To ensure consistent understanding among participants, each was provided with a clear explanation of 4IR, as introduced in the earlier section, focusing on its technological aspects as a mediator, and societal impacts as an embedded element.

5. Findings

This section presents the study findings in a form of key themes derived from secondary contradictions that exist between the elements of the current activity system. The focus solely on secondary contradictions is justified to address prior research that highlights conflicting views on how challenges should be addressed by different elements of the activity system. By exploring tensions between

specific elements of the system, this approach helps manage complexity while directly aligning with the research aim. Implications of the findings are discussed in the following section and attempts to understand why these contradictions exist and what prospective changes they force participants of the activity (Figure 4) to undertake further discussed in the later section.

5.1 Transitioning into the current business environment does not heavily necessitate the use of 4IR tools by students (Tools-Object)

The first contradiction has a source in a tension between technological tools used by the subject and the object represented by successful attainment of an undergraduate accounting degree (Figure 5). The results of interviews with students showed that based on their experience the ability to apply 4IR technologies is not a key factor for a successful transition in the professional business environment. This is confirmed by two excerpts from the interviews, where students first talk about their experience of using technologies and then share their feelings during the period of employment, already having a university diploma.

EXCERPT #1: Interviews with students (May 2024)

- Researcher: What types of technologies or digital tools have you used in your accounting courses, and how effective have they been in enhancing your learning?
- Student 1: Paper and MS Excel. I cannot say that we used something exceptional but it still enhanced my learning.
- Student 2: I was ok with MS Excel once I gained conceptual understanding.

EXCERPT #2: Interviews with students (May 2024)

- Researcher: What skills related to 4IR do you expect to acquire (acquired) by the end of your course, and how do you think they will benefit (benefit) your future (current) career?
- Student 1: The experience is positive I got the background in accounting and now I can understand the business
- Student 2: Business skills are necessary but soft skills and digital data skills are not really suited to accounting.

Figure 4. An activity system of undergraduate accounting teaching

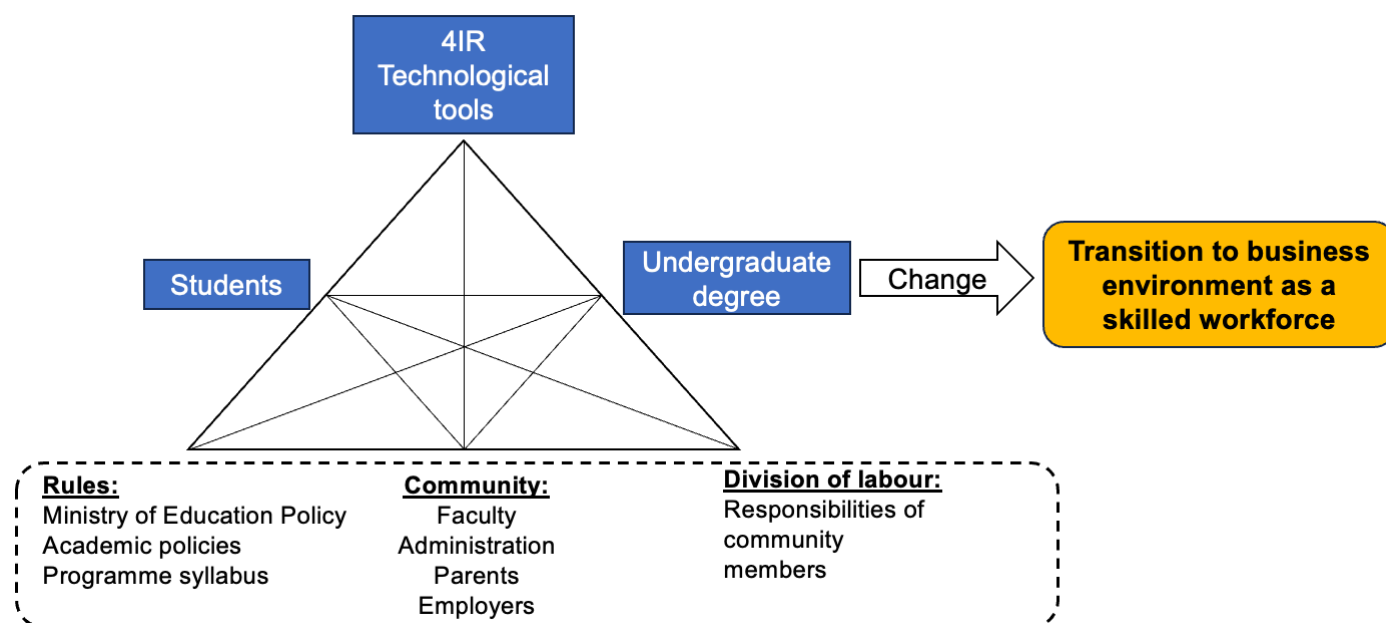
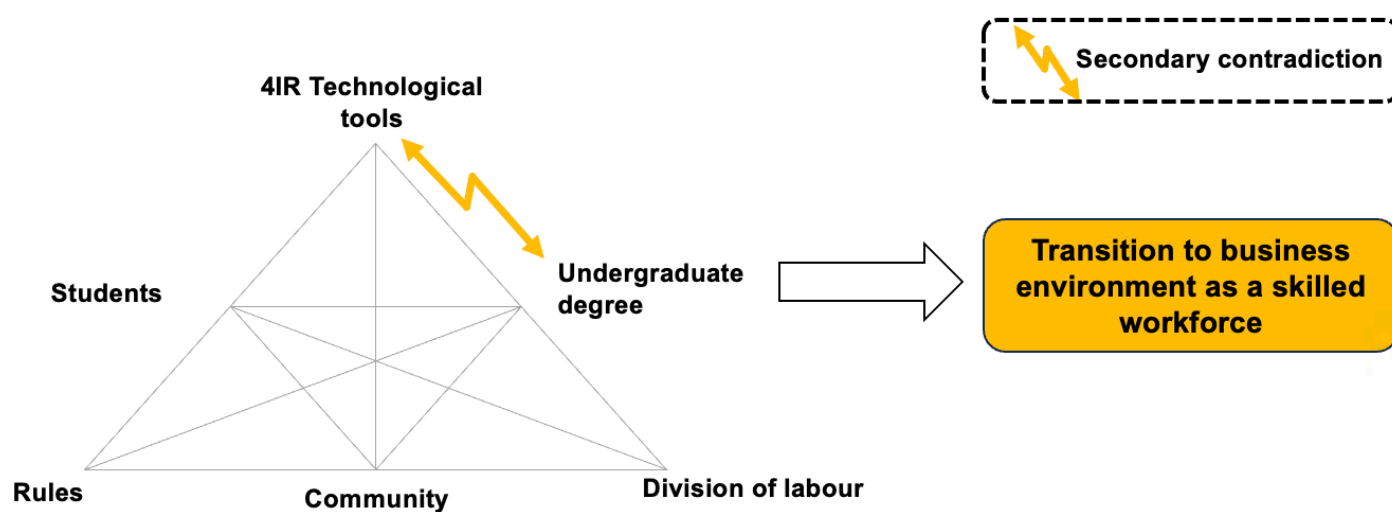


Figure 5. An activity system of Tools-Object contradiction

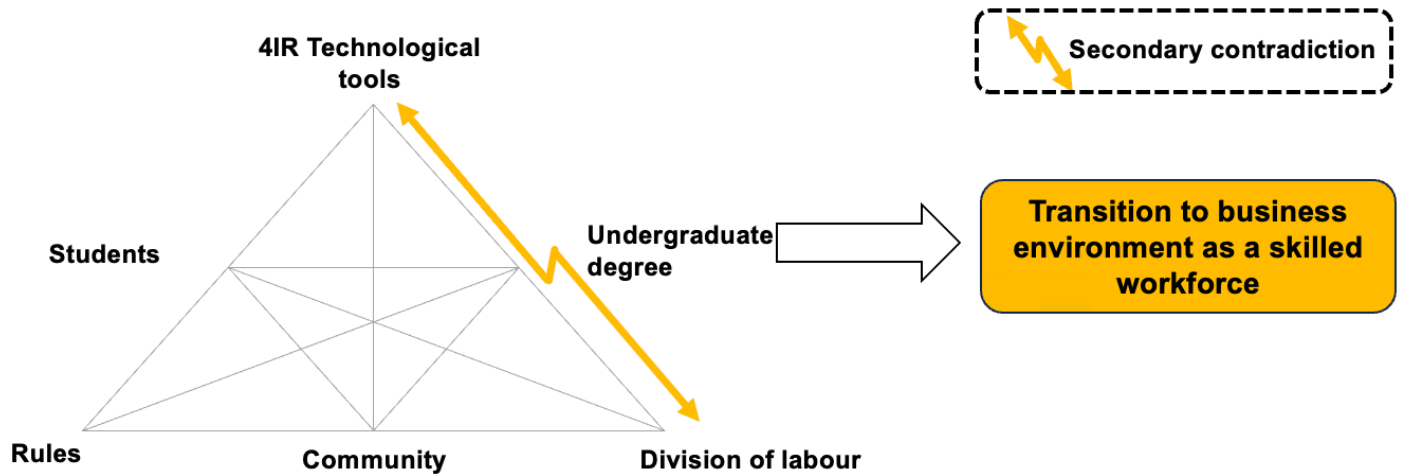


- Student 3: I think that even accountants in the industry themselves do not understand exactly how things work, so I think I have a competitive advantage.

The finding reveals a significant contradiction between the perceived importance of 4IR technologies in academic accounting education and their actual contribution in the

early stages of entering the professional business environment. This discrepancy results in a challenge of aligning expectations between industry and academia within the activity system of accounting education. Potential sources of change include reassessing the requirements for recent graduates entering the job market and integrating comprehensive digital skill sets into accounting curricula.

Figure 6. An activity system of Tools-Division of labour contradiction



5.2 Faculty members do not perceive themselves as responsible for implementing 4IR tools in student education (Tools–Division of labour)

The following observation concerns instructors' role and proficiency in delivering technological skills to students thus representing a tension between a part of division of labour and tools within the activity system (Figure 6). Although the majority of teachers are actively engaged in teaching and shaping the educational curriculum, none perceive it as their duty to incorporate 4IR technologies into the educational programme. In addition, faculty views varied, with some suggesting that the business school administration should take the lead in fostering innovation, while others admitted to lacking technological expertise and expressed a desire to educate themselves before instructing others.

EXCERPT #3: Interviews with faculty (May 2024)

- Researcher: What specific technologies or software tools have you introduced to support 4IR skills in accounting courses?
- Faculty 1: I don't find myself using many innovative technologies. My main tools are typically classroom equipment.
- Faculty 2: Encouraging students to be innovative and think critically [...] with modern technologies like Refinitiv and AI in accounting activities.

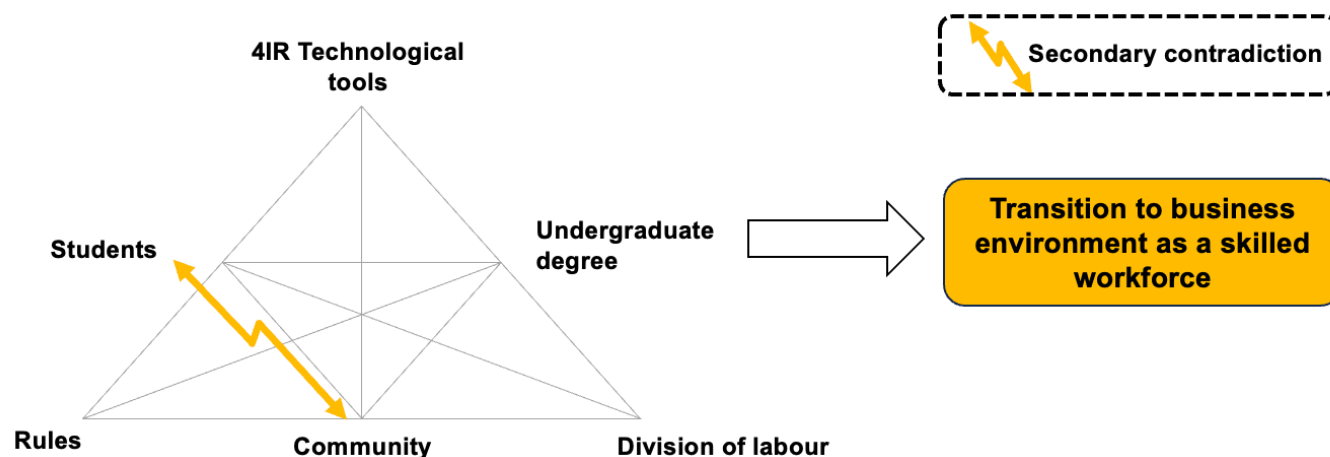
- Faculty 3: I did ERP system, but I only did it once. I stopped doing it because the university does not require these technologies. I do not want to deal with IT guys.
- Faculty 4: We need to learn ourselves for that. I'm not very good at using these technologies myself, but I would like to learn.

EXCERPT #4: Interviews with faculty (May 2024)

- Researcher: How is the workload related to teaching 4IR skills distributed among your team?
- Faculty 1: There is no distribution of roles. It's individual. If someone has tech skills, then they include.
- Faculty 2: I believe we should rely on industry specialists. Advice from them what is hot and trendy.
- Faculty 3: Dean should be responsible for strategic vision of what trends and requirements are in the market.
- Faculty 4: Ideally, we should have programme leaders who can offer insights on what is crucial to include.

Thus, this secondary contradiction regarding tools and division of labour indicates a potential reassessment of ownership within the activity system and the individual contributions needed from stakeholders to achieve desired outcomes.

Figure 7. An activity system of Subject-Community contradiction



5.3 Divergent interpretations of the skills conveyed by teachers compared to those understood by students (Subject-Community)

The final observation from the interviews highlights a difference in perspective regarding the definition of success in obtaining an undergraduate degree. While teachers emphasise the importance of teaching both technical and soft skills, student experience shows that a strong foundation in fundamental accounting knowledge is sufficient to excel in the job market. This secondary contradiction emerges among the subject and community elements of the activity (Figure 7).

EXCERPT #5: Interviews with students and faculty (May 2024)

- Student 1: I have acquired a knowledge base and can now navigate in business.
- Student 2: I have learned to think structurally.
- Student 3: Many people do not understand accounting, and this makes me competitive.
- Faculty 1: Many skills become obsolete very quickly. The main issue is identifying which skills we need to cultivate in students and which skills should receive less emphasis.
- Faculty 2: Ethical behaviour and the ability to assess situations are crucial. It's not sufficient to merely grasp the subject matter.

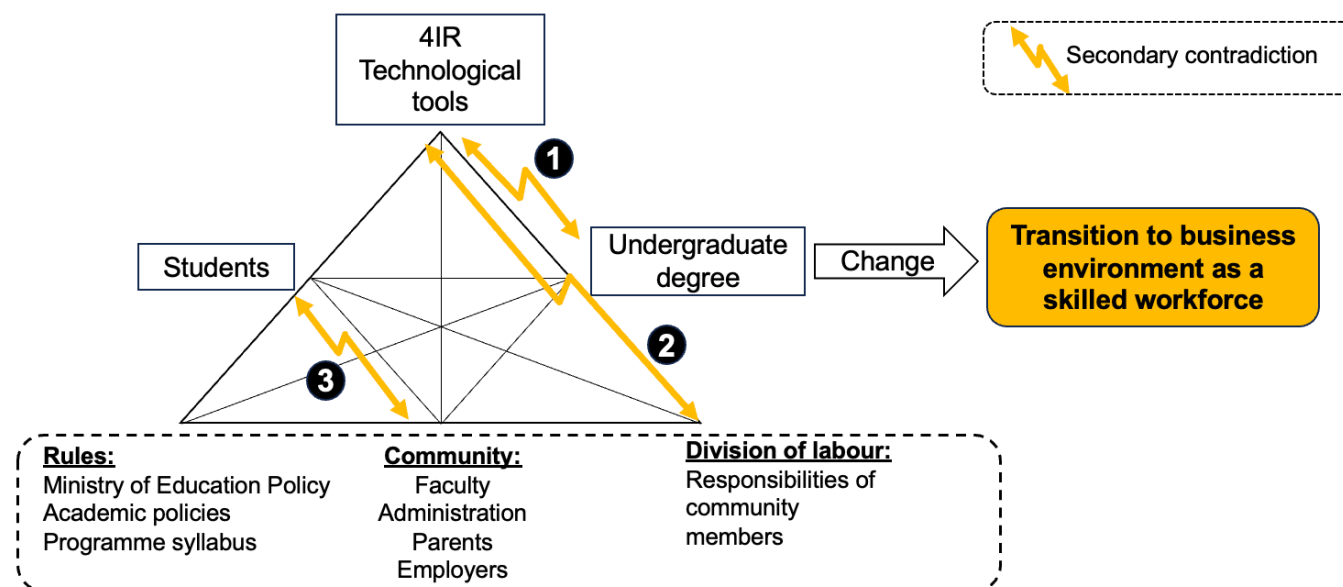
- Faculty 3: We may not know exactly what they need to learn, but we can assert that they must be adaptable to anticipate changing circumstances.

The finding reveals a difference between the skills emphasised by teachers and those perceived by students, thus highlighting the need to align educational objectives with what students, educators and employers expect for job readiness. This mismatch complicates accounting education activity system by raising questions about which skills are most crucial for success in the workplace and whether current teaching methods adequately prepare students. Possible change drivers could involve updating curriculum content to better integrate both technical skills and soft skills, ensuring graduates are better equipped to meet the changing demands of their future careers.

6. Discussion

The analysis of the findings presented in the earlier section revealed three central contradictions between elements of the activity system (Figure 8). Firstly, there is a gap between how important 4IR technologies are seen in education and their actual usefulness in the workplace. This mismatch challenges both employers and universities to align teaching with industry needs, updating curricula to include digital skills alongside traditional knowledge and incorporate technological requirements when entering the job market. Secondly, faculty members show mixed willingness to incorporate 4IR tools into teaching, highlighting a need for clearer roles and more support for adopting new technologies. Educators should be encouraged to develop digital skills to enhance their teaching methods. Lastly,

Figure 8. Secondary contradictions within activity system of undergraduate accounting teaching



differences in how teachers and students view essential skills create confusion about what is most important for future careers. Updating the curriculum to better match industry requirements is crucial for preparing students effectively. Overall, ongoing discussions between educators, students, and industry are crucial to adapting educational practices to meet professional requirements.

When addressing the contributions of the study, some findings align with common arguments presented in the body of literature, while others diverge. The main finding suggests that there is no strong evidence to claim that the 4IR significantly shapes the design and delivery of undergraduate accounting programmes in Kazakhstan. However, the results partially support earlier findings regarding the lack of faculty training and technological resistance. Furthermore, the study confirms the presence of contradictory perceptions on how the challenges of the 4IR should be addressed by different stakeholders within the activity system.

This study contributes to the existing literature by presenting findings that diverge from previous results regarding significant discrepancies between the emphasis on 4IR technologies in academia and their perceived relevance in professional practice. While the body of literature suggests that integrating educational technologies to enhance student learning outcomes is an urgent priority for ensuring the success of graduates in the job market, interviews with students in the context of the study indicate contradictory

findings. Instead, students prioritise acquiring fundamental accounting knowledge over advanced technological skills upon entering the workforce. Nevertheless, this finding still supports the existing gap regarding contradictory views on curriculum alignment with industry expectations. Similar to previous studies, the results of this research highlight the need for a detailed approach to integrating 4IR technologies into accounting education, balancing theoretical knowledge with practical industry demands.

Another contribution of the study is the identification of a reluctance among faculty members to take responsibility for incorporating 4IR technologies into the curriculum. This finding aligns with existing literature discussing barriers such as faculty resistance and technological proficiency gaps. Faculty members' varying perspectives on the integration of technology and the role of university administration in fostering innovation outline challenges within the educational activity system. Addressing these challenges requires institutional support for faculty development and strategic leadership to navigate technological integration effectively.

The final contribution of the study addresses the gap of a holistic view by highlighting a divergence between the skills emphasised by educators and those perceived as crucial by students. While faculty prioritise the development of both technical and soft skills, students place a higher importance on foundational accounting knowledge for early career. This contradiction reflects the need not merely to align educational objectives with industry expectations but also

to incorporate students' experiences and views. Effective curriculum design should bridge this gap by incorporating both technical proficiency and essential soft skills necessary for future accounting professionals.

This study has several limitations that should be acknowledged. Due to the rapidly evolving technological landscape, the research deliberately avoids specifying particular 4IR technologies or providing detailed examples of their integration into different accounting subject areas. The technologies mentioned by participants reflect their current understanding and experience, which may not represent the full spectrum of 4IR technologies used in other accounting settings. The scope is limited to a single undergraduate accounting programme, and the unique cultural, economic, and educational context may influence the applicability of findings to other settings. The exclusion of professional accounting bodies due to complex consent procedures limits the comprehensive understanding of the entire accounting education ecosystem. While identifying faculty resistance to technology adoption as a significant barrier, the research does not provide detailed strategies for addressing this challenge. Future research could explore specific 4IR technologies and their practical integration into different accounting subject areas, investigate successful cases of technology adoption, expand the scope to include professional accounting bodies and multiple institutions.

7. Conclusion

This study provided insights into how undergraduate accounting education in Kazakhstan adapted to the 4IR. It explored the challenges posed by 4IR and the need for educational institutions to adjust to new technologies and societal expectations. Several key contributions were made based on the study findings.

Firstly, Kazakhstani accounting programmes had not fully integrated 4IR technologies despite global discussions. This highlighted a gap between expectations and action in educational practices, calling for more effective strategies. Secondly, the study identified ongoing issues such as faculty resistance and inadequate technological skills among educators, consistent with previous research findings. Overcoming these barriers requires better support for faculty development and strong leadership. Finally, the research revealed a gap between skills prioritised by educators—technical and soft skills—and those students saw as crucial, such as foundational accounting knowledge. This suggested the need to align educational goals with industry needs and consider student experiences in curriculum planning.

While this study provided valuable insights, it had limitations, focusing on just one institution in Kazakhstan and a limited sample size. Therefore, future research could expand to multiple institutions in Kazakhstan or similar contexts globally.

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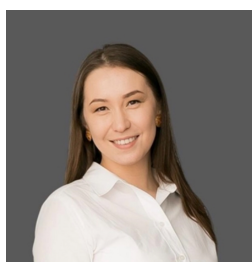
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