
Faculty Development and Dual Professionalism in Higher Vocational Education: A Survey

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Abstract

This survey paper examines the crucial role of faculty development, dual professionalism, and educational innovation in enhancing higher vocational education. Faculty development initiatives are pivotal in aligning teaching practices with industry standards, fostering dual professionalism by integrating academic knowledge with practical expertise, and ultimately improving student outcomes and employability. The use of multimedia technologies within these programs significantly boosts student motivation and engagement. Dual professionalism, which merges academic and practical skills, prepares students for the evolving labor market by promoting collaborative learning environments and innovative pedagogical practices. Educational innovation, through the integration of emerging technologies, transforms vocational training by personalizing educational experiences and improving learning outcomes. The survey highlights the potential of digital transformation to bridge education and workforce skills, emphasizing its importance in reducing unemployment and enhancing teaching efficacy, particularly in developing contexts. Future research should explore the effectiveness of different training models and the long-term impacts of vocational training on employment. It should also focus on optimizing resource allocation and enhancing educational equity in vocational education. The paper concludes that embracing these elements can effectively prepare students for the demands of a rapidly evolving job market, with further research needed to continue improving the quality and relevance of vocational training.

1 Introduction

1.1 Contextualizing Faculty Development and Dual Professionalism

Faculty development and dual professionalism are essential for fostering educational innovation within higher vocational education. These concepts focus on the continuous enhancement of educators' skills and knowledge, enabling them to adapt to evolving pedagogical methodologies and industry standards. By merging academic knowledge with practical expertise, educators create an environment that connects theoretical learning with real-world applications, crucial for preparing students to thrive in a rapidly changing landscape. Innovative pedagogies empower learners with necessary skills [1].

The integration of digital literacy into faculty development is vital, particularly given the pressing need for digital transformation in higher vocational education [2]. Additionally, cultivating a craftsman spirit is important for training technical talents and aligning with national innovation strategies [3]. Multimedia technologies significantly enhance student motivation and educational outcomes, further emphasizing the necessity for innovative educational practices [4].

Virtual learning environments (VLEs) and web-based tools, such as the Virtual Interactive Engineering on the Web (VIEW), have been shown to improve student success and learning experiences, highlighting the importance of technology integration in educational practices. Promoting ownership,

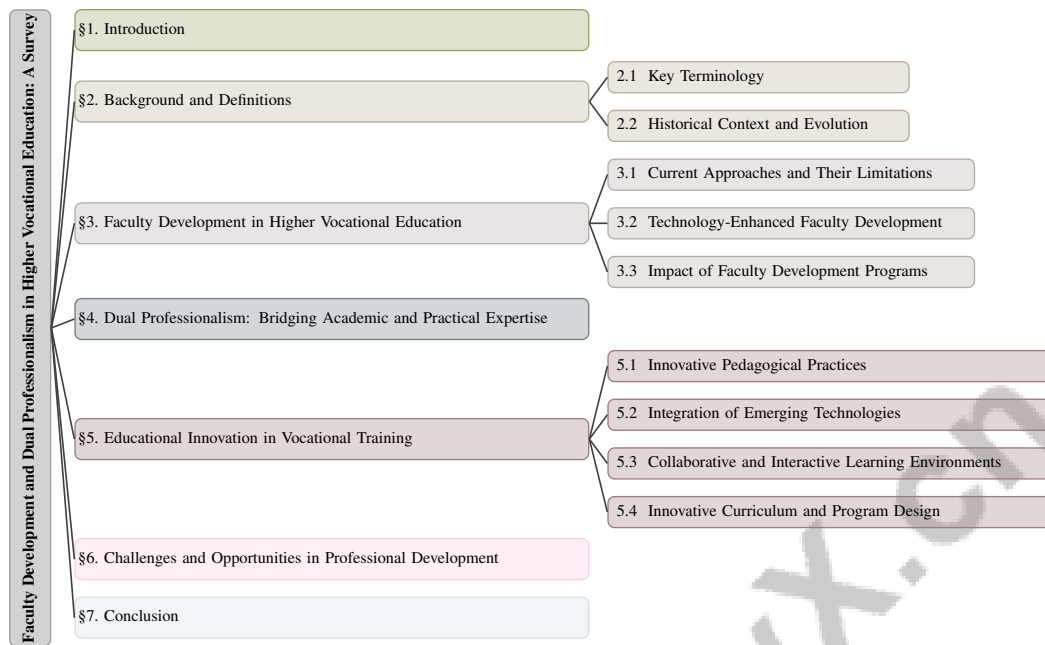


Figure 1: chapter structure

equity, and agency in faculty development through connected learning is crucial for transforming higher education practices [5].

The dual education system, recognized globally as an effective model for training qualified staff, ensures workforce alignment with employer demands through collaboration among various stakeholders in the educational process [6]. Additionally, the need for reform in the management system of higher vocational education, particularly in China, underscores the importance of enhancing educational quality to meet the demands of a rapidly evolving economy [7].

1.2 Structure of the Survey

This survey is designed to explore the multifaceted dimensions of faculty development and dual professionalism among educators in higher vocational education, emphasizing educational innovation through personalized learning strategies that align individual professional growth with organizational goals. It addresses the challenges faced by vocational teachers, as identified in recent research, by focusing on continuous professional learning that fosters meaningful professional identities and enhances the educational experience [8, 9, 10].

Beginning with an introduction that contextualizes the significance of these concepts in advancing pedagogical practices and aligning educational outcomes with industry standards, the survey progresses to provide a comprehensive understanding of key terminologies and the historical evolution of faculty development and dual professionalism in vocational education.

The third section examines current approaches to faculty development in higher vocational education, assessing their limitations and the transformative potential of technology-enhanced programs on teaching effectiveness and student outcomes. Following this, the survey explores dual professionalism, presenting definitions, frameworks, and models that integrate academic and practical expertise while discussing practical applications, benefits, and associated challenges.

The fifth section focuses on educational innovation in vocational training, scrutinizing innovative pedagogical practices and the integration of emerging technologies. It emphasizes the significance of collaborative learning environments and innovative curriculum design in enhancing vocational education. The survey further addresses challenges and opportunities in professional development, identifying specific issues within vocational training contexts and proposing strategies for overcoming them.

Finally, the survey concludes with a summary of key findings and reflections on the implications of faculty development, dual professionalism, and educational innovation for the future of higher vocational education. It suggests areas for further research, particularly regarding the integration of AI in education, as evidenced by studies across Greece, Hungary, Latvia, Ireland, and Armenia, which highlight the role of AI in promoting educational innovation [11]. The following sections are organized as shown in Figure 1.

2 Background and Definitions

2.1 Key Terminology

In higher vocational education, understanding key terminology is vital for navigating faculty development and dual professionalism. Faculty development involves structured programs to enhance pedagogical skills and integrate technologies like AI into teaching [12], crucial for adapting to technological advancements and improving student engagement [13]. Dual professionalism combines academic knowledge with practical skills, ensuring alignment with labor market demands [10]. This alignment is essential in vocational education for preparing a competent workforce [10].

Higher vocational education equips learners with skills for employment by blending theoretical instruction and hands-on experience, addressing regional disparities and fostering economic growth [10]. Educational innovation adopts cutting-edge technologies and practices to enhance learning, including AI literacy and interdisciplinary partnerships [12], with digital competence being crucial for modernizing educational practices [12].

Professional development, a continuous process, enhances educators' methodologies and expertise, especially in STEM [13], supported by frameworks emphasizing lifelong learning [14]. Vocational training, central to higher vocational education, prepares learners for the workforce by aligning curricula with industry standards, making understanding terms like 'professionalism' crucial [10].

A comprehensive grasp of faculty development and dual professionalism lays the foundation for exploring their interactions in higher vocational education. Effective strategies can facilitate personalized learning, enhance dual professionalism, and meet institutional and individual teacher needs. Recognizing evolving definitions of professionalism informs practices supporting teachers in their roles and identities in higher education [8, 9, 15, 10].

2.2 Historical Context and Evolution

The evolution of faculty development and dual professionalism in vocational education has been shaped by socio-economic changes, technological advancements, and educational reforms. The establishment of apprenticeship centers in France in 1945 was pivotal for equipping workers with practical skills [16], highlighting the enduring importance of vocational training. In India, vocational training inadequacies have led to labor market mismatches, emphasizing the need for reforms to align education with industry requirements [17]. Similarly, China's vocational education system faces challenges due to outdated models, necessitating reforms for workforce readiness [7].

Interdisciplinary approaches have influenced vocational training evolution, with frameworks for interdisciplinary science teaching shaping current practices [18]. In Australia and the UK, Initial Teacher Training frameworks have significantly influenced vocational education, reflecting broader trends in faculty development [10]. Technological advancements have catalyzed vocational education evolution, with slow progress in AI integration, yet critical for modernizing educational frameworks [12]. The COVID-19 pandemic accelerated this transformation, necessitating innovative teaching strategies and virtual environments, achieving outcomes comparable to traditional settings.

Recent studies emphasize cultivating a craftsman spirit in higher vocational education, stressing the need for theoretical and practical training to align with national innovation strategies [3]. This approach highlights the importance of valuing quality and precision for professional development in vocational contexts. Policy reforms have also shaped vocational education, with shifts towards flexible models like Germany's voucher system, increasing adaptability to labor market demands [19]. In countries like Australia, Canada, Finland, and Singapore, teacher education system evolution has informed faculty development practices, underscoring the global nature of these transformations [20].

3 Faculty Development in Higher Vocational Education

Faculty development is pivotal in higher vocational education, enhancing teaching efficacy and aligning educational practices with industry needs. This section explores current faculty development strategies, their strengths, limitations, and barriers to innovative pedagogical practices. As illustrated in Figure 2, the hierarchical structure of faculty development highlights not only current approaches and their limitations but also technology-enhanced development strategies. Furthermore, it emphasizes the impact of these programs on teaching effectiveness and broader societal outcomes. This comprehensive overview addresses contemporary approaches and challenges that hinder effective teaching and learning.

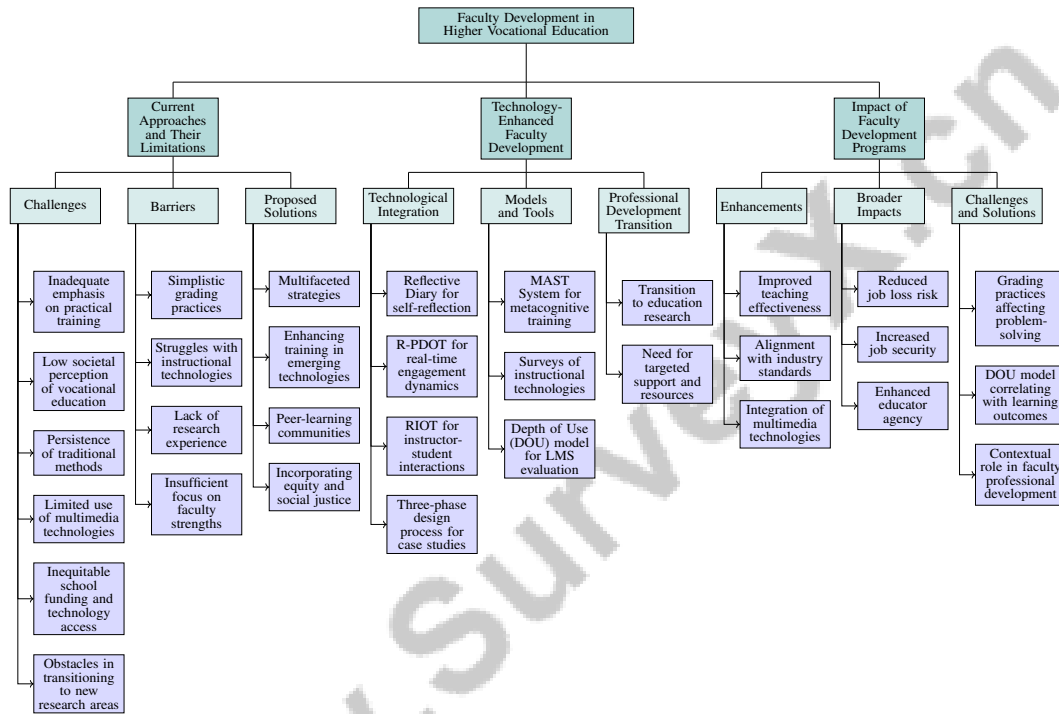


Figure 2: This figure illustrates the hierarchical structure of faculty development in higher vocational education, highlighting current approaches and their limitations, technology-enhanced development strategies, and the impact of these programs on teaching effectiveness and broader societal outcomes.

3.1 Current Approaches and Their Limitations

Faculty development programs in higher vocational education face challenges that limit their effectiveness in promoting pedagogical innovation and industry alignment. A major limitation is the inadequate emphasis on practical training and the low societal perception of vocational education, which hinders educational reforms [7]. Traditional methods persist due to simplistic interpretations of professionalism within teacher training frameworks, often ignoring the complexities of professional knowledge and practice [10].

The limited use of multimedia technologies in practical classes further impedes progress, as these tools are crucial for enhancing student motivation and engagement [4]. Inequitable school funding, disparities in technology access, and economic challenges restrict educators' participation in professional development [21]. Additionally, educators transitioning into new research areas, such as physics education research, encounter obstacles due to inadequate support and understanding [22].

Grading practices also pose challenges, as teaching assistants often prefer simplistic solutions over comprehensive reasoning, negatively impacting student understanding [23]. Many faculty members struggle to integrate instructional technologies effectively [24], compounded by limited exposure to AI concepts and technical challenges in integrating AI tools into educational frameworks [12].

Furthermore, the lack of research experience among educators limits the implementation of authentic scientific inquiry, restricting innovative teaching methodologies [25]. Proposed frameworks emphasize the importance of psychological and pedagogical competencies in mentorship to improve educator support [6]. Insufficient focus on leveraging the strengths and agency of physics faculty in professional development interactions poses additional challenges [14]. Programs like MIPEP, aimed at enhancing physics teachers' content knowledge and instructional practices, highlight the need for targeted initiatives [13].

Addressing these limitations requires a multifaceted strategy challenging conventional pedagogical practices, enhancing training in emerging technologies, and tackling systemic barriers to educational reform. As illustrated in Figure 3, which highlights the current challenges, obstacles, and potential solutions in faculty development within higher vocational education, key areas such as practical training, multimedia use, and innovative educational models are emphasized. Emphasizing peer-learning communities, such as the Tools of Engagement Project (TOEP), fosters collaboration and knowledge-sharing among faculty. Incorporating equity and social justice principles promotes educator agency and participatory learning environments. Innovative models inspired by heutagogy and connected learning can cultivate a culture of continuous improvement, enhancing student learning outcomes [5, 15, 26]. Equipping educators with essential skills and knowledge will better prepare them for dynamic teaching environments.

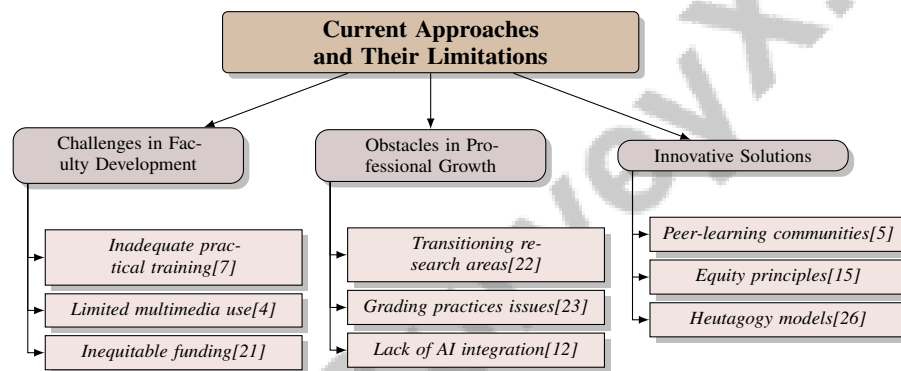


Figure 3: This figure illustrates the current challenges, obstacles, and potential solutions in faculty development within higher vocational education, highlighting key areas such as practical training, multimedia use, and innovative educational models.

3.2 Technology-Enhanced Faculty Development

Integrating technology into faculty development programs is crucial for equipping educators with the skills needed for contemporary educational landscapes. These programs utilize technological advancements to enhance pedagogical practices and promote continuous professional growth. For example, the Reflective Diary encourages self-reflection among novice teachers, enabling critical assessment of teaching experiences and skill refinement [27]. Such reflective practices are vital for tailoring faculty development to individual needs, improving instructional effectiveness.

The R-PDOT captures faculty engagement dynamics in real-time during professional development workshops, offering insights into effective teaching practices for integration into faculty development programs [28]. Similarly, the Real-time Instructor Observing Tool (RIOT) quantifies instructor-student interactions during classroom observations, supporting the incorporation of effective teaching practices into faculty development initiatives [29].

A structured three-phase design process for developing case studies emphasizes user interaction and iterative testing, enhancing the relevance and applicability of faculty development programs [30]. The MAST System integrates metacognitive training into professional development, allowing teachers to reflect on and adapt practices based on student data, underscoring the importance of reflective practice in teaching effectiveness [31].

Surveys of faculty development initiatives highlight the integration of instructional technologies into teaching practices, emphasizing peer learning and community support as critical components of successful faculty development [15]. These surveys categorize multimedia technologies based

on their capacity to enhance student engagement and motivation, underscoring the importance of leveraging these tools in faculty development programs [4].

The Depth of Use (DOU) model introduces an ordinal scoring system categorizing LMS use into low, medium, and high levels, providing a framework for evaluating and enhancing technology integration in faculty development [24]. Additionally, the transition of faculty from traditional physics research to education research is emphasized as a transformative element in professional development, highlighting the need for targeted support and resources to facilitate this transition [22].

3.3 Impact of Faculty Development Programs

Faculty development programs (FDPs) significantly enhance teaching effectiveness and improve student outcomes in higher vocational education. These programs align educational practices with industry standards, fostering dual professionalism by equipping educators with skills to integrate academic knowledge with practical expertise. The integration of multimedia technologies within FDPs enhances student motivation, preparedness, and overall education quality [4], crucial for creating engaging learning environments.

A shift towards a personality-based educational approach is necessary, as focusing solely on technical skills is insufficient for adequately preparing graduates for the workforce [7]. FDPs incorporating psychological and pedagogical training enhance mentors' competencies within dual education systems, further supporting educators' professional growth [6].

The impact of FDPs extends beyond immediate educational settings, as further training participation significantly reduces job loss risk, enhances job security, and increases commitment to employers, particularly during economic downturns [32]. This underscores the broader societal benefits of investing in faculty development.

Despite advancements, challenges persist. Teaching assistants' grading practices continue to affect students' problem-solving strategies, revealing a gap in promoting effective reasoning and understanding of complex concepts [23]. The DOU model indicates that higher engagement with learning management systems correlates with better learning outcomes, including higher GPAs and lower DFW rates, emphasizing the importance of effectively integrating digital tools into FDPs [24].

FDPs also enhance the agency of emerging education researchers, facilitating their transition into discipline-based education research (DBER) and improving their confidence and capabilities in conducting educational research [22]. This professional growth is supported by interdisciplinary partnerships that enhance educational practices when AI technologies are informed by insights from the Learning Sciences [12].

Moreover, the context of FDP implementation plays a complex role in moderating faculty professional development, underscoring the need for a faculty-centric approach that supports educators' growth within their specific contexts [14]. Programs emphasizing authentic scientific inquiry have been shown to increase educators' comfort with scientific methods and foster a desire to implement more authentic science in classrooms, thereby enhancing professional growth and instructional practices [25].

The MIPEP program exemplifies the effectiveness of targeted professional development in addressing the preparation gap in physics education, successfully improving the physics content knowledge and confidence of in-service high school teachers [13].

4 Dual Professionalism: Bridging Academic and Practical Expertise

4.1 Defining Dual Professionalism

Dual professionalism in higher vocational education merges academic knowledge with practical industry skills, aligning educational outcomes with labor market demands. This approach equips students with both theoretical understanding and practical application, enhancing employability in a global economy. Educators are central to this paradigm, balancing theoretical rigor with hands-on experience, thereby fostering a craftsman spirit that values academic and practical proficiency [12]. By integrating interdisciplinary education, educators enrich student learning outcomes and prepare them for complex professional challenges [14].

Professionalism in vocational education is shaped by managerialist, emancipatory, and utilitarian discourses, influencing how professionalism is perceived and practiced. Managerialist discourse focuses on regulatory efficiency, often prioritizing compliance, while emancipatory discourse advocates educator empowerment and autonomy. Utilitarian discourse emphasizes practical outcomes and skill acquisition. These perspectives collectively shape expectations of vocational teachers, with initial training often inadequately addressing professionalism’s complexities, impacting both teacher and student experiences [10, 8]. Incorporating AI literacy into educational frameworks supports dual professionalism by bridging academic knowledge with technological skills, facilitated by partnerships that integrate insights from the Learning Sciences with AI development [12].

4.2 Frameworks and Models of Dual Professionalism

Frameworks supporting dual professionalism in vocational education are essential for bridging academic and industry skills. Boundary objects within cultural-historical activity theory highlight shared tools and concepts that transcend individual activity systems, emphasizing collaborative processes in integrating theoretical learning with practical application [33]. The socio-technical perspective, as seen in the LA Program, underscores the interplay between social processes and technical work, crucial for cultivating dual professionalism through integrating social and technical dimensions in education [34].

As illustrated in Figure 4, which depicts the frameworks and models supporting dual professionalism in vocational education, the focus is on boundary objects, socio-technical perspectives, and the role of universities in integrating academic and industry skills. This visual representation reinforces the importance of these components in fostering a cohesive educational environment.

Universities as integrators and catalysts within the innovation infrastructure further support dual professionalism, positioning them as entities that facilitate practical knowledge application through industry partnerships [35]. These frameworks collectively emphasize integrating academic and practical expertise in vocational education, enhancing student competencies and success in professional fields. Research on dual professionals’ transition experiences underscores professional development’s role in shaping their identities and roles, contributing to improved educational outcomes and stronger academic-industry connections [9, 33].

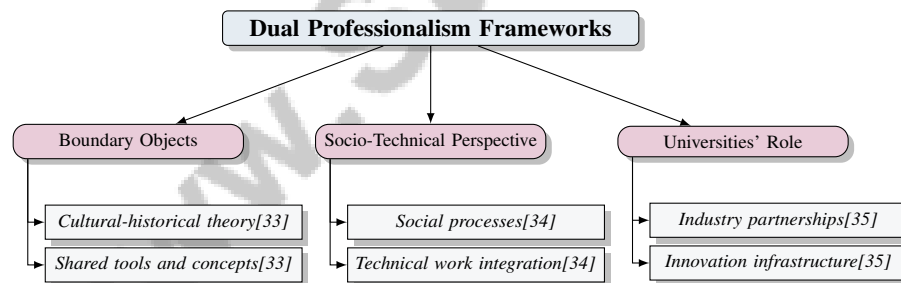


Figure 4: This figure illustrates the frameworks and models supporting dual professionalism in vocational education, focusing on boundary objects, socio-technical perspectives, and the role of universities in integrating academic and industry skills.

4.3 Practical Applications and Benefits

Practical applications of dual professionalism in vocational education are exemplified by collaborations between educational institutions and industry, enhancing teaching practices and student outcomes. The cooperation between German companies and U.S. educational institutions in establishing dual training structures demonstrates effective integration of academic learning with industry skills, improving employability [33]. Aligning educational programs with industry needs ensures students acquire relevant skills, bridging theoretical knowledge and practical application [36].

Web 2.0 technologies in collaborative learning environments increase educational resource accessibility, promoting interactive and engaging learning experiences. Interactive 3D modules in engineering education, for instance, enhance comprehension of complex principles, showcasing technology’s benefits in vocational training [37, 38]. The National Dual Training System (NDTS) exemplifies dual

professionalism's benefits, improving graduate employability and fostering industry collaboration by aligning curricula with industry standards [39].

4.4 Challenges and Identity Issues

Dual professionalism in vocational education presents challenges and identity issues, notably in defining and enacting professionalism within teacher training frameworks. Professionalism varies across contexts, leading to understanding gaps and inconsistencies in vocational settings [10]. This variability can hinder the effective integration of academic and practical expertise, essential for dual professionalism. Instructor-student interaction dynamics are crucial for cultivating dual professional identity, yet studies often overlook students' actions and reactions, vital for understanding classroom dynamics and professional identity development [29].

Traditional interpretations of professionalism within vocational training often emphasize a simplistic, utilitarian view, inadequately addressing the complexities of integrating academic and industry skills. This narrow perspective can create identity issues for educators balancing roles as academic instructors and industry practitioners [10]. Addressing these challenges requires reevaluating teacher training programs to incorporate a nuanced understanding of professionalism aligned with dual professionalism principles. A supportive environment prioritizing continuous professional development is crucial, facilitating personalized learning opportunities that align with organizational goals and individual teacher needs, empowering educators to enhance professional identities and competencies [8, 9, 10].

5 Educational Innovation in Vocational Training

5.1 Innovative Pedagogical Practices

Innovative pedagogical practices in vocational training are pivotal for equipping students with skills vital for the modern workforce, emphasizing critical thinking, creativity, and collaboration. As illustrated in Figure 5, the hierarchical structure of these practices highlights key methods such as project-based learning, digital tools, and active learning strategies. Each category showcases specific examples and their contributions to enhancing educational outcomes. Project-based learning in creative environments fosters interaction, enhancing critical thinking and teamwork, thereby improving comprehension and retention while boosting engagement and motivation [40, 41]. Digital tools further enrich learning experiences, as evidenced by increased participation and diversity in fields like astronomy through online programming, showcasing technology's role in enhancing access and inclusivity [21]. Platforms such as Riff Video and Meeting Mediator exemplify effective online learning environments, promoting student-centered and personalized educational experiences [42, 43].

Adaptive learning models, such as adaptive hybrid MOOCs (ahMOOCs), customize content to individual learner profiles, aligning instructional strategies with educational goals to enhance outcomes and well-being [44, 1]. Case study-based methods are particularly effective in software engineering, where real-world applications enhance theoretical understanding, supporting higher vocational education and initiatives like rural revitalization [45, 46]. The integration of computational thinking into curricula emphasizes mathematical integration and student-centered learning over traditional programming [47]. Web 2.0 tools enhance engagement and retention through interactive learning environments [37]. Active learning techniques, supported by conducive institutional cultures, are crucial for transforming departmental practices and embracing technological advancements in pedagogy [48, 2].

5.2 Integration of Emerging Technologies

The integration of emerging technologies in vocational training is crucial for improving learning outcomes and preparing students for a technology-driven workforce. Blended learning, which combines face-to-face instruction with online assessments and digital resources, offers a flexible educational framework catering to diverse learning preferences [49]. Virtual Learning Environments (VLEs) are central to this integration, providing platforms tailored to accessibility and institutional needs, supporting vocational training objectives [50]. VLEs' adaptability allows for personalized learning experiences that address vocational education challenges.

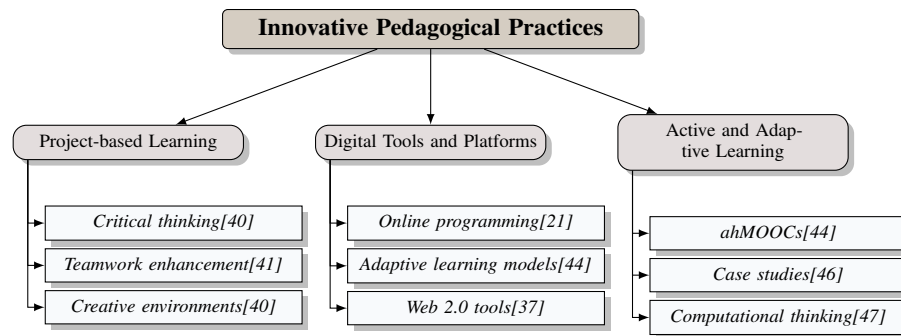


Figure 5: This figure illustrates the hierarchical structure of innovative pedagogical practices, highlighting key methods such as project-based learning, digital tools, and active learning strategies. Each category showcases specific examples and their contributions to enhancing educational outcomes.

Adaptive learning technologies further enhance personalization by tailoring content to individual needs, improving engagement and knowledge acquisition [44]. This learner-centered approach underscores technology's role in enabling personalized learning pathways. Coordination technologies improve communication, enhancing collaboration and interaction among educators and students [51]. Research highlights technology's effectiveness in professional development for teachers, especially through the flexibility of online courses, accommodating vocational educators' diverse schedules [52].

5.3 Collaborative and Interactive Learning Environments

Collaborative and interactive learning environments are essential in vocational education, fostering engagement and adaptability. These environments emphasize peer interactions and cooperative learning, crucial for developing modern professional skills. Collaborative strategies like team projects and group problem-solving significantly enhance student engagement and comprehension through interactive learning, encouraging peer knowledge sharing and reflection. This approach aligns with lifelong learning principles and emerging technology integration, as seen in initiatives like the Tools of Engagement Project (TOEP) and co-teaching models that promote innovative instructional practices [53, 54, 42, 15].

Adaptive learning models facilitate these environments by customizing experiences to individual profiles, providing insights into collaborative strategies' effectiveness through data-driven analyses of completion rates and participant perceptions [44]. Interactive technologies, including VLEs and digital collaboration tools, enable real-time student engagement, enhancing educational outcomes through collaborative resource sharing and project work. Leveraging social media and advanced educational technologies promotes active participation and peer learning, preparing students for a rapidly evolving digital landscape [54, 42, 43, 12, 15].

5.4 Innovative Curriculum and Program Design

Innovative curriculum and program design in vocational education are vital for aligning educational outcomes with industry demands, developing a workforce equipped with practical skills. Emphasizing practical education necessitates improvements in teacher training and infrastructure to cultivate a craftsman spirit [3]. This approach highlights the importance of hands-on learning experiences for preparing students for real-world challenges.

Interdisciplinary teaching approaches enhance learning outcomes, with integrated curricula often outperforming traditional methods by offering holistic experiences that better prepare students for complex professional environments [18]. Initiatives like scientific parks and public-private partnerships significantly contribute to regional economic development, providing students opportunities to engage in real-world projects and collaborations with industry partners [35].

However, understanding the long-term impacts of machine learning interventions and the ethical implications of data usage in vocational education remains necessary, requiring a balanced approach to technological integration and ethical standards to ensure curriculum relevance and responsibility [55].

The rigidity of grading rubrics can hinder innovative curriculum design; thus, vocational programs should adopt flexible assessment strategies recognizing diverse learning paths and competencies [56].

6 Challenges and Opportunities in Professional Development

6.1 Challenges and Opportunities in Vocational Training

Vocational training encounters significant obstacles that hinder professional development, notably educators' limited engagement with authentic scientific research, which weakens their capacity to impart genuine scientific practices [25]. This issue is compounded by benchmarks that fail to meet the needs of underprepared physics teachers, resulting in subpar professional development programs [13]. The inconsistent adoption of AI technologies further complicates the landscape, as skepticism about their efficacy persists among educators [12], alongside a lack of standardized digital literacy measures, political barriers, and disparities in teacher preparation standards that influence professional identities [10].

Despite these challenges, vocational training offers substantial opportunities for enhancement. Collaborative networks, such as Faculty Learning Communities, are pivotal for professional growth, promoting engagement and innovation through knowledge sharing [14]. Adaptive learning models like the ahMOOC demonstrate the transformative potential of flexible learning environments, using technology to tailor experiences to diverse learner needs and significantly improving completion rates [50, 44, 49].

6.2 Opportunities for Overcoming Challenges

Addressing professional development challenges in vocational training necessitates a strategic, multifaceted approach emphasizing collaboration, innovation, and resource allocation. The Depth of Use (DOU) model offers a promising framework for guiding faculty development and optimizing Learning Management System (LMS) resources [24], enhancing instructional practices and student engagement. Expanding professional development to include a broader range of participants and settings, especially for those transitioning into discipline-based education research (DBER), can yield insights into educators' diverse experiences, informing more tailored development programs [22]. Continuous organizational investment in training, as supported by economic research, is essential for adapting to economic shifts and positively influencing career trajectories [32].

Establishing diverse partnerships among stakeholders is critical for overcoming development challenges, enhancing educators' understanding of AI, and facilitating its integration into teaching practices [12]. Cross-disciplinary collaborations can lead to innovative professional development programs that address evolving workforce demands. Additionally, expanding research to include a broader spectrum of physics instructors across varied environments can provide insights into context-dependent expertise, influencing professional growth [14]. The MIPEP model, which has enhanced physics education, presents an opportunity for scaling its impact on teacher retention and student outcomes [13].

6.3 Innovative Approaches to Professional Growth

Innovative approaches to professional growth are essential for equipping educators with skills to navigate the changing educational landscape. Implementing innovative teaching methods and integrating technology in vocational training are crucial for adapting to market demands [7]. Multimedia technologies effectively boost student engagement and motivation, fostering dynamic and interactive learning environments [4]. Emphasizing lifelong learning and continuous professional development is vital for faculty to engage with new pedagogical strategies and technologies, meeting evolving student needs and labor market demands [15].

Developing professionalism models that incorporate critical pedagogy and educators' voices represents an innovative approach to professional growth, creating a more inclusive and reflective development process [10]. Future research should explore the application of the DOU model across institutions and LMS platforms, integrating emerging educational technologies [24], which can optimize digital tools in professional development programs, enhancing their effectiveness.

Additionally, developing targeted training programs for mentors and examining diverse mentorship styles' impact on trainee outcomes are critical for improving mentorship quality [6]. Effective mentorship enhances educators' disciplinary understanding and fosters collaboration, leading to robust educational practices [25].

7 Conclusion

The exploration of faculty development, dual professionalism, and educational innovation reveals their pivotal roles in advancing higher vocational education. Faculty development initiatives are instrumental in enhancing teaching quality and aligning educational practices with industry standards, thereby promoting dual professionalism. This dual approach empowers educators to integrate theoretical and practical knowledge, significantly enhancing student employability and learning outcomes. Incorporating multimedia technologies into faculty development programs further boosts student engagement and motivation, cultivating vibrant learning environments.

Dual professionalism, which seamlessly combines academic and practical expertise, is crucial for equipping graduates to meet the dynamic demands of the labor market. By fostering collaborative learning environments and adopting innovative pedagogical methods, vocational education ensures that students gain both theoretical insights and practical skills. Successful implementations of dual professionalism, such as innovation clusters, underscore the potential of vocational education to drive regional economic growth and develop a skilled workforce.

Educational innovation, particularly through the integration of emerging technologies, is transformative for vocational training. Adaptive learning models and virtual environments personalize educational experiences, enhancing learning outcomes and student well-being. The role of digital transformation in bridging education and workforce skills underscores the importance of technological integration in reducing unemployment and improving teaching effectiveness, especially in developing regions.

Future research should focus on evaluating the effectiveness of different training models and the long-term impacts of vocational training on employment and income. Additionally, understanding the transition experiences of dual professionals is crucial for designing effective professional development programs that facilitate meaningful change. Optimizing resource allocation and improving the alignment between educational supply and labor market demand are essential for achieving equity in higher vocational education.

This survey also emphasizes the importance of higher vocational education in fostering interdisciplinary collaboration and suggests further research areas, including the impact of digital transformation on achieving Sustainable Development Goals. Moreover, the introduction of direct observation tools in telehealth education calls for future studies to assess their influence on learner performance and patient outcomes.

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