

# Construction of Intelligent Platform for College Student Management under the Background of Digital Transformation

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**Abstract:** The ways of information processing in all walks of life change tremendously in the digital age, especially with the spread of education. Colleges and universities pay more attention to fostering students' comprehensive quality besides mastering their subject knowledge. The training and management of students need extensive information interaction with all participants related to students' development, resulting in a huge amount of data. The traditional student management platform can not meet the needs of student information management in colleges and universities. Under the background of digital transformation, by introducing new technologies such as workflow engine and data middle platform, a new intelligent management platform for college students is constructed, which can realize data sharing. It can promote the informatization and standardization of student management, and empower students' comprehensive quality evaluation with the help of information technology.

**Keywords:** Digital Transformation; Workflow Engine; Student Management; Data Middle Platform; Student Portrait

## 1. Introduction

The situation of educational reform and development in the period of "14th Five-Year Plan" shall be accurately grasped to deeply understand the connotation and characteristics of China entering the stage of high-quality development, which is of vital importance for planning and building a high-quality education and teaching system in colleges and universities, and is conducive to respond to the urgent expectations of all sectors of society for upgrading the quality of education and teaching in colleges and universities in the new era[1]. With the gradually prominent

value of digital transformation, the country vigorously promotes the development of digital economy, and it has become a trend to accelerate the digital transformation. The application of information technologies such as big data has improved the efficiency and accuracy of information processing greatly. At present, Internet technology has gradually entered the campus, and universities have begun to publish information with the help of network platform [2]. Although many universities have established their own information management systems, which make students and teachers greatly convenient, some shortcomings are still existing compared with the modern society with numerous educational data [3].

Personnel training is the fundamental task of colleges and universities. Both teaching management and student management should develop harmoniously and work collaboratively. In order to give full play to the positive role of student management in the stability and development, educational informatization is adopted to empower student management, and a new intelligent student management platform is established which introduces technologies such as workflow engine and low-code. Informatization construction of colleges will be improved which can benefit to enhance students' independent management ability, so as to promote their all-round development [4]. With the support of technologies, talent training will move forward in a more personalized direction and realize the high-quality development of higher education. In the new era, colleges and universities innovate informatization with the help of Internet, which is an effective means to improve the college student management and service level [5].

## 2. Status Analysis of the Construction of College Student Management Platform

In recent years, the application level of information technology in colleges and universities has been greatly improved, and the construction of digital campus is more and more perfect, which brings great convenience to the information management of college students [6]. However, the classification of modules about students' study and life in school is gradually enriched, and it is difficult to share and exchange data between systems and departments, which forces the system to become an "information isolated island". The aging of the system framework is adverse to the maintenance of the system and the update of data in the later period. Therefore, some colleges have begun to explore new technical frameworks to build the system to ensure the sustainable and good development of education management.

### 2.1 Dispersion of System Data Modules

The enrollment expansion of colleges has increased the number of students. In the daily management of college students, counselors need to know the basic information of students, including the rewards and punishments during school, and timely understand and concern students' psychological status and family poverty. In the management of college students, counselors have great mobility. Once in case of personnel transfer and handover, it takes a lot of time and energy to reorganize and familiarize themselves with historical data. Moreover, due to the different working methods of each person, it is difficult to ensure the consistency and standardization of the data before and after the handover, which increases the difficulty of all the work involving previous students [7].

In students' daily study and life, besides the academic achievements recorded in the educational administration system, it also involves practical activities, scholarships and financial aid application, psychological counseling, etc. For graduates, it is necessary to fill in relevant employment information. With the rise of building the "Extracurricular College Activities", the study and life of students need to investigate the situation of clubs and competitions for comprehensive analysis. The data modules in the existing student management platform are relatively scattered, which cannot realize the timely update and sharing of student information.

Finally, the information management equipment becomes a decoration, which is only superficial acting [8]. Scattered modules will not only cause students' repeated reporting and inconsistent information, but also make it inconvenient for counselors to grasp the overall situation of students such as academic achievements and employment guidance, and it is even more difficult to form corresponding student portraits, so as to force the system to become an "information isolated island".

### 2.2 Insufficient Technical Support of System Framework

Most existing student management systems are simple three-tier models based on B/S architecture design. In terms of the business management needs of business departments at that time, the system is single in functionality and simple in design, which can only meet the needs of traditional business management mode. Student management is cumbersome and complicated, and the information transmission and data statistics under the traditional working mode are not ideal, which cannot comprehensively and objectively reflect the situation of students, which brings challenges to the management of college students [9]. With the rise of emerging technologies such as big data and artificial intelligence, the innovation of education and teaching forms has been driven, the student management system has become more and more refined and humanized, and the needs of teachers and students for information systems have become more and more diversified and complicated. The existing management systems cannot meet the relevant needs through simple logical adjustment or system update, and the system iteration cost is high, which brings great inconvenience to student management.

Secondly, in the development of Internet technology, front-end development has not been paid attention to for a long time, and most front-end personnel only develop HTML and CSS. The front-end does not have its own architecture, and even some front-end work is completed by the background [10]. This traditional front-back coupling mode leads to a massive amount of code repetition, which increases the workload of developers. The changes of little part of functions in the later

period will also cause a large number of code modifications, which improves the difficulty of code management and is not conducive to system maintenance.

The construction of a new student intelligent management platform will avoid this risk well. The platform uses front-back separation technology, and front-end developers only need to pay attention to the presentation, style and behavior of front-end pages, and realize data rendering by calling back-end API; Back-end personnel only need to focus on data access and business logic, and provide corresponding API interfaces for front-end calls in accordance with project front-end requirements. The front-back separation realizes the high decoupling of Web development, with clear division of labor and clear responsibilities among developers, and the front-back ends only interact through API [11]. Developers focus on their own areas, do not affect each other, with independent development, test and deployment. It effectively reduces the communication and coordination costs among developers, and improves the development efficiency. It also reduces the impact of the change of a single function on the whole application, and reduces the system maintenance cost and code repetition rate. Asynchronous loading and local refreshing can be realized, and the user experience can be improved.

### 3. Overview of Key Technologies

Under the digital transformation, the development of intelligent platform for college student management mainly involves the introduction of workflow engine, the use of data middle platform and the application of low-code development, aiming at building an intelligent management platform that meets the expectations of colleges to promote the high-quality development of college education.

#### 3.1 Workflow Engine

The coordination nature of workflow technology determines that it will play an important role in the informatization process of industry business. Because of its powerful integration function, workflow technology is often used as the primary scheme to implement system integration in computer application field [12]. As a part of the application system, it can provide the core

solutions that can determine each application system such as determining the information transmission route and content level in accordance with different roles, division of labor and conditions. Workflow engine includes important functions such as node management, flow direction management and process sample management of the process.

The purpose of workflow engine is to be convenient and simple to use, and it can be realized by instantaneous feedback of systems and specifications and application of business logic [13]. Introducing the concept of workflow engine can combine the management of college students with workflow control, which greatly improve the management efficiency and information processing capability of colleges and universities. Developers can sort out business operation standards accordance with different business needs, and then establish approval process model through workflow engine technology, and pre-configure each review node of business process and its related attributes in accordance with the system and specification, such as processing personnel, processing conditions, etc. Then, it will be published to the process engine to execute a series of process services, the intermediate process data will be stored in the corresponding data table of the database in the background, and the executed process examples will be analyzed and displayed to the user interface through the management end, so that the users can handle the current flow to-do process.

#### 3.2 Data Middle Platform

Data Middle Platform is a data management and analysis platform, which can aggregate and integrate data. Its functions mainly include data sharing query, data visualization report, data verification, data file uploading, data file export, data classification, etc., and finally realize the value realization capability of data. The decision makers based on effective tools such as data analysis and mining, and then improve data-driven ability and decision-making effect.

Introducing Data Middle Platform can realize the analysis of students' data and form students portraits, which is beneficial for colleges to know more about their information, understand their needs in time.

### 3.3 Low-Code Development

Low-code has fast development speed and low cost, and does not require professional development business knowledge, so that business departments can well participate in the whole construction life cycle of the system, which greatly promotes the effective communication between business departments and development departments, saves time and cost, and reduces the deviation between actual business requirements and developed programs. This development method allows synchronization with other interfaces, also allows the setting of various roles, and supports the setting of additional attributes, which can meet most business requirements [14].

The introduction of low-code development effectively improves the construction speed of intelligent platform for student management, and makes the developed system more in line with the requirements of colleges and universities.

## 4. Intelligent Platform for College Student Management with the Digital Transformation

Under the digital transformation of education, new technologies are introduced to build an intelligent management platform for college students to meet the requirements of information management for students in colleges. The construction of intelligent management platform through three parts, from process analysis to system architecture design, and finally to model construction will be mainly introduced.

### 4.1 Process Analysis

The intelligent platform of student management focuses on the service of student affairs in colleges and universities, and uses workflow engine technology to transform student work from three dimensions: work management, business process and data processing. Through information flow and collaboration, process integration and optimization, data statistics and analysis, etc., it builds a whole life cycle management and service platform for students from pre-

enrollment, during enrollment, school, graduation and post-graduation. The main work flow is that the school carries out enrollment through the enrollment management module, and provides the students with admission inquiry function. After the enrollment, the data flow into the welcome new management module, mainly including two sub-modules: welcome new management and online welcome new service. Welcome new management mainly provides services such as class grouping, student number and dormitory for enrolled students, and also provides registration and green channel for freshmen on the welcome site. Online welcome new mainly provides freshmen with information confirmation, online self-service registration, bedding purchase and other functions. After the students complete the welcome registration, the information automatically flows into the school management module, so as to facilitate the dynamic management of students daily school changes, such as joining the army, dropping out of school, returning to school and other operations. As the data source of students in school, the school module is transferred to the relevant systems of students in school, such as student information management, student financial assistance management (scholarship, work-study, financial aid, and student loan), student psychological counseling, and student extracurricular college activities management. Through diversified data summary, the comprehensive quality evaluation of students in school is formed, and finally the portrait of students is completed. During graduation, student information will be transferred to two business modules: employment management and students from leaving management. The school will track the employment situation of fresh graduates in real time, thus forming a portrait of school-level employment data and providing decision support for school employment; At the same time, after graduates leave school, their identities will change from students to alumni, and the data will eventually be transferred to the alumni management module. The main business process is shown in Figure 1.

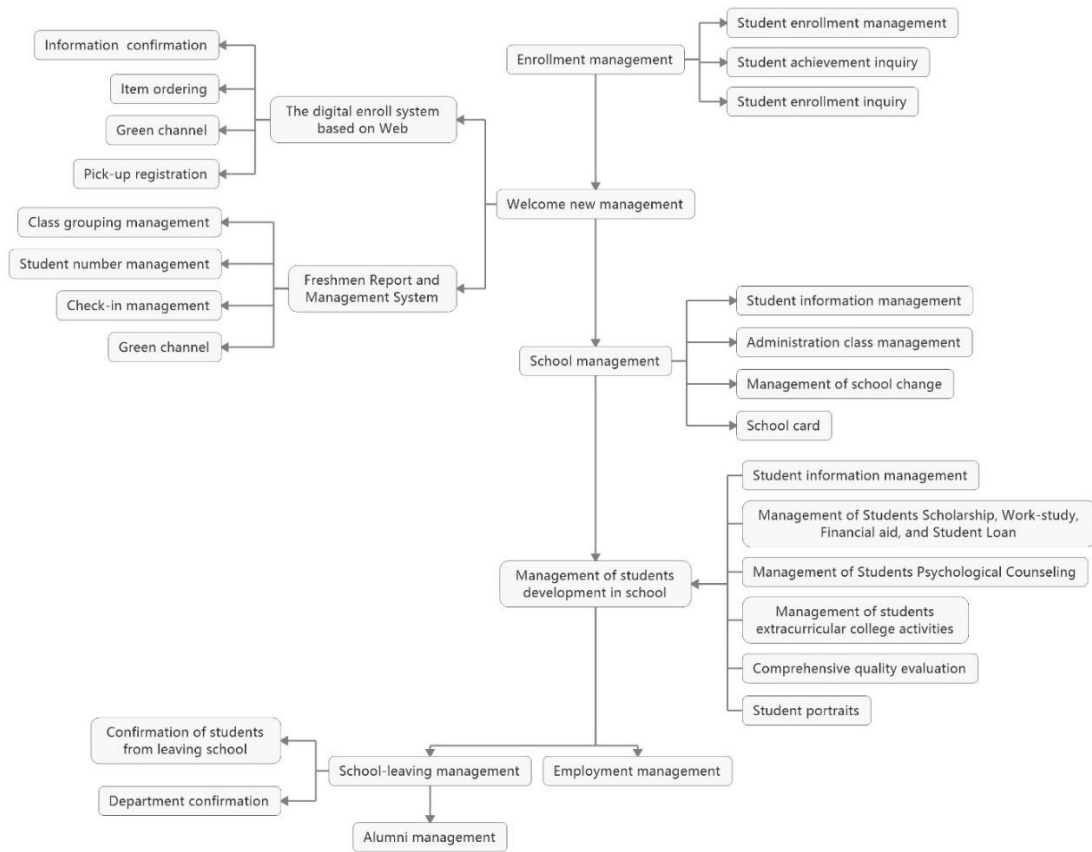


Figure 1. Business Flow Chart

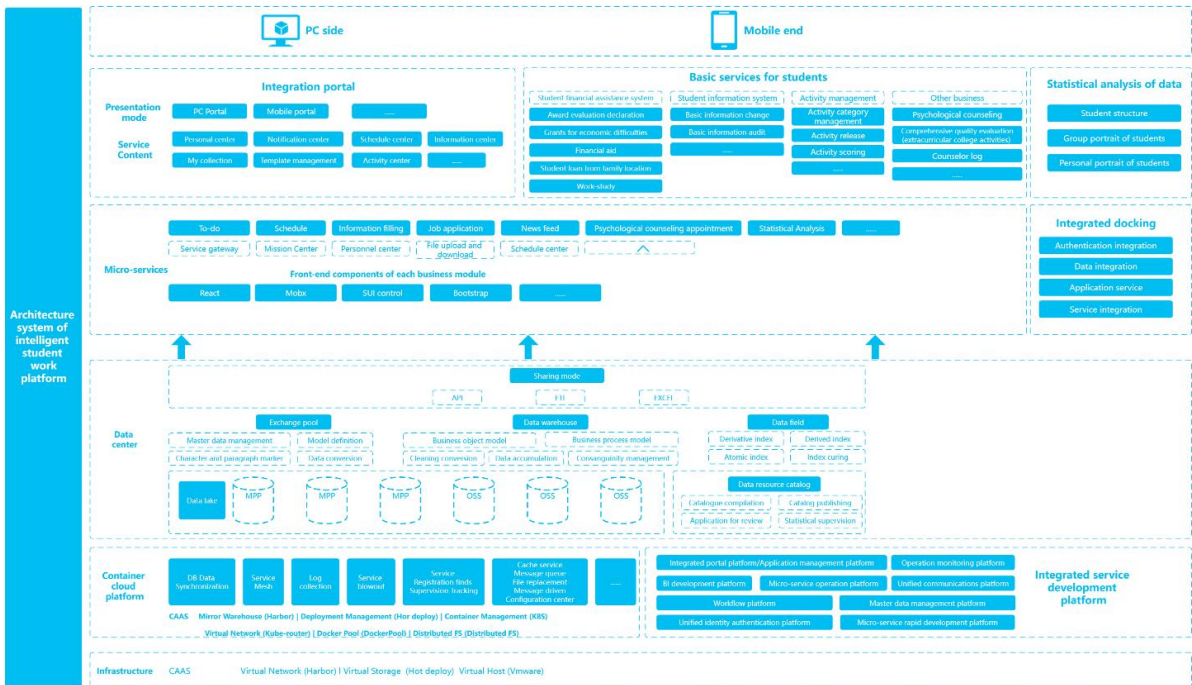


Figure 2. Overall Framework

The intelligent platform of student management uses information and communication technology to sense, analyze and integrate the key information of the core

system of student work, and respond intelligently to various requirements of students individual affairs management and service, quality development, ability

improvement, employment development, knowledge acquisition, etc., including the decision-making of management and service of schools and teachers, the orientation of the individual growth of the students, the attention of parents and society, etc., so as to improve management efficiency and service level.

#### 4.2 Framework Design

Combined with the actual situation of colleges and fully considering the requirements of future development, the overall planning and design of the system is carried out. An intelligent platform for college student management is built, integrating business management, data sharing and exchange, data mining and analysis, etc. The platform fully displays the design idea of the overall framework through effective hierarchical structure division, as shown in Figure 2.

The first level is infrastructure. Through new infrastructure such as CAAS, virtual network and virtual storage, the scenarios such as container, network environment construction and server host construction are completed. The application program is protected in the internal virtual network, and all traffic is protected by gateway to realize authorized access, which is the basic guarantee for student management intelligent platform.

The second level is middleware. The middleware such as BI development platform, workflow engine platform, and low-code development platform through the tools such as mirror warehouse, container management, and deployment management, and realizes various services such as data synchronization, log collection, and service blowout. It can automatically expand and contract containers in accordance with the load of applications, improve resource utilization and application performance, and it has high flexibility, portability, security and scalability, thus realizing the personalized and precise requirements of school business management.

The third layer is the data middle platform. It compiles and publishes the school-based data resource catalogue in accordance with relevant data standards, and gathers all the original data related to student management in different equipment, different applications and different channels in the school into the data lake through certain rules, and then constructs, filters and processes the data for specific

purposes, providing version management of metadata to ensure high quality, authority and reliability of metadata, thus forming a data warehouse on student topics, effectively integrating various student information, realizing the sharing and unification of student data in the whole school, eliminating data isolated islands, and finally gradually forming different index systems in accordance with different business needs.

The fourth layer is micro-service. In accordance with the different functional requirements of student management intelligent platform, various front-end controls (such as React, SUI, Bootstrap, etc.) are used to split and package complicated services into single-function services, presenting them to the front end of users. They are also used to deploy and run independently in order to realize decoupling between businesses. Micro-service (such as to-do, schedule, task center, news feed, etc.) is constructed through business modules. The “plug and play” of functional modules makes the system operational, extensible and cross-platform capabilities more prominent, which not only facilitates business management and system operation and maintenance, but also promotes the coordination between student management and service departments, and improves the efficiency of student management and service.

The fifth layer is the business layer. It is the core construction content of the whole system. It provides student management services for teachers and students through the integration portal. The platform packages, models and designs the application scenarios of all kinds of data obtained from Data Middle Platform, and builds them from the dimensions of mental health, learning situation, comprehensive quality and student growth, such as activity management, psychological counseling, comprehensive quality evaluation, scholarship, work-study, financial aid, and loan declaration, award and excellent students evaluation declaration, work-study program, etc. Through the whole cycle of information scene construction, it adopts the data collection methods of all situations, all factors and all time and space to clearly understand the learning characteristics, learning status and growth characteristics of students, outline detailed and true digital students portraits, to provide scientific basis for leaders to analyze

all kinds of students.

### 4.3 Model Building

In the process of digital transformation of college education, the technologies such as workflow engine, data middle platform and low-code development are introduced around student management to build a platform for business digitalization, data service and intelligent service. Based on the design concept of “student-centered”, the academic evaluation system of college students is reconstructed from the dimensions of knowledge, ability and value, and process check and encouraging evaluation are implemented to cultivate students’ innovative capability and stimulate students’ learning initiative and consciousness. The business intelligence platform is built for life cycle management from pre-enrollment, during enrollment, in school, during graduation and post-graduation, collect and analyze the information from the college class, rich practical activities in the extracurricular college activities, and finally use visual tools to output individual or group “student portraits” through big data empowerment, forming an accurate, scientific, practical and developmental analysis report. It provides more possibilities for meeting individual needs and realizing accurate services[15], and is gradually applied to students’ academic evaluation, early warning, award and excellent student evaluation, tracking graduates’ direction and professional courses, etc., to provide visual help for comprehensive training of students, realize the goals of intelligent management, intelligent service and intelligent analysis of student management, and form a complete “action track” of students in school, as shown in Figure 3.

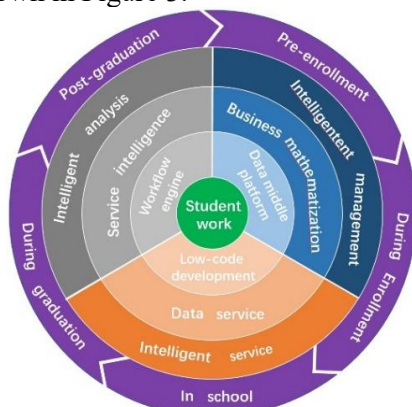


Figure 3. System Model

### 5. Conclusion

Under the digital transformation of education, it is important to build an intelligent platform for college student management. In the process of promoting the digital transformation of data governance, colleges and universities can break down data barriers, eliminate information isolated islands by the means of relying on the new information technologies such as workflow engine and data middle platform, which will promote cross-departmental and cross-disciplinary linkage through structural reorganization, process reengineering and data integration. The goal of building the platform is to realize the digital transformation of all elements, processes, businesses and fields in student education governance. It is helpful to strengthen the ability of predicting, diagnosing and making decisions for students' development through the formation of students' portraits, so as to realize the intelligentization and individuation of college student management.

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