

Application Research of Agile Concepts in Teacher Development in the Big Data Era

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Abstract: In examining the trends characteristic of the digital era, it is essential to consider both the challenges and opportunities faced by educational institutions, as well as the critical role of big data in investigating the education sector. The abundance of data, ranging from official statistics to intricate social patterns, offers fresh insights for addressing the needs of educators and learners, facilitating educational innovation, and enhancing service quality. This study seeks to explore how big data technologies can be leveraged to increase the adaptability of teacher training programmes. Agile education emphasises the capacity to respond swiftly to shifts in the external environment, to seize emergent opportunities, and to foster the ongoing professional growth of teachers, highlighting the value of sustainable lifelong learning. Strategies examined include the development of intelligent learning environments, integration of artificial intelligence within instructional processes, and the establishment of trans-regional learning networks. Furthermore, the study addresses the implications of cultivating digital literacy, ensuring the ethical application of AI, and devising inventive approaches to evaluate the efficacy of machine learning systems. Employing the comprehensive, learner-centred principles of agile education has the potential to substantially transform conventional models of teacher training. Key measures for effective implementation include nurturing an agile organisational culture, forming collaborative cross-functional teams, and utilising adaptive talent management systems. An analysis of Qingdao Chaoyin Education Development Group illustrates how agile education principles can enhance outcomes for both educators and learners. It is imperative for educational organisations to adopt such methodologies and integrate innovative practices in response to the continually evolving educational landscape, thereby supporting the sustainable professional development of teachers and improving the quality of educational provision.

Keywords: Agile Education, Big Data in Education, Teacher Training Flexibility, Smart Learning Environments, Digital Literacy in Education.

1. Introduction

In the current era of rapid technological advancement, the widespread implementation of big data has exerted a considerable influence across multiple domains, including education. Big data offers numerous advantages for educational institutions, providing mechanisms to enhance the services offered to both teachers and students, to facilitate educational reform, and to elevate the overall quality of education (Jing & Shen, 2018). The concept of agility, which originated within the software development and manufacturing sectors, has more recently been explored as a means to promote positive change and improvement in educational contexts (Allen & Sites, 2012).

Adopting an agile framework in education combines rapid adaptability with a sustained focus on the professional growth of teachers as lifelong learners (Wu et al., 2023). This approach is particularly pertinent in the context of big data, where swift data processing and prompt decision-making are essential for knowledge advancement and effective educational planning (Trust, 2012). Integrating agile methodologies in teacher development offers multiple advantages, such as the capacity to transform conventional learning processes, incorporate artificial intelligence into instructional practices, and establish cross-border learning networks (Jing & Shen, 2018; Zhao, 2016). Nevertheless, several challenges must be addressed to ensure the successful and productive implementation of agile education. These challenges include the increasing volume and complexity of data requiring systematic analysis, the necessity for ongoing professional development to maintain educators' digital competencies, and the ethical considerations associated with the use of AI (Caili et al., 2023). Additionally, the benefits of applying agile methodologies in teacher training and in enhancing educational outcomes require empirical validation and careful evaluation (Arimoto, Barroca & Barbosa, 2016).

This study aims to investigate the application of agile principles in teacher education within the framework of big data. To identify key practices, methodologies, and challenges associated with the implementation of agile approaches in educational settings, the research utilises a combination of case study analysis and surveys targeting participants engaged in agile teaching and learning processes. The findings are anticipated to provide valuable insights for educators and policymakers, supporting the advancement of teacher professional development and the enhancement of educational services.

2. Literature Review

2.1. Method Empowerment: Establishing Conducive Environments

This underscores the necessity for all learning environments to be structured in a manner that actively supports and enhances the learning experience. Li, Du and Li (2019) suggest that information technology-driven intelligent learning involves the development of smart learning environments, the cultivation of an optimised learning climate, and the promotion of a culture that encourages intelligent learning practices.

2.2. Developing Intelligent Learning Spaces

According to Jing and Shen (2018), an intelligent learning space is not constrained

by traditional temporal or spatial boundaries and relies on technology to enhance the hardware components of the physical learning environment. In alignment with agile principles in teacher professional development, educators require access to essential physical resources, including computers and internet connectivity, as well as software tools such as ChatGPT and other AI applications. The integration of big data, the Internet of Things (IoT), and virtual reality (VR) facilitates blended learning, combining online and offline experiences to strengthen teachers' professional competencies through enhancements in the learning environment (Chen, 2022).

Promoting the use of artificial intelligence-supported education across family, school, and societal levels immerses teachers in a culture of intensive learning. As noted by Trust (2012), AI has transformed teaching and learning methods, moving beyond the traditional model in which the teacher is the exclusive source of knowledge. This shift emphasises that teachers must adopt a mindset of continuous learning, recognising that valuable knowledge can be acquired from peers or technology, thereby fostering an environment where all participants in the classroom can contribute as learners and educators. A learning community represents a network of interpersonal relationships and support systems that facilitates incidental learning among individuals who share a commitment to collective growth (Trust, 2012). Variations in regional, economic, environmental, and cultural contexts may lead teachers from different schools to encounter diverse challenges, resources, and motivations for professional development. To address these disparities, educators must move beyond the conventional single-school research model and leverage opportunities provided by temporal and spatial technologies. By establishing cross-school and cross-regional intelligent learning communities, teachers gain access to extensive resources and mutual support, thereby broadening their perspectives on professional learning.

The professional growth of teachers is closely intertwined with curriculum development. Educators must remain informed about ethical considerations arising from the adoption of new technologies while integrating these tools into instructional practice. Educational authorities should design comprehensive curriculum frameworks for digital literacy training, extending from the pre-service to in-service phases. Such frameworks should incorporate both theoretical and practical components, including detailed planning of curriculum structure, hierarchy, content, and constituent elements. Schools have been developing curricula and platforms dedicated to enhancing teachers' skills and competencies (Jing & Shen, 2018).

2.3. Courses on Artificial Intelligence and Technology Ethics

Given that conventional teacher training models are increasingly unsustainable in the context of rapidly evolving information technology, educators must adapt by integrating digital tools, transforming instructional delivery, and fostering professional growth through comprehensive, lifelong learning approaches. The adoption of advanced technologies, including artificial intelligence and big data, enables the enhancement of personalised learning. By analysing the data generated during teachers' learning activities, precise and insightful evaluations of their professional development can be conducted. Consequently, learning resources can be tailored to meet the specific needs of individual educators, thereby increasing the intelligence,

sophistication, and customisation of teacher training programmes. In this context, professional development should move away from rigid, centralised, and instructor-centred models that neglect the humanistic aspects of learning. Instead, approaches that prioritise personalised and adaptive training strategies should be promoted to support the continuous development of teaching professionals (Caili et al., 2023).

2.4. Quality Enhancement Measures: Methodological Innovation

The advent of information technology has fundamentally reshaped traditional teacher training, requiring educators to develop proficiency in digital tools, to innovate their instructional strategies, and to pursue professional growth through collaborative, efficient, and continuous learning. The integration of artificial intelligence and big data facilitates the advancement of personalised learning. By analysing the data generated throughout teachers' learning activities, precise evaluations and diagnostics of their development can be achieved. Over time, this enables the design of learning resources tailored to the specific requirements of each educator, delivering training that is more intelligent, refined, and customised. Consequently, in professional development, reliance on rigid, centralised, and instructor-centred training approaches should be consciously abandoned, with emphasis placed on adopting a personalised learning model that supports individualised professional growth (Caili et al., 2023).

2.5. Deep Learning Methodologies

Challenges associated with fragmented learning often arise when online tools encourage the use of superficial learning strategies. Deep learning, in contrast, seeks to construct integrated and systematic knowledge structures, emphasising comprehension, reconstruction, and practical application of acquired knowledge. Conversational AI tools, such as ChatGPT, support educators in reconfiguring and expanding their knowledge bases through interactive educational experiences. As society increasingly adopts AI-enhanced learning, teachers must integrate technology-informed learning theories into deep learning practices to maximise the impact of each instructional intervention.

Technological advances have extended learning beyond the constraints of traditional time and space, creating environments in which learning can occur at any moment and in any location, a concept referred to as ubiquitous learning. This approach highlights the continuous accessibility of education across contexts (Zhao, 2016). Both pre-service and in-service teachers are encouraged to apply ubiquitous learning in their instructional practice, coordinating activities with the assistance of AI technologies such as the Internet and ChatGPT, to ensure ongoing professional growth regardless of personal preference. The significance of educational evaluation in guiding the future direction of teaching and learning cannot be overstated. Evaluation shapes subsequent developments and strategies within educational institutions. With the continuous evolution of information technology reshaping education, evaluation practices must also evolve to meet contemporary standards.

The ongoing interactions between AI tools such as ChatGPT and learners demonstrate that knowledge acquisition remains a primary goal in the era of intelligent learning. However, educators must also cultivate higher-order competencies, including

creativity and critical thinking. Consequently, evaluation of teacher professional development should encompass these modern priorities, expanding beyond traditional skill-based metrics to include creativity, critical thinking, and related capabilities (Wu et al., 2023). Through engagement with AI and big data, teachers continuously refine and expand their professional skills. While terminal assessments can measure knowledge and technical skills gained, monitoring teachers' approaches to learning and the development of higher-order abilities necessitates ongoing evaluation. Information technology offers sophisticated tools and methods to systematically assess teacher professional development and learning processes (Trust, 2012).

Intelligent technologies facilitate data-driven and efficient assessment practices, providing opportunities for innovative evaluation approaches. Teacher professional development should be regarded as a cyclical, long-term, and lifelong process rather than a discrete event. Modern education can be tracked through teachers' digital learning records, with personal electronic portfolios storing data on their learning and growth. By analysing data retrospectively or in real time, teachers and educational authorities can conduct evidence-based evaluations at various stages of professional development. Such insights can inform the design of targeted guidance pathways to support the ongoing advancement of educators' professional competencies.

3. Research Methodology

This study employs an interdisciplinary, mixed-method descriptive research design to investigate the application of agile principles in teacher training within the context of big data. The methodology incorporates the following key components:

3.1. Literature Review

A comprehensive literature review is conducted to establish the theoretical foundation of the study. This review examines agile concepts, the adoption of big data in education, and teacher training programmes. It also includes an international perspective, providing insights into the value-added evaluation model widely used in the United States and assessing its relevance to educational practices elsewhere.

3.2. Case Study Analysis

To illustrate the practical application of agile education strategies, a case study of Qingdao Chaoyin Education Development Group is presented. This case demonstrates how the organisation has implemented agile principles to enhance both teacher and student performance (Missiroli, Russo & Ciancarini, 2016). Data for the case study are collected through structured interviews, document reviews, and observation of organisational activities.

3.3. Survey and Data Collection

Quantitative and qualitative data are gathered using questionnaires distributed to teachers. The survey addresses key areas such as collaboration, communication, and professional development within teacher teams. Pre-screening questions examine

aspects of work attitude, continuous learning capability, and job competency. The collected data are used to identify critical issues and evaluate the effectiveness of the agile practices being applied.

3.4. Evaluation of Agile Implementation

The study assesses the relative effectiveness of various approaches to implementing agile technologies in education. This includes reviewing progress in designing intelligent learning environments, integrating AI into instruction, and establishing multiregional learning networks. Analysis of the case study and survey findings provides insights into the applicability and impact of agile methodologies in educational settings.

3.5. Framework Development

Drawing on the literature review, case study analysis, and survey outcomes, the study proposes a potential framework for agile teacher training. This framework highlights strategic approaches to enhancing instructional methods, refining curricula, supporting methodological development, and reforming evaluation processes. It is intended to guide educational institutions in effectively adopting agile practices.

3.6. Recommendations and Best Practices

The study concludes with implications for educators and policymakers regarding the implementation of agile methodologies. Recommendations are provided to improve teaching and learning processes, informed by insights derived from the case study and survey data forming the foundation of the research. This systematic approach enables a thorough exploration of how teacher professional development processes can be organised according to the identified agile principles, considering both theoretical perspectives and practical recommendations.

4. Data Analysis and Discussion

4.1. Implementation Strategies

These organisations are defined by their rapidity, adaptability, technical expertise, documented response times, and swift decision-making processes. They also incorporate a range of innovative methods, continuously refining them through practical application. Table 1 outlines five key characteristics of effective agile teams, derived from an analysis of school management documents and interviews (Lukusa et al., 2020). These characteristics can be summarised with three principal terms: precision, stability, and talent. The term “precision” refers to the compact scale of the teacher team, as overly large organisations may impede the efficient implementation of decisions. “Stability” denotes the presence of consistent and harmonious relationships among team members, which serves to minimise internal conflicts (Avila, Van Petegem & Snoeck, 2021). The concept of “talent” encompasses both generalists and specialists, with approximately 70% of the team comprising specialists who possess domain-specific expertise, while the remaining 30% are adaptable individuals capable of rapidly acquiring knowledge from other areas.

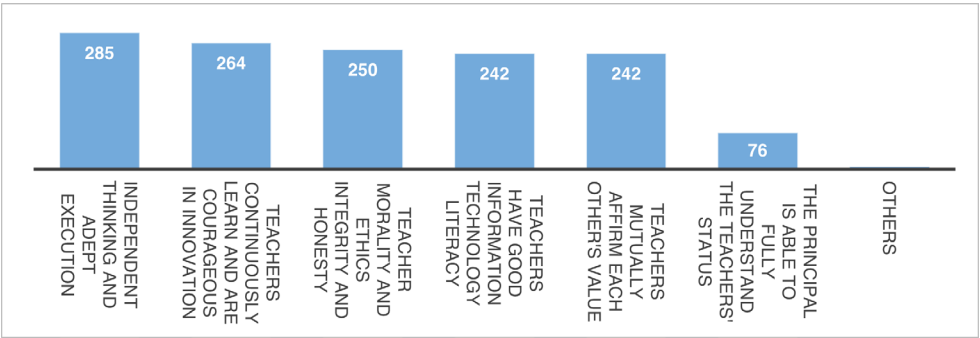
Table 1: Attributes of a Successful Agile Team.

Attributes	Goals
Specialised Personnel	Ensuring focused and highly efficient work outcomes; small team size of fewer than ten members to optimise performance.
Cross-Functional Team Members	Facilitating frequent development and delivery cycles; enabling the team to provide value independently; integrating all tasks for complete execution; obtaining feedback from internal and external stakeholders, such as supervisors.
Ability to Work in a Centralised Office or to Cope with Challenges from Different Office Locations	Enhancing communication effectiveness; strengthening team motivation; promoting knowledge sharing; reducing training and learning costs; fostering commitment to collaboration.
A Mixed Team Consisting of Generalists and Experts	Experts contribute specialised skills, while generalists provide adaptability across diverse tasks; team members develop professional competence, often evolving into versatile specialists with multiple skills and practical experience.
Stable Work Environment	Establishing interdependence to achieve delivery goals; promoting mutual acceptance of work methods; simplifying team cost accounting and operation rates; retaining and developing organisational knowledge capital.

4.2. Building An Agile Culture

Developing an agile teacher team necessitates particular attention to fostering an agile culture at both the individual and collective levels. A survey conducted with 335 participants revealed that the principal challenges in team collaboration and communication were low levels of collaborative effectiveness and divergent objectives among members. Before discussing specific team qualities, it is essential to clarify the definition of a “team” within the context of this study. According to Figure 1, 285 respondents (85%) identified independence and self-sufficiency as the most critical elements for achieving optimal team performance. Additionally, 264 participants highlighted the importance of continuous learning and innovation skills, while 250 respondents emphasised integrity, honesty, and a willingness to assume responsibility as essential competencies (Abdullah & Qureshi, 2023; Kropp et al., 2014; Meier, Kropp & Perellano, 2016; Mishra, Mishra & Ostrovska, 2012; Noguera, Guerrero-Roldán & Masó, 2018).

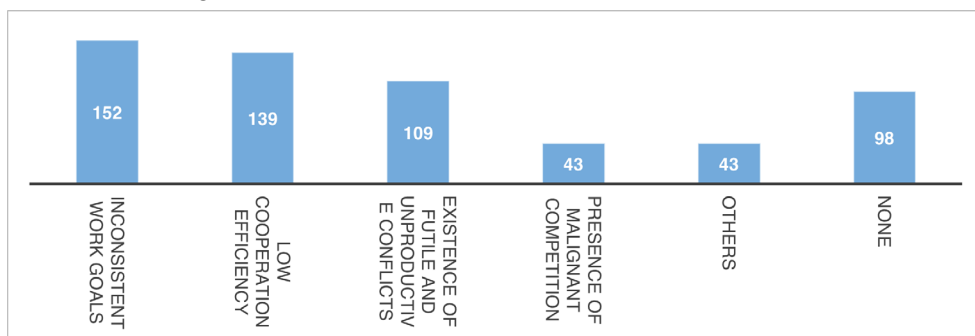
Figure 1: The Characteristics of An Outstanding Teaching Team.



At the community level, members of the subject team are expected to adopt agile thinking and behaviours, take responsibility for their actions, and remain attuned to the external environment. Initially, they should proactively engage with emerging trends, such as big data, automation, and artificial intelligence, participate in organisational decision-making, and accept accountability for outcomes. A flat organisational structure

is essential to enhance employees' sense of involvement and motivation, which in turn fosters the creation of value. At the organisational level, cultivating effective team dynamics and a culture that encourages innovation is critical. Trust, active engagement, inclusivity, and openness within the team enable the organisation to respond effectively to external changes and support productive cognitive processes. The survey identified several challenges, including misaligned work objectives and poorly defined priorities (26.07%), inefficiency and slow performance (23.84%), aggressive behaviours (27.5%), gossip (33.3%), and unproductive conflicts (18.7%). Despite these issues, the majority of respondents (38%) felt well-prepared for their roles prior to the hiring of additional personnel, and 81% reported no conflicts regarding communication or collaboration within their teams.

Figure 2: Performance of Teacher Team Collaboration.



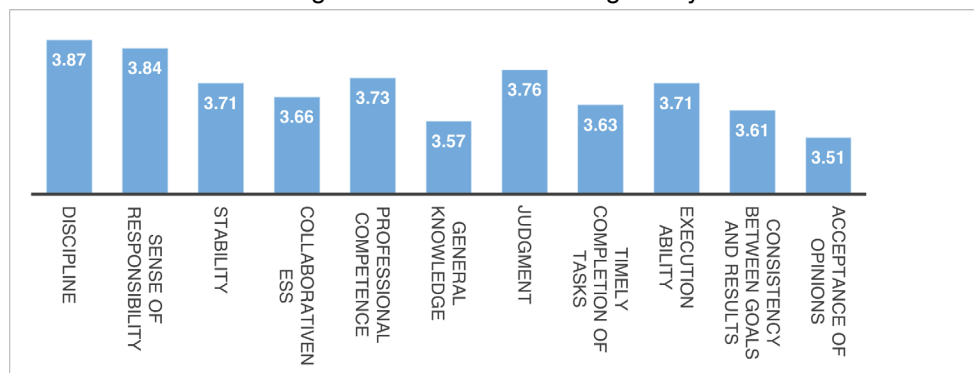
Within the framework of the agile approach, it is essential to communicate effectively and cultivate shared values through both formal and informal interactions, while simultaneously building trust among team members. Effective knowledge management relies on robust communication and the active exchange of knowledge within an engaged and trusting organisational environment. Such a culture enables teams to adapt more readily to dynamic and unpredictable contexts (Noguera et al., 2018). Furthermore, for an agile team to operate efficiently, it is recommended that 20% to 30% of its time be allocated to creative thinking, fostering an environment that encourages innovation (Abdullah & Qureshi, 2023). Collaborative teamwork enhances productivity by combining learning with collective effort, generating a continuous cycle of innovation (Kropp et al., 2014; Mishra et al., 2012).

4.3. Talent Cultivation

Agility denotes an organisation's ability to respond rapidly to continuously evolving external conditions, with talent management serving as the key to this capability. Human capital constitutes the primary resource necessary for developing nimble organisations. In order to enhance organisational agility, two aspects are particularly important. First, it involves establishing a multifaceted team, often referred to as T-shaped or versatile talent (Abdullah & Qureshi, 2023). Second, it requires the application of systematic, evidence-based methods in talent management. Members of agile teams must possess appropriate skills, and the teams themselves should be

interdisciplinary or cross-functional. Leveraging the abilities and capacities of team members to address tasks efficiently enables the organisation to respond effectively to dynamic environments, thereby enhancing overall operational performance (Kropp et al., 2014). Figure 3 presents respondents' evaluations of their organisation's employees across three dimensions—work attitude, continuous learning capability, and job competency—using a five-point rating scale.

Figure 3: Teacher's Working Ability.



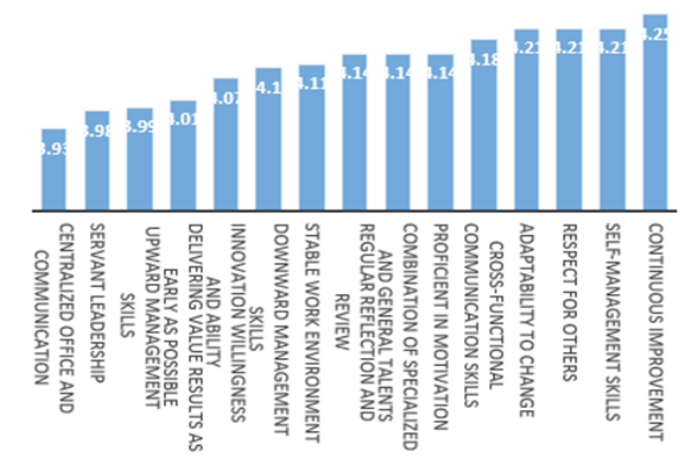
The survey results reveal that employees in the participating companies generally adhere to regulations, with a mean score of 3.87, and exhibit responsibility (3.84) and resilience (3). However, cross-functional communication scored noticeably lower, indicating a need for improvement in interdepartmental interactions (3). Continuous learning skills received an average rating of 3 out of 4.57 for general knowledge, highlighting gaps in cross-domain understanding and the adoption of effective learning strategies. Professional competence was rated at 3.73, although experience across diverse sectors was limited. Additional components contributing to overall work capability scores included comprehension and reasoning ability (3.76) and planning (3.71), while the score for actions implemented was lower at 3.51, reflecting partial execution of proposed suggestions. Agile work teams particularly require constructive attitudes toward tasks and the use of systematic, evidence-based work practices to foster accountability and create opportunities. In the era of big data, employees require a sense of identity rather than mere obedience, making hierarchical management models less effective. Agile teams rely on a foundation of trust, which enhances engagement and allows team members the autonomy to make decisions, aligning with contemporary demands for organisational growth and development.

4.4. Building a Self-Management Flexible Talent Development Model

To explore the research question, participants were asked to complete a self-administered questionnaire designed to evaluate their perceptions of the key skills that enable organisations to function effectively within complex and rapidly changing environments. Responses were recorded using a five-point Likert scale. According to the results illustrated in Figure 4, continuous improvement was identified as the most critical competency, achieving an average score of 4. This skill encompasses

the systematic enhancement of organisational processes, environmental conditions, knowledge structures, and architectural features, all of which contribute to the effective management of intricate operational contexts (Abdullah & Qureshi, 2023). Additional competencies recognised as significant included self-management, respect for others, and adaptability to change, which collectively received an average rating of 4.21. These findings indicate that the development of such skills strengthens the collective capacity and performance of the team as a whole (Kropp et al., 2014). Conversely, the area receiving the lowest evaluation was central office coordination and communication, with a mean score of 3.93, suggesting that interdepartmental communication remains a domain requiring further attention and improvement.

Figure 4: Operational Capability.



The development of agile talent necessitates a fundamental transformation of traditional educational models, particularly regarding the design and structuring of professional programmes and curricula. Given current societal trends and the continuously evolving expectations of employers, educational institutions must anticipate future talent market requirements and adjust their curricula accordingly. Consequently, schools are required to create diverse, adaptive, applied, and innovative talent development models (Noguera et al., 2018). For instance, new students should initially be placed in broader disciplinary areas, such as management, and undertake foundational courses to establish a solid theoretical base. After approximately two years, specific majors can be refined according to prevailing societal needs, enabling the flexible cultivation of management-oriented, creative professionals with strong theoretical knowledge and versatile skills (Kropp et al., 2014).

A highly flexible, modular, and scalable curriculum system is essential to meet these challenges. Such a system must be capable of addressing varying market demands and adapting promptly to changes in the field, allowing lessons to be tailored to students' developmental requirements (Abdullah & Qureshi, 2023). The modular approach ensures effective teaching while maintaining the quality of talent output. Flexibility in education should extend to core teaching methodologies, including

course duration, course selection, and assessment systems, reflecting contemporary trends in global education and market-driven requirements (Mishra et al., 2012). Implementing a credit-based system enables students to select courses aligned with societal talent demands, educational value, and available credits. Elective course systems should also be considered, permitting management students to enrol in science courses, thereby facilitating knowledge integration and application to foster high-quality education suitable for future dynamic job markets.

To cultivate applied talent, traditional training models must shift, with increased emphasis on practical instruction. Strategies should integrate school-based, social, and corporate education. Instead of relying solely on systematic knowledge and memorisation, interactive teaching models such as discovery, exploration, and problem-solving should be promoted. Pedagogical methods should be participatory, heuristic, and discussion-oriented. Approaches such as case-based learning, fieldwork, simulation exercises, integrated learning, and bilingual instruction are recommended, enabling early socialisation and preparing students to meet societal demands efficiently. Essential skills for agile team members include self-management, enabling them to work independently and self-organise tasks according to context. Responsibility involves understanding the organisational vision and aligning tasks and goals accordingly, ensuring prioritisation with an emphasis on creativity and enthusiasm. The shift from empowerment to enablement involves providing resources and autonomy to ambitious agile teams, allowing professional work to be performed effectively while administrative support is managed separately. Autonomous management within agile teams does not imply the absence of oversight but rather an adaptive approach that enhances autonomy and team dynamics.

Teaching and learning approaches should be conceptualised as an integrated, flexible system that allows restructuring of learning while optimising available resources to achieve otherwise unattainable objectives. Schools should leverage external human resources and related assets, adjust teaching materials as needed, and establish virtual collaborative teams. Addressing faculty or equipment shortages may involve recruiting external talent and utilising social resources. Organisationally, schools must integrate resources effectively, maintain flat management structures, and decentralise authority. Modern educational units operating under agile principles, with students in multidisciplinary project teams, do not rely on rigid hierarchical management. Following the principles of agile manufacturing, knowledge and flexibility are crucial organisational assets. Schools should therefore promote teachers' professional engagement, motivation, and continuous professional development (Abdullah & Qureshi, 2023).

Enhancing teaching team capacity involves cultivating innovative thinking, dispositions, and capabilities. Institutions should invest in teacher training and continued professional education, including opportunities at specialised institutions or corporate positions. Teachers should participate in academic conferences and undertake visits to other schools to broaden their perspectives, thereby continually improving educational quality and fostering creativity. This approach ensures that teaching teams remain progressive and innovative, equipped to address evolving educational requirements.

4.5. The Practice and Effectiveness of Agile Enhancement in Educational Organisations

The Qingdao Chaoyin Education Development Group comprises numerous affiliated

entities, including Qingdao Chaoyin Industrial Co., Ltd., multiple primary and middle schools, a senior high school, and an international school in Canada, among others. Emphasising its core values of “people, innovation, respect, and shared success,” the group focuses on educational reform and diversified expansion. The Chaoyin team has consistently emphasised unity, dedication, and creativity, evolving from a single-campus institution into a multi-campus organisation. Qingdao Chaoyin School, one of the group’s key institutions, accommodates over 8,000 students and employs more than 1,000 faculty members. The school has made substantial investments in educational resources, driving reform, upgrading infrastructure, and enhancing competitive and qualitative improvements within its educational system (Li & Yang, 2007; Sun & Zhou, 2009).

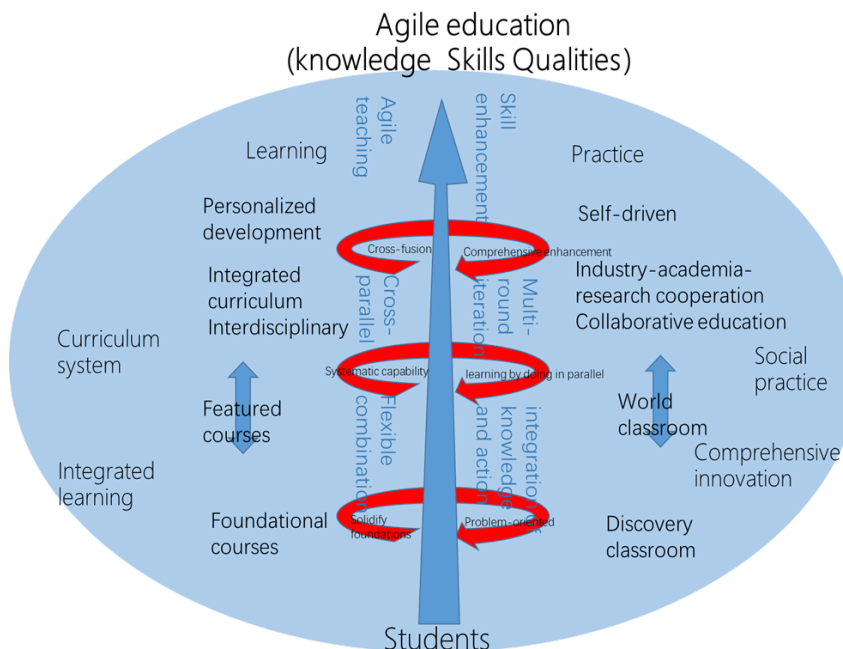
4.6. *The Philosophy and Goals of Agile Education*

The rapid evolution of the information society demands enhanced capabilities in managing talent-related information as well as broader and deeper professional competencies. In the era of big data, future careers will require young people to engage in Internet-based learning and acquire practical skills necessary to remain competitive and relevant. Presently, global competition in education is intensifying, and the advancement of digital technologies necessitates the urgent revision of educational systems, philosophies, models, and methodologies (Zhang, Lin & Xiao, 2018). In response to these challenges, China has implemented initiatives aimed at achieving the great rejuvenation of science and education, cultivating high-quality and forward-looking talent, and driving innovation-led development (Lv, 2022). Talent development can be classified into three primary categories:

1. **“I” Talents:** Individuals who possess in-depth expertise within a specific domain, emphasising specialisation and mastery in their chosen field.
2. **“T” Talents:** Highly skilled professionals combining deep domain knowledge with broad-based competencies, including communication, organisational, managerial, innovative, and international collaboration abilities.
3. **“Π” Talents:** Integrated leadership talents who combine specialised expertise with practical experience in related industries, focusing on the convergence of “specialisation + industry.”

In response to these considerations, this study proposes the Agile Education System as a framework for cultivating sustainable and competitively skilled talent. This system aligns with multiple educational objectives, addresses individual talent requirements, and adapts to the dynamic nature of contemporary education. It prioritises student development by integrating theoretical and technical knowledge with practical skills while promoting iterative reconstruction of learning. The system facilitates effective utilisation of inter-school and interdisciplinary resources, allowing repeated cycles of knowledge acquisition and skill enhancement. Its high degree of versatility and rapid responsiveness equips students to navigate the demands of modern, dynamic higher education institutions and workplaces. In the context of the Chaoyin Education Group, implementing this system with a focus on practical application demonstrates its potential effectiveness and relevance.

Figure 5: Agile Education.



4.6. Agile Education System

Agile education can be conceptualised as a comprehensive system encompassing theoretical foundations, knowledge, and practical skills. Originating from the mid-1990s concepts of “Agile Manufacturing” and “Agile Software Development,” Agile education emphasises responsive flexibility to accommodate the rapidly evolving and diverse demands of learners, technological advancements, and environmental changes. It relies on multiple iterative cycles of interaction to continuously develop and reinforce students’ capabilities, thereby enhancing their adaptability and resilience (Kamat & Sardessai, 2012). The framework of the Agile education system is grounded in both domestic and international educational reforms, innovations, and best practices. It incorporates elements from initiatives such as the “Stanford 2025 – Open Loop University,” Bloom’s taxonomy of educational objectives, connectivist network learning, constructivist learning theory, MOOC-based blended learning, and project-based learning methodologies. These innovations broaden the scope of the Agile education system, ensuring its relevance, adaptability, and practical applicability in modern educational contexts (Krehbiel et al., 2017).

4.7. Implementation and Practice

The Agile education system is structured around the dual dimensions of learning and practice, emphasising personalised development goals for students through tailored and precise teaching aligned with cultivation objectives. High-quality educational resources within this system are consolidated using advanced information

technologies, including network platforms and data intelligence, drawing from multiple domains, disciplines, and institutions. Teaching materials, courses, and skill-training modules are dynamically organised through non-linear combinations and parallel blended arrangements, facilitating refined collaborative education and systematic talent development. Ultimately, this approach achieves an integrated implementation of the learning process (López-Alcarria, Olivares-Vicente & Poza-Vilches, 2019).

Theory and practice are closely intertwined within the self-directed framework of Super Silver Agile Education. Alongside theoretical coursework, students acquire a wide range of competencies through project-based training and engagement in social practice. Key characteristics of this model include goal differentiation, agile instructional methods, dynamic content reconstruction, flexible integration, learning combined with work, cross-parallel processing, iterative learning cycles, collaborative support, comprehensive innovation, and progressive skill development. It is further recommended that students be provided with a variety of opportunities, including access to renowned teachers and courses, participation in extracurricular activities, engagement with different disciplines, involvement in laboratory research, social practice experiences, and the possibility of further study at prestigious international institutions. Offering these opportunities not only broadens students' knowledge and skills but also enhances their abilities through practical experience, enabling them to validate knowledge through practice, innovate through available platforms, and expand their prospects through access to opportunities (Sharp & Lang, 2018).

4.8. Effectiveness of Agile Education Enhancement

The Agile Education System has been extensively implemented within the Smart Campus, resulting in the registration of 10,822 user accounts, comprising 884 teacher accounts and 9,938 student accounts. The deployment of this system has produced notable outcomes, including an average daily visitor count exceeding 2,300, with a user activity rate of approximately 73%, along with several other measurable improvements. The 5G Smart Education comprehensive evaluation management system is integrated with the Smart Campus Big Data Center, enabling seamless data interoperability with the Subject Competency Comprehensive Evaluation System, OA System, and BI System, thereby establishing a model for data reuse. This integration has substantially reduced teachers' workload in data collection and processing, saving approximately 11,200 hours and 330,000 yuan per semester—equivalent to roughly 16,500 U.S. dollars and 6.5 workdays per month—by eliminating redundant tasks (Chen et al., 2022; Lu & Wu, 2022). Regarding school-parent communication, information related to students' competencies is efficiently managed through the comprehensive assessment system, which generates detailed student records. These records allow parents to quickly monitor and understand changes in their children's development, resulting in a reduction of 21,000 hours and 620,000 yuan per semester previously spent on teacher-parent interactions (Li, Yuan & Elhoseny, 2021).

4.9. Attributes of Agile Teaching Teams

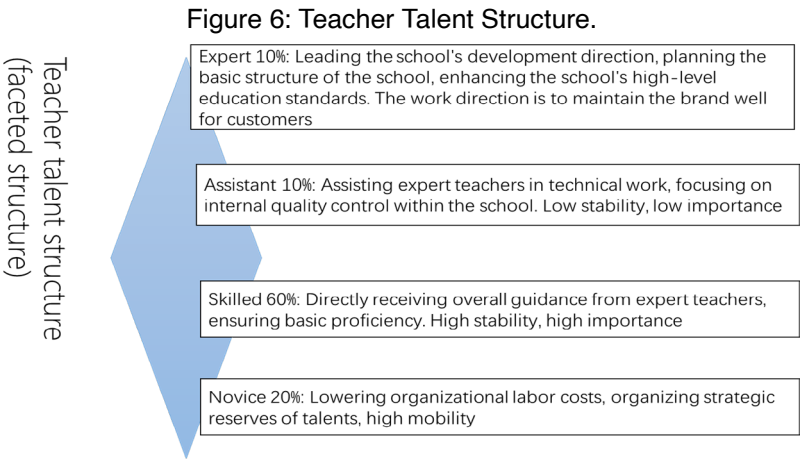
Following the implementation of the Agile Education System and guided by the "Three Names" development strategy—focusing on "Famous Teachers, Famous

Students, and Famous Experiences”—the Super Silver Education Group selected 14 top-tier subject specialists from nearly 1,000 faculty members to lead the Teacher Studios. These appointed educators represent fields such as language, mathematics, English, physics, chemistry, biology, politics, history, geography, music, art, STEAM, Brain Olympics, and additional disciplines. Their responsibilities include conducting professional research, breaking down traditional boundaries between campuses and educational stages, and mentoring colleagues, thereby serving as hubs for pedagogical discussion and acting as catalysts for the formation of agile teacher teams. Furthermore, they engage in interdisciplinary research and collaboration through unit-based inquiries, cross-disciplinary projects, and larger integrated initiatives, creating scenario-based teaching environments that significantly enhance students’ problem-solving capabilities (Lundqvist et al., 2019).

Table 2: Attributes of Agile Education Team.

Attributes of Agile Education Team	
1	Professional Research and Teaching Team
2	Cross-Level and Cross-Disciplinary Teams
3	Centralised Lesson Preparation, Teaching Research Activities
4	A Mixed Team Consisting of Generalists and Experts
5	Stable Work Environment

Following the implementation of the Agile Education System, the Super Education Group restructured its workforce, establishing a polyhedral talent framework that emphasises work attitude, continuous learning capacity, and professional competence. Among approximately 1,000 employees, this structure categorises personnel into 10% industry specialists, 60% experienced teachers, and 30% technical support staff. The system fosters internal dynamism, encourages proactive engagement from employees, strengthens collaborative efforts, and enables individuals to express their capabilities effectively. Staff members receive diverse forms of evaluation, incorporating comprehensive feedback and continuous updates on assessed competencies to support ongoing professional development.



4.10. Education Resource Repository

Chaoyin Education Group has developed an internal resource repository dedicated to agile education, concentrating on three principal domains: Intelligent Online Education, Service-Oriented Education, and Metaverse Education.

1. Intelligent Online Education focuses on networking, personalisation, service orientation, intelligence, and precision. It embodies agility by integrating multiple networks and systematically organising extensive educational resources through online platforms, supporting both human-machine collaboration and mobile learning. This form of education excels in personalised learning by addressing learner profiling and adaptive learning requirements, employing intelligent learning companions to design individualised learning pathways (Aggarwal, Sharma & Saxena, 2023). Advanced courses leverage artificial intelligence and data technologies to achieve precision in educational management and behavioural analytics, thereby enhancing the overall learning experience (Wei et al., 2021).
2. Service-Oriented Education is facilitated through abundant networked educational resources and connected technologies, forming an intelligent and open educational ecosystem. It establishes platforms and systems capable of serving large learner populations while maintaining customisation and adaptability. This approach promotes the development of a learning society and supports the evolution of modern digital education (Shu & Gu, 2023).
3. Metaverse Education employs metaverse technologies to create immersive, interactive, and collaborative learning environments that blend virtual and real-world elements. Supported by intelligent technologies, this approach enhances memory, engagement, and skill acquisition. Key attributes include immersion, multi-modal learning, personalisation, and objective assessment. By integrating digital avatars and virtual instructors alongside intelligent learning assistants, metaverse education transforms traditional teaching into scenario-based learning experiences, producing lifelike and effective educational encounters (Yu, 2023; Zhao et al., 2022).

4.11. The Application of Agile Philosophy in Classroom Teaching

Research has also examined the application of agile philosophy in teaching at both domestic and international levels. According to prior literature the SCRUM methodology in mechatronics courses, enabling flexible approaches to product development tasks. SCRUM in a software engineering course, which allowed instructors to make timely adjustments in response to student feedback. Prior literature also described agile principles into a Database course, fostering student autonomy and reducing dependence on teacher-led instruction. Collectively, these studies indicate that agile methods are predominantly applied within software engineering education. Prior studies also emphasise that the core focus should be on the development and coordination of teams rather than solely on technical agility within the classroom.

4.12. Agile Principles Applied to Instructional Design

Research on agile instructional design has explored various adaptations across educational contexts. Literature described that School Extreme Programming techniques to school teaching, incorporating iterative stages of planning, designing, developing,

and evaluating throughout the academic year. Similarly, the Online Learning Consortium proposed an AGILE model for corporate training, emphasising responsiveness and collaboration through five sequential stages: planning, positioning, designing, selecting, and evaluating. Arimoto et al. (2016) developed an agile learning design framework for open educational resources, encompassing stages of envisioning, design and development, and evaluation sharing. This approach integrates continuous planning, dynamic design, iterative development, collaboration, and early assessment, with the ultimate goal of optimising learning materials for diverse educational environments.

5. Conclusion

5.1. Agile Deep Infiltration and Integration with School Culture

School management is gradually being influenced by the principles of agility, a shift largely driven by economic globalization. An agile organisation is one that can rapidly adjust its technology, personnel, and management practices to respond effectively to evolving market conditions. Promoting agility within education necessitates the development of a flexible school structure that combines technological resources with human capital to facilitate adaptive responses and foster a responsive organisational culture. Key characteristics of such agile educational institutions include adaptable organisational frameworks, integrated technological systems, a skilled workforce, interdisciplinary collaboration, empowered leadership, efficient operational processes, and culture-oriented organisational behaviours.

5.2. Enhancement of Educational Data Analysis Capability

Schools today face an overwhelming influx of data but are often inadequately prepared, as contemporary educational institutions frequently lack robust resource management systems capable of converting such extensive data into valuable assets across diverse digital platforms. Extracting meaningful patterns and correlations from large datasets poses a significant challenge. Beyond enhancing data analysis skills, strengthening this capacity requires systematic upgrades to institutional systems and technological platforms. Consequently, teachers' awareness and responsiveness to student data should be cultivated through structured training in data literacy, educational technology tools, and analytical methodologies. Such preparation should focus on the precise application of technology for student assessment, data interpretation, and informed decision-making, ensuring that instructional strategies are guided effectively by data-driven insights.

5.3. Practicing Agility to Achieve School Goals

The cultivation of agility within educational institutions is fundamentally driven by digital technologies and represents a prevailing trend in organisational management development. Models designed to foster agility contribute directly to enhancing the quality of high school education and are closely integrated with educational digitalisation initiatives. By improving teachers' sensitivity to student data and providing systematic training, the overall effectiveness and quality of the educational process are significantly strengthened.

5.4. The Agile Future: Methodological Summary and Reshaping

The capacity for agility lies in strategic workforce management and the systematic application of operational processes. Key elements include organisational flattening, promotion of interdisciplinary collaboration, comprehensive empowerment, dynamic adjustment of responsibilities, streamlined workflows, and the cultivation of a culture that drives behavioural change. Future-focused agility emphasises continuous monitoring and improvement of methods that enhance the organisation's ability to respond to external pressures while addressing evolving internal requirements.

1. **Flattening Organizational Structures:** Transforming an organisation's hierarchy into a flatter structure enhances communication effectiveness. Matrix management facilitates coordination and integration across different disciplines, overcoming barriers created by rigid departmental divisions.
2. **Total Empowerment and Dynamic Authorization:** Empowerment must be flexible and adapt to changing circumstances. School administrations need to maintain a balance between centralised and decentralised authority, adjusting authorisation levels in line with organisational development to support structural evolution.
3. **Process Simplification:** Streamlining work procedures reduces the time required to complete tasks, thereby improving operational efficiency. Implementing agile processes is essential to achieving educational agility.
4. **Cultural Transformation:** Agile education requires a culture characterised by student-centricity, rapid responsiveness, high execution capability, innovation, commitment to learning, teamwork, and tolerance for mistakes. School systems and activities should integrate these cultural elements to unify values, reduce communication costs, enhance performance, and ultimately cultivate a fully agile institution.

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