



The Path and Method of Digital Transformation of Higher Education Based on PDCA

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Abstract. The digital transformation strategy represented by artificial intelligence and digital technology is gradually driving the fundamental change and comprehensive reshaping of the thinking mode, organizational structure and operation mode of human society. As an important part of the transformation strategy, higher education is also faced with opportunities and challenges from the change of technology, cognition, methods and ecology. In this paper, the basic law and fundamental goal of higher education to follow, put forward a based on PDCA quality management closed loop of higher education digital transformation path, build a set of "teaching, learning, examination, evaluation, building, tube," each link of the digital transformation system architecture, and from the teaching operation, teaching management, teaching construction, quality assessment four basic PDCA closed-loop, detailed design of higher education digital education new paradigm, new mechanism, new ecological, provide a new path for the development of higher education high quality connotation.

Keywords: PDCA, Digital Transformation, Basic Follow, Path, Method

1 Background Introduction

The world is ushering in the fourth industrial revolution represented by digital technology. Digital technology has increasingly become a leading force driving the fundamental changes and all-round reshaping of the thinking mode, organizational structure and operation mode of human society. Countries around the world have introduced digital transformation strategies and taken education as an important part of them[1][2], as shown in Table 1. China attaches great importance to the digital reform of higher education. The 20th National Congress of the Communist Party of China clearly put forward to "promote the digitalization of education and build a learning society and a learning country with lifelong learning for all"[3]. In March 2022, the Ministry of Education of China launched the implementation of education digitalization strategy[4]; in May 2023, Chinese President Xi Jinping pointed out that "education digitalization is an important breakthrough to open up a new track of education development and shape the new advantages of education development"[5]. It has become the trend of higher education to promote the transformation and upgrading of higher education, reshape the educational concept, paradigm and practice, and improve the quality of higher

education[6]. There are unlimited opportunities but also many challenges. In general, we need to focus on the "four changes": changes in technology, ideas, methods and ecology.

Table 1. Typical education digital strategic action.

Continent	Country	Important planning documents	Strategic Objective
Asia	India	India Report 2021: Digital Education	Promote digital education nationwide to make India a global knowledge-based superpower
	Vietnam	The National Digital Transformation Plan 2025 and 2030 Development Direction	A stable and prosperous digital country with qualified digital citizens
Africa	Egypt	The Basic Digital Skills Development Program	Cultivate citizens' digital capabilities to prepare for the era of artificial intelligence
	South Africa	The South African National Digital and Future Skills Strategy	Eliminate the gap between providers of digital skills in universities and vocational colleges and demanders of digital skills such as businesses and communities
Europe	Germany	Digital knowledge society	To enable learners to obtain appropriate personalized education programs
	Russia	Digital transformation of education	Personal digital archives and "virtual scholar assistant" will be established, and one third of the courses will use digital technology by 2030.
North America	America	A Digital Learning Guide for School Leaders	Help students have the necessary skills needed in a digital society
	Canada	The Digital Literacy Education Framework	Cultivate the digital ability and digital literacy that students should have, covering the three levels of application, understanding and creation
South America	Baxi	Digital transformation strategy	Strengthen digital talent training and promote value creation
Oceania	Australia	The Digital Literacy Strategic Framework	Train students to fully master digital skills, including collaboration, integration, innovation and other abilities

1.1 Change of Technology

Human beings are civilized because of education, and education develops because of science and technology[7]. The digitalization of higher education comes from technological innovation, which drives the transformation and development of higher education digitalization. Reviewing the previous industrial revolutions, it is not difficult to find that the reform of higher education has been evolving with technological changes. The fourth Industrial Revolution is characterized by its great speed, breadth and depth, which has brought about systemic changes and exacerbated inequality[3][8]This will force higher education and basic education to make a systematic reshaping to adapt to

the age of intelligence. From the perspective of the current technology drive, both digital industrialization and industrial digitalization will push the digital economy to the leading role[4][10], The reform of higher education is bound to experience the exploration and practice of the digital transformation of education.

1.2 Change of Cognition

With the change of The Times and technology, the concept of higher education is also constantly developing and changing. In the era when digital economy has become the latest engine of the world economic development, the teaching cognition of teachers, students' learning cognition and the governance cognition of managers will inevitably change from the era of the combination of industrialization and informatization to the era of active adaptation to the integration of informatization and intelligence. From the current more and more college graduates can only be engaged in almost zero degree requirements of services, to recently hot technical secondary school reading ginger ping to 12 for global Ali-baba global mathematics competition finals, to ren repeatedly talked about "artificial intelligence in China could not develop quickly, actually China now education or industrial society that way of education", more and more people realize that higher education can no longer go along the 100 years of industrial age model, must step up for the era of intelligent reform transformation, in order to improve citizens digital adaptability, competence, creativity.

1.3 Change of Method

From the point of classroom teaching and management service practice, as information technology into education teaching each link, each process, whether teachers, students, and managers, more and more strongly aware of, using the traditional method mode, more and more difficult to adapt to and competent for heavy work study task, investigate the underlying mechanism is mainly to adapt to the new situation of "teaching method, research method, governance" are quietly changing. In terms of teaching method, the traditional one-way knowledge indoctrination has been difficult to reconcile the contradiction between students' personalized learning demand and rich resource supply, which forces teachers to change to heuristic, case and personalized supply mode. In terms of learning method, the traditional single subject topic tactics and scattered unsystematic pure knowledge acquisition are far from meeting the ability to solve complex problems, which makes students 'learning gradually change from passive learning to active inquiry learning, and students' ability generation will be more personalized. On governance, the traditional repeated fill and statistics, tedious artificial data analysis, a large number of business process offline traditional management has been difficult to adapt to the rapid work rhythm and increasingly heavy tasks, both managers and managers, are eager to achieve, automatic data collection and analysis, most, business online.

1.4 Change of Ecology

The core elements of digital transformation are data, resources and users[9], which involves the teaching operation, teaching management, teaching construction, teaching evaluation of total elements, whole business and whole process, which requires "teaching, learning, examination, evaluation, management, business, building, service", data exchange, business interconnection, resource sharing, to realize the teaching information system, chimney of ecological ecology, into the teaching field of data and resources isolated, and the ecology of data sharing between various systems. In this ecology, the digital literacy of teachers, students and educational managers all needs to be continuously improved, and a series of norms, constraints and incentive mechanisms compatible with the digital transformation need to be gradually established and improved.

2 Basic Laws

No matter how the technology develops, the basic law of teaching remains unchanged. The digital transformation of education and training must follow the basic laws of education, otherwise it is to ignore the essentials, get the casket and return the pearl. Wei Shusheng, a famous teacher, once used thirty-two words to sum up the basic laws of education that have been handed down since ancient China: "teaching without class, teaching in accordance with their aptitude, teaching through fun, teaching and learning", and "learning by practice, learning and perseverance". Through the comparative analysis with the typical educational concepts such as OBE (Outcome Based Education) and CBE (Competency Based Education) widely accepted by modern education circles (see Table 2 for details), it is not difficult to find that the connotation of the educational concepts of the educational circle from ancient times to the present, from China to the world is consistent. The original reason is that they all follow the basic laws of education and can build a teaching quality cycle.

Table 2. Comparative analysis of typical educational concepts.

OBE	CBE	Chinese concept
Student Centered	Centered on the Student	Education for all, Educate according to abilities, Learning through enjoyment
Output Oriented	Based on learning outcomes	Learning for application ,Teaching and learning enhance each other
Continuous Improvement	Focus on mastery of Competencies	Teaching and learning enhance each other, Advance gradually, Persist consistently

2.1 The PDCA Teaching Cycle

PDCA (Plan-Do-Check-Action) cycle, also known as "Deming ring", is widely used in the cycle process of continuous quality improvement, including planning (P), execution (D), inspection (C) and treatment (A), and constantly finding and solving problems in

the cycle, thus continuously improving the quality and efficiency[11]. It is the general rule of managing each work[11], It is also applicable to education and teaching, which is mainly embodied in the four basic PDCA teaching cycles of teaching operation, teaching management, teaching construction and quality evaluation. The typical representatives are shown in Table 3.

Table 3. Typical PDCA teaching cycle.

Domain	P	D	C	A
Teaching operation	Curriculum teaching plan	Classroom teaching	Determine and review	Transformation of education
Teaching management	School timetable	Organize teaching	Classroom quality monitoring	Revised rules and regulations
Teaching construction	Planning plan	Resource conditions construction	Inspection and acceptance	Make a new plan
Quality assessment	train objective	teaching process	Achievement evaluation	Improve content methods

From the Point of Teaching Operation. Course teaching plan, teaching plan, plan, experiment plan, training plan and Plan, class preview research, classroom teaching, after-school tutoring, finish homework belong to Do, assessment, examination and practice training belong to Check, scheme revision, course plan adjustment, classroom teaching way change, course content update, knowledge system reconstruction belong to Action.

From the Perspective of Teaching Management. Formulating and revising talent training plan, arranging class schedule, demonstrating and designing teaching reform plan, preparing business work plan, and preparing planning plan belong to Plan; organizing teaching training, conducting business work, and grasping teaching basic construction belong to Do; classroom quality monitoring, inspection and supervision, leadership listening, peer evaluation, student evaluation and evaluation; Check business optimization, rules and regulations, work plan improvement, and continuous promotion of teaching reform belong to Action and enter the new PDCA cycle.

From the Point of Teaching Construction. Professional, curriculum, teaching materials, teaching team planning plan belong to Plan, curriculum, textbooks, case, experimental conditions, experimental practice project construction belong to Do, interim inspection, process supervision and concluding acceptance belong to Check, each five-year plan of continuous planning argument belongs to Action and a new cycle between the new Plan.

From the Point of Quality Assurance. School orientation, training objectives, graduation requirements, ability quality model belong to Plan, teaching operation, teaching

management, teaching construction all belong to Do, course, graduation requirements achieve degree, professional quality evaluation, certification, teaching evaluation, audit evaluation are Check, based on the results of Check training target revision, teaching management optimization, teaching content upgrade, teaching conditions, education method change belong to Action.

2.2 PDCA and OBE Complement Each Other

In the new round of review and evaluation plan of the Ministry of Education of China, the OBE quality assurance concept of "student center, output-oriented and continuous improvement" is an important consideration throughout. In fact, the PDCA teaching cycle and the OBE education concept are complementary to each other, and the relationship between the two is shown in Figure 1. From the connotation of the student center (original intention, process, result)[12].The training objectives should be centered on students' needs, growth and development, that is, the process education teaching should be based on the current situation and potential, and the learning of the students, i. e., D, the quality assessment of the students, the achievement of the training requirements, and the achievement of the students, etc. From the output oriented need to grasp the "five degrees" training requirements is P, C and A need to focus on the problem, the fitness of social demand needs to focus on P, D and C, teachers and conditions of support is P and D need to focus on problems, the effectiveness of quality assurance operation is C and A need to focus on, students and user satisfaction is P, C and A need to focus on. The achievement of "five degrees" depends on the allocation of quality elements such as process elements and resource elements[13], is the relationship between C and D. The continuous improvement mechanism is the premise of the closed-loop operation of the quality assurance "evaluation-feedback-improvement"[13],is the fundamental purpose of the Action..

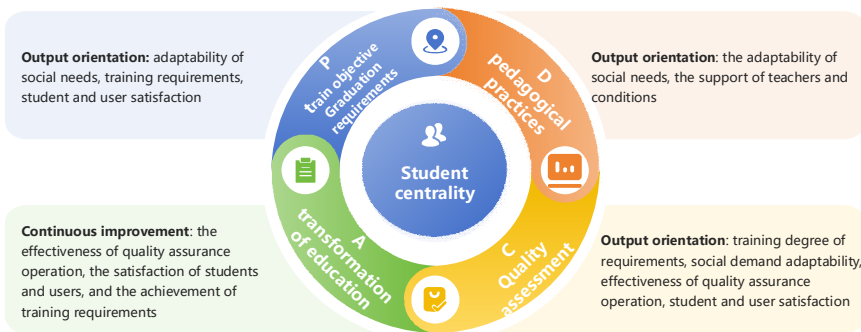


Fig. 1. Plot of PDCA and OBE.

3 Transformation Path

Based on the basic compliance of PDCA in higher education and the four main challenges facing digital transformation, this paper proposes a digital transformation path based on PDCA teaching cycle, which is divided into three steps: one is to build a platform, the second is to promote reform, and the third is to build ecology.

3.1 Construct the Platform

The digital transformation of higher education involves a wide range of applications, has high technical complexity, and fast iteration and update. The traditional application design, development, deployment, operation and maintenance are difficult to effectively support the rapid iteration and stable operation of applications, which leads to the application service ability to keep up with the business needs and changes. In the past, the "chimney-type" application and development system basically existed, with significant contradictions such as uncontrollable data and resource dispersion, decentralized and unfocused technical capabilities. To effectively cope with the change of technology, the digital transformation of higher education is a unified application of unified, unified data, unified resources, unified ability, the education teaching field has been built, under construction, in use to upgrade and new business system, integrated into "teaching, learning, examination, evaluation, tube, building, take" seven business plate integration, business association, data exchange, resource sharing the wisdom of the teaching platform, its architecture design as shown in figure 2.

The First is Unified Application. To build an integrated application architecture at the application layer, covering all system modules in the teaching field, unify data definition, business definition and interface operation, standardize business processes, and gradually form an integrated intelligent teaching platform of information exchange and business exchange, to achieve efficient business operation.

The Second is Unified Data. To build an integrated data middle platform in the supporting layer to form a unified data system from a business perspective, including data definition, data storage, data calculation and data application, so as to realize the collection, mining, analysis and application of the full-link data of education and training.

The Third is Unified Resources. To build an integrated resource platform in the support layer, to provide more efficient and convenient resource processing, more stable and reliable resource supply, more flexible polymorphic resource style, greatly improve the utilization rate of teaching resources, and reduce the construction and operation and maintenance costs of data resources.

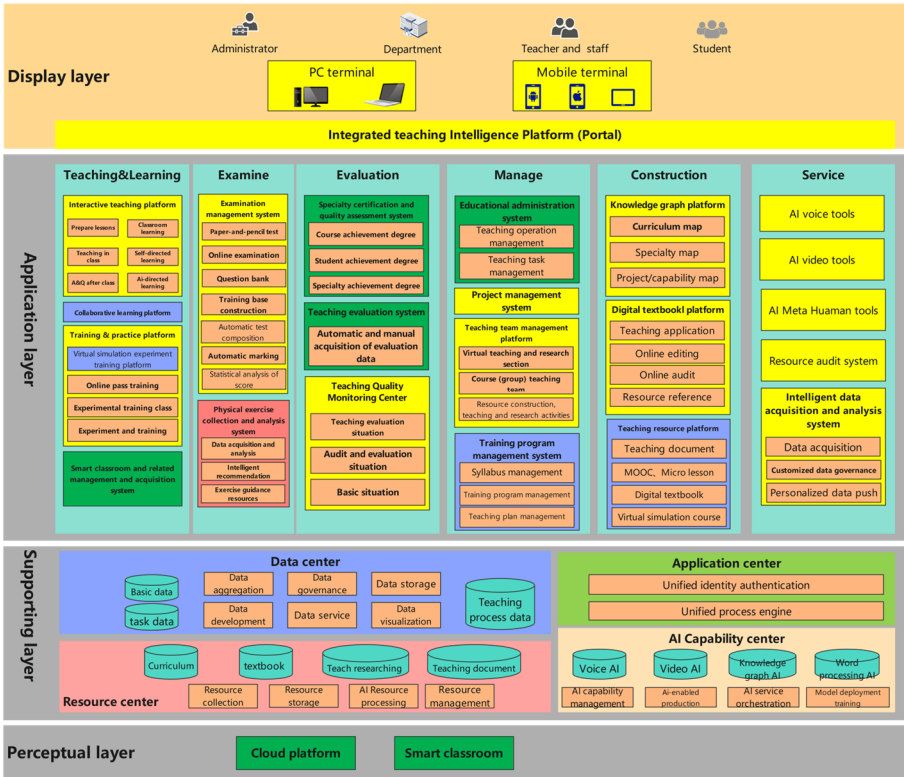


Fig. 2. Digital transformation platform architecture chart.

The Fourth is Unified Capability. To build an integrated AI capability middle platform in the support layer, form a common AI auxiliary capability system for various business systems, and provide intelligent and efficient voice, text, map, video and other AI processing and generation capabilities for various teaching applications.

3.2 Promote the Reform

The application level and scale of digital technology in the field of education have been greatly improved, which has greatly improved the quality and efficiency of teaching and management. In order to effectively cope with the change of cognition and methods, the second step of the digital transformation of higher education is to promote the comprehensive reform of the paradigm, learning mode and management mode.

In Terms of Teaching Paradigm. The integrated intelligent teaching platform not only makes it possible to teach students in accordance with their aptitude, but also drives large-scale individualized teaching to become the new core paradigm of education[14], Leading the teachers 'teaching to serve the students' personalized ability generation

needs continue to evolve. This requires school reform to the center of teachers, large-scale knowledge transmission teaching method, through the point with surface, demonstration lead, continuously improve teachers' digital literacy, to promote the student-centered personalized, targeted ability training education paradigm reform, promote teachers' classroom role to resource supply, enlightenment, method, path leading shift.

In Terms of Learning Methods. The information age has shown the characteristics of knowledge explosion, and the new knowledge about doubles every two years. It is not difficult to imagine that in the intelligent age, especially with the popularization of generative AI, the knowledge update rate is expected to increase at an exponential rate. Standing in the history of responsible for students, responsible for the future, the new era of university should actively guide students to change the traditional passive learning mode, help students to build up personalized independent inquiry learning paradigm, on the basis of limited high quality knowledge content, training students' thinking mode, train students to find problems, analyze and solve problems system, causes the students to deal with the future of uncertain factors of migration ability.

In Terms of Management Mode. The construction of teaching informatization construction period of a large number of information system to a certain extent, improve the level of teaching automation, informatization, but repeated fill and statistics, tedious artificial data analysis, cross-sectoral cross-system business process long run, and so on and so forth still exist, resource base is not clear, decision analysis, lack of data, evaluation heap text, repeated labor by human teaching management and construction quality effect still exists. Relying on the integrated platform, the school can comprehensively reengineering the business process of the physical space in the digital space (such as audio and video equipment, handwritten signature equipment) through the call of the digital space, and realize the closed loop of the business process in the data space. Relying on data governance, the school can realize the collection of a large amount of human filling data and automatic analysis of data, promote the transformation of the evaluation mode into scientific and objective evaluation based on multi-dimensional big data, and realize more scientific, refined and intelligent educational decision-making and management.

3.3 Create the Ecology

Digital transformation is a complex systematic project. In order to effectively deal with the change of higher education ecology, the third step of digital transformation of higher education is to fully mobilize all forces in the field of education and teaching to actively change and invest, and to build a new ecology of time and space, resources and mechanism.

In the Time and Airspace. The digital transformation should build a learning time and space of "combining online and offline, combining virtual reality, combining before

class, during and after class, and combining theory and practice". Based on the virtual simulation and the augmented reality technology, Breaking down the limits of the physical space, Form a multidimensional interactive teaching scenario, To realize the dynamic three-dimensional display of the teaching content that is difficult to reproduce, observe and present; According to the actual needs of teaching or learning, Building specific teaching units or learning communities based on the digital space, To achieve cross-class, cross-grade, interdisciplinary, cross-space-time learning; Based on the virtual teaching and Research Section, Promote the sharing of high-quality educational resources and promote the co-education of excellent teachers; Based on the smart teaching platform combined with the smart classroom, Assist teachers to better organize teaching activities in various forms and covering all staff, Better implementation of the formative evaluation.

In the Resource Domain. Digital transformation should provide diversified, differentiated and personalized methods, means and resources for students' thinking training and ability generation. Based on the full-link knowledge map of "training objective-ability system-project system- -system-knowledge system-resource system", the knowledge integration, better forming the project system which is more conducive to the ability generation, and the resource platform fully integrates the rich teaching resources of various media and forms; based on the online practical training and examination platform, realizing automatic volume formation, automatic interpretation, automatic analysis practice and examination results.

In the Mechanism Domain. Digital transformation should build a benign constraint and incentive mechanism in which teachers, students and teaching administrators can actively adapt to digital transformation and actively improve digital literacy. In terms of quality assurance, the evaluation achievement, graduation requirement and professional quality evaluation, excellent typical cases of digital teaching and demonstration radiation effect; in the aspect of teaching capital construction, vigorously supports the construction projects of rich digital resources such as digital teaching materials, course group knowledge map and professional knowledge map; in the aspect of management decision, it changes from relying on text demonstration to seeking data support.

4 Transformation Method

Data, resources, process as the three key elements of digital transformation, according to the clear higher education digital transformation of basic follow and path, the specific implementation of digital transformation process, need to grasp the teaching operation, teaching management, teaching construction, quality assurance four areas based on business process data and resource flow, and the most effective way is to build up four in the field of PDCA cycle. From the system architecture diagram shown in Figure 2, we can clearly see that the support layer and display layer bear the base and top cover of digital transformation, while numbers and resources actually interact and flow

between various application systems. Therefore, to construct the PDCA cycle in the four fields, it is necessary to clarify the positioning of each business system in the PDCA cycle and the dynamic line of data and resources, so as to realize the optimization and reconstruction of education paradigm, governance mechanism, condition ecology and quality culture.

4.1 Continuously Optimize the Education Paradigm by PDCA Cycle of Teaching Operation

From the dimension of teaching operation, The teaching application systems that the “**Plan**” phase relies on mainly includes Training program management system, Educational administration system. “**Do**” phase mainly relies on Interactive teaching platform, Knowledge map platform, Training & Practice platform, Meta teachers, Collaborative platform. “**Check**” phase mainly relies on Examination management system, Specialty certification and quality assessment system, Teaching evaluation system, Lessons listening & checking system, Teaching quality monitoring center. “**Action**” phase mainly relies on Interactive teaching platform, Teaching resources platform, Training program management system. Its resource&data flow and circulation relationship as shown in figure 3.

Based on the PDCA cycle, the teacher student-centered heuristic, guiding teaching, students demand for the development of independent inquiry learning, can get the support of information system, the supply of resources, data generation and feedback, and constantly optimize to adapt to the era of intelligent new type of education paradigm.

4.2 Continuous Improve Governance Mechanism with PDCA Cycle of Teaching Management

From the dimension of teaching management, The teaching application systems that the “**Plan**” phase relies on mainly includes Training program management system, Educational administration system, Project management system. “**Do**” phase mainly relies on Educational administration system, Project management system, Interactive teaching platform, Examination management system, Project management system. “**Check**” phase mainly relies on Teaching quality monitoring center, Lessons listening & checking system, Specialty certification and quality assessment system, Resources audit system, Project management system. “**Action**” phase mainly relies on Training program management system, Interactive teaching platform, Teaching resources platform, Project management system. Its resource data flow direction and loop relationship are shown in Figure 4.

Based on the PDCA cycle, all the operation work of teaching management can be supported by the information system, the feedback and accumulation of data, and the teaching operation management mechanism can be continuously improved based on the various data analysis results.

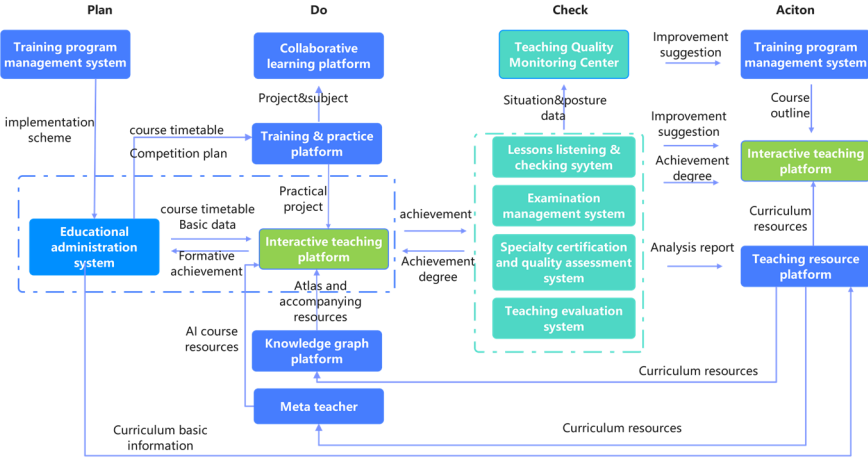


Fig. 3. Teaching operation PDCA cycle.

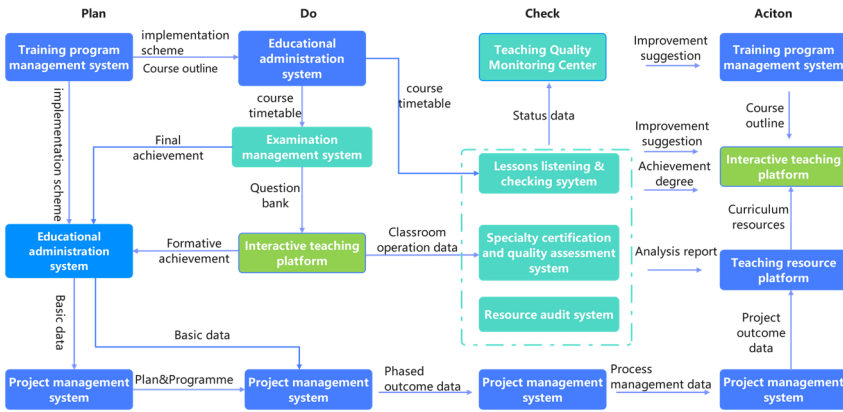


Fig. 4. Teaching management PDCA cycle.

4.3 Continuous Complete Teaching Resources through PDCA Cycle of Teaching Construction

From the dimension of teaching construction, The teaching application systems that the “Plan” phase relies on mainly includes Training program management system, Project management system. “Do” phase mainly relies on Teaching resource platform, Digital textbook platform, Teaching team management platform, Knowledge graph platform, Training & Practice platform, Project management system. “Check” phase mainly relies on Teaching quality monitoring center, Resources audit system, Interactive teaching platform, Project management system. “Action” phase mainly relies on Teaching resource platform, Teaching team management platform, Digital textbook platform, Knowledge graph platform, Training & Practice platform. Its resource data flow direction and cyclic relationship are shown in Figure 5.

Based on the PDCA cycle, the construction of various project management and the base number of various resources can be supported by the information system, realize the overall management of resources, data statistics and analysis, and the teaching resources are continuously updated and improved based on the analysis results of the use of resources.

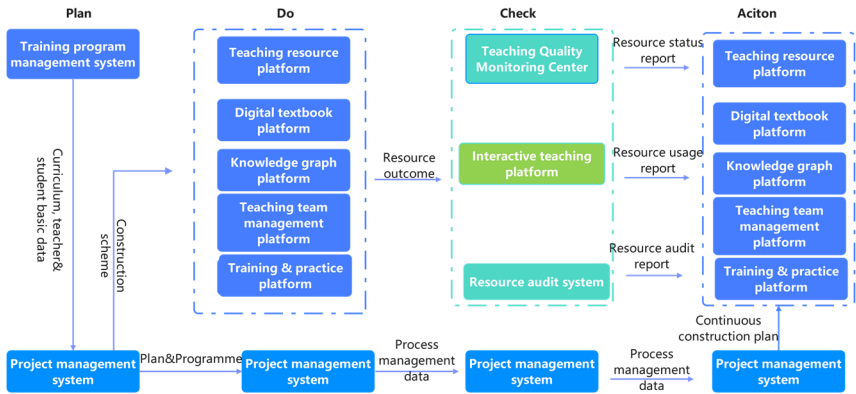


Fig. 5. Teaching construction PDCA cycle.

4.4 Sustained Consolidate the Quality Culture with the Quality Assurance PDCA Cycle

From the dimension of quality assurance, The teaching application systems that the “Plan” phase relies on mainly includes Training program management system, Project management system. “Do” phase mainly relies on Educational administration system, Lessons listening & checking system, Interactive teaching platform, Training & Practice platform, Teaching team management platform, Teaching resource platform. “Check” phase mainly relies on Teaching quality monitoring center, Specialty certification and quality assessment system, Teaching evaluation system, “Action” phase mainly relies on Training program management system, Interactive teaching platform, Teaching team management platform, Educational administration system, Teaching resources platform etc. Its resource data flow direction and loop relationship are shown in Figure 6.

Based on the PDCA cycle, from classroom to course to professional even to the school teaching quality assessment monitoring can get information system support, achieve graduation requirements, curriculum objectives, teacher evaluation points of multidimensional data support and automatic analysis, and based on the analysis results to promote the teaching operation, teaching management, teaching construction continuous improvement, finally consolidate form to good quality culture.

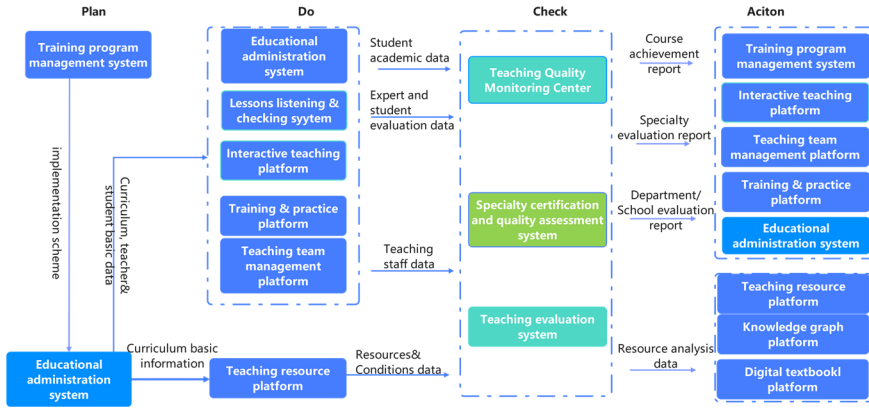


Fig. 6. Quality assurance PDCA cycle.

5 Conclusion

Digital transformation is a great opportunity for the high-quality development of higher education, but it is also a great challenge for the self-revolution of higher education. The digital transformation of higher education is a complex and systematic engineering. It should not only deal with the changes of technology, cognition, methods and ecology in a whole, but also plan the transformation path reasonably and adopt scientific transformation methods according to the basic laws of education. This paper is based on the analysis of the four challenges of digital transformation of higher education, mining the PDCA teaching cycle and the connotation of the basic law of teaching, and PDCA teaching cycle as the basic platform, promoting the reform, build ecological three steps transformation path, and teaching operation, teaching management, teaching construction, quality assurance, four basic areas business process for traction, put forward to build PDCA cycle transformation method, respectively analyzed the data, resources in the related teaching application system of circulation relationship. Of course, an important prerequisite for the construction of these four PDCA cycles is the need to establish a relatively complete business center, data center, resource center and AI capability center.

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References

1. Vlies, R. V. D. . (2020). Digital strategies in education across oecd countries: exploring education policies on digital technologies. OECD Education Working Papers.
2. Secretariat of the World MOOCS and Online Education Alliance. (2023). Consensus for Action on the Strategy for Digitization of Higher Education: The Limitless Possibilities: The World Report on Digitization of Higher Education, excerpt IV. Chinese Educational Informatization, 29(1), 36-43.
3. Central Government of the People's Republic of China. Holding High the Great Banner of socialism with Chinese Characteristics and Striving together to Build a modern socialist Country in an All-round Way -- Report at the 20th National Congress of the Communist Party of China.https://www.gov.cn/xinwen/2022-10/25/content_5721685.htm.
4. Ministry of Education of the People's Republic of China. Work highlights of the Ministry of Education in 2022. http://www.moe.gov.cn/jyb_xwfb/gzdt_gzdt/202202/t20220208_597666.html
5. Li Yongzhi, Opening Up a New Track for Education Development with digitalization, People's Daily, 2023-10-13 (09)
6. China's digital Intelligence Transformation Promotes high-quality Development of University Education (2169)[Z].2023.02.20.
7. Gao Shengnan. (2023). Research on the Digital Development of Ideological and Political Education in Universities. (University of Electronic Science and Technology of China).
8. Zhang Nanxing and Wang Xinfeng. (2023). The Mutual construction Path of technological change and Higher education and its reflection. Higher Engineering Education Research (4), 110-115.
9. Svensen, N. . (2019). The key to digital transformation. Factory Equipment, 2019(Mara).
10. Yang Z K. (2023). The path of digital transformation of higher education. Higher Education Research in China (3), 4.
11. PDCAcycle.https://baike.baidu.com/item/PDCA%E5%BE%AA%E7%8E%AF/5091521?fr=ge_ala.
12. Hu Jianbo, (2022). A Case study of "Student-centered" Paradigm transformation in applied universities -- Practice and reflection of Xi 'an Eurasia University. Research trends in Domestic Higher Education Teaching and Learning (7), 1.
13. Li Zhiyi, & Zhu Hong. (2021). Promoting Comprehensive Reform of Undergraduate Education and Teaching with Advanced Quality Assurance Concept: Analysis of connotation of a New round of Audit and Evaluation Index System. Higher Engineering Education Research, 69(6), 75-80.
14. Li Yongzhi. (2022). The idea and practice of digital transformation in education. Academic Abstracts of Colleges and Universities, 39(5), 156-157.

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