

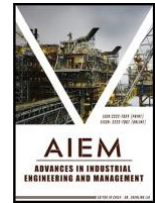


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REVIEW ARTICLE

CONSTRUCTION AND PRACTICE OF DIGITAL TRANSFORMATION OF EDUCATION UNDER THE BACKGROUND OF BIG DATA

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ABSTRACT

As the new generation of digital technologies such as cloud computing, big data, artificial intelligence, the internet of things, and blockchain continue to develop and apply, the digital transformation of various industries driven by digital technology has become a global theme. The digital transformation of education is an inevitable path for education to respond to the changes of the times and economic development. This paper takes a perspective on the cultivation of digital capabilities in cross-disciplinary virtual simulation comprehensive training platforms for economics and management majors, using innovative teaching methods with modern information technology: (1) Introducing the UFIDA U8 enterprise management information system to achieve enterprise operation informatization; (2) Introducing the "RPA robot" project to analyze and optimize various business processes; (3) Developing an "enterprise management cockpit" to visually display the enterprise's operating status from different dimensions. By promoting the multi-scenario application of modern information technology, a large-scale cross-disciplinary virtual simulation comprehensive training platform with digital characteristics is created, which enhances students' digital literacy and achieves breakthroughs in education reform and innovation.

KEYWORDS

Digital transformation, simulation training, enterprise management information system, RPA robot, management cockpit

1. BACKGROUND

The digital transformation of education is a special stage of educational informatization, which aims to achieve the integration of digital technology from initiation, application, and fusion, to establishing digital awareness and thinking, cultivating digital skills and methods, constructing a smart education development ecosystem, and forming a digital governance system and mechanism (Zhou et al., 2022). To practice the call of the Ministry of Education's "Education Digitalization Strategic Action" and meet the real needs of developing digital skills in business talents, it is urgent to make up for the deficiencies in the existing curriculum system from teaching methods and processes. The traditional model of business talent cultivation has limitations, including a single course system for each major, relatively independent and closed disciplines, and fragmented practical teaching activities, which cannot meet the demands of the digital era. Traditional business simulation platforms face the following problems:

(1) Lack of visualized enterprise resource management and control;

(2) Lack of a dashboard-style enterprise strategic performance evaluation system;

(3) Lack of quantitative management methods for non-financial indicators;

(4) Lack of community-based interactive management methods suitable for the digital age, such as mobile cloud service management;

(5) Lack of risk management methods required for enterprise operation, such as early warning and prediction methods;

(6) Lack of data sharing among high-level strategic managers, leading to the problem of data silos.

2. UTILIZING INNOVATIVE TEACHING METHODS WITH MODERN INFORMATION TECHNOLOGY

2.1 Introducing the UFIDA U8 Enterprise Management Information

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System to Achieve Digitalization of Enterprise Operations

The training platform is built on the foundation of the internet and cloud computing. It simulates the specific business processes of the shoemaking industry’s production, supply, sales, and research departments, and incorporates the UFIDA U8 management software to create a realistic business environment. The platform includes various functional modules, such as general ledger, UFO reporting, fixed assets, accounts receivable management, accounts payable management, sales management, purchasing management, inventory management, inventory accounting, and salary management. Through the use of the accounting information system, students are divided into different roles and levels to experience firsthand the true meaning of accounting information management. By conducting online business operations, the platform encourages students to adhere to standardized processes offline, which leads to greater synchronization and collaboration among finance and accounting departments. The standardized processes are essential for regularizing business procedures, ensuring a productive

internship experience, and effectively developing students’ business acumen, financial and tax application skills. The platform promotes a new perspective on enterprise financial, tax management, and accounting from an informationization angle, helping students to fully comprehend the knowledge connotation of business, finance, and tax integration.

2.2 Introducing the “RPA robot” Project, Analyzing and Streamlining Various Business Processes, and Optimizing Them

2.2.1 Introduction of RPA Financial Robot Practice Teaching Platform

The RPA financial robot practice and teaching platform of Guangzhou HanZhi is an advanced learning platform designed to provide accounting and finance students with the opportunity to learn intelligent RPA technology. It is designed in combination with professional practical teaching systems and core experimental content that meet the needs of students’ learning. Its core concept integrates advanced case practices

Table 1: Management cockpit indicator system

Primary Dimension	Primary Indicator Percentage	Secondary Dimension	Secondary Indicator Percentage	Sub-Indicator Percentage	Indicators	Computational Formula
1 Industry and finance management dimension	40%	Financial early-warning	25%	30%	Z value	$0.717*X1+0.847*X2+3.107*X3+0.420*X4+0.998*X5$
				5%	Debt-to-Equity Ratio	Operating cash flow net of debt / total debt
				5%	Return on Assets	Net income / total assets
				5%	Debt Ratio	Total debt / total assets
				5%	Total debt / total assets	80% (asset turnover ratio) - debt ratio
				10%	Core Profit Margin:	Core profit (operating revenue - operating cost - taxes and surcharges - period expenses) / operating revenue
				5%	Operating Working Capital Turnover Ratio	Net sales / (average current assets - average current liabilities)
				15%	Overall Goal Profit Achievement	(current EBIT - previous EBIT) / current EBIT
				5%	Cash Balance Warning	Cash balance for the third quarter of the future is greater than 0
				10%	Earnings Cash Coverage Ratio	Operating cash flow net of interest and tax / net profit
		5%	Cash-to-Sales Ratio	Operating cash flow net of interest and tax / operating revenue * 100%		
		Budget deviation	10%	20%	Budget Preparation Accuracy Rate	
				20%	Annual Budget Completion Rate	Actual completion number / budget number * 100%
				20%	Annual Budget Deviation Rate	Difference between actual completion number and budget number / budget number * 100% = (actual completion number - budget number) / budget number * 100%
				20%	Quarterly Budget Completion Rate	Actual completion number / budget number * 100%
20%	Quarterly Budget Deviation Rate			Difference between actual completion number and budget number / budget number * 100% = (actual completion number - budget number) / budget number * 100%		

Table 1: Management cockpit indicator system (continued)

Primary Dimension	Primary Indicator Percentage	Secondary Dimension	Secondary Indicator Percentage	Sub-Indicator Percentage	Indicators	Computational Formula
		Business and financial value-added benefits	30%	20%	PE Ratio Difference Rate	Company average PE ratio / industry average PE ratio
				40%	ROE (Return on Equity)	Net income / owner's equity (average net assets)
				10%	Return on Total Assets (ROTA)	EBIT (earnings before interest and taxes) / average total assets
				10%	Capital Yield Rate	Net income / paid-in capital
				5%	Capital Accumulation Rate	Increase in owner's equity this year / beginning-of-year owner's equity × 100%
				5%	Equity Multiplier	Total assets / owner's equity (average net assets)
				10%	Cost-Expense-Profit Ratio	Total profit / total cost and expenses * 100%
		Management incentive quality	15%	15%	Operating Profit Growth Rate	(this year's operating profit - previous year's operating profit) / previous year's operating profit * 100%
				15%	Self-Sustainable Growth Rate	Net income return on equity (ROE) × retention rate (100%, excluding dividends)
				15%	DFL	EBIT/(EBIT-I)
				15%	Capital Preservation and Appreciation Rate	End-of-year owner's equity after deducting objective factors / beginning-of-year owner's equity × 100%
				20%	Main Business Profit Margin	Main business profit / net sales of main business * 100%
				10%	S-Minimum Share Channel Sales Ratio	10%,3
		Total scale level	20%	30%	Economic Value Added (EVA)	Net income + interest expense * (1 - 25%) - average capital cost (= registered capital * 10%)
				15%	Net Profit	Recent research shows that about 30% of a company's profits are industry-related, meaning that 30% of a company's profits are determined by the industry it operates in. However, 46% of profit variability is determined by the company's characteristics and business activities, as well as environmental factors, jointly determining the level of the company's profit margin.
				15%	Owner's Equity	Owner's equity
				10%	Sales Revenue	Sales revenue
				15%	S-Number of Channel Distributors	S-Number of Channel Distributors: 3
				15%	Q-Number of Suppliers	Q-Number of Suppliers: 4

from various industries, new technologies, and teaching content. It also integrates rich resources of RPA financial robot case studies to meet the needs of student-centered learning and innovation.

The teaching platform is jam-packed with a vast array of instructional resources and a highly realistic business system that is custom-tailored for students to engage in practical training exercises related to intelligent financial robots using UiPath software. By completing the courses offered on the platform, students will (1) master the basic

principles and knowledge of financial robot process automation; (2) become proficient in Uipath Studio's functionality and settings; (3) learn the applicable scenarios of RPA in financial work, and develop financial robots for corresponding work scenarios; and (4) learn to identify processes that can be automated and independently develop and apply RPA financial robots.

2.2.2 Developing Process Automation Robot based on Platform

The training platform sets up student development groups, in which students work alongside developers, corporate and peripheral staff to form project teams. They analyze and streamline various business processes of corporations and peripherals, identify steps that can be automated by robots, and have developed dozens of robots, such as "bank reconciliation robot", "accounting robot", "raw material and auxiliary material procurement form checking robot", "product sales form checking robot", "invoice preparation robot", "tax declaration form preparation robot", "peripheral evaluation summary robot", "demand release and order response system control robot", and "raw material procurement system control robot". These robots have automated some business processes, achieving significant progress in the field.

2.3 Developing an "Enterprise Management Cockpit" that Presents the Business Operation Status from Different Dimensions in a Visual Format

The training platform has launched the "management cockpit" project, which breaks down the company's business situation into five dimensions: business, finance, products, internal operations, and learning and growth. It then decomposes the indicators of these five dimensions and captures raw data based on these indicators to ultimately form a panel-style "management cockpit" that can dynamically reflect the company's business situation at different levels of granularity (Wu and Lv, 2022). The management cockpit is divided into three levels of data granularity: overall, second-level, and micro-level, reflecting the company-level, department-level, and position-level business situation, respectively. From a temporal perspective, the management cockpit is divided into daily, annual summary, and end-of-period summary, reflecting the company's business situation at different points in time. Through understanding the design principles of the management cockpit and analyzing the intuitive data presented in the panel, students can develop systematic thinking and a holistic perspective, and master the principles and basic skills of data analysis. Companies can view their own business data and the industry average data from different levels and dimensions, and determine their position in the competition.

2.3.1 Apply Performance from the Time Dimension

The daily panel includes financial performance (three major abilities: solvency, operational efficiency, and profitability) and operational performance (market status, market share and capacity, risk status, policies, research and development, market expansion, operations, financial capital chain, and dependence on key personnel) (Li 2022).

The annual summary panel includes financial performance (three major abilities: solvency, operational efficiency, and profitability) and operational performance (market status, market share and capacity, risk status, policies, research and development, market expansion, operations, financial capital chain, and dependence on key personnel), as well as team atmosphere (assessment of team status and investment status).

The end-of-term summary panel includes financial performance (three major abilities: solvency, operational efficiency, and profitability) and operational performance (market status, market share and capacity, risk status, policies, research and development, market expansion, operations, financial capital chain, and dependence on key personnel), as well as team atmosphere. See Table 1 for the management cockpit indicator system.

2.3.2 Drilling Application Performance from Data

(1) Macroscopic application

Firstly, the overall performance index reflects the comprehensive effect of both financial and non-financial indicators, which demonstrates the company's overall strategic capabilities. Then, the secondary level sub-indices delve into five aspects: business operations, product development, customer marketing, internal operations, and team building, to show the decision-making abilities of different departments (A cluster of tree peaks).

(2) Micro application

To demonstrate the execution and performance abilities at the job level, data and charts will be drilled down for each of the five comprehensive indicators, highlighting the effectiveness in business operations, product development, customer marketing, internal operations, and team building.

3. SIGNIFICANT EFFECTIVENESS OF APPLYING DIGITAL VIRTUAL SIMULATION PLATFORMS IN TEACHING

3.1 Building a Real Enterprise Accounting Information System to Realize the Development of Social Information Synchronization

The deployment and implementation of the UFIDA U8 system are carried out in the training platform. Business processes such as procurement, production, sales, and personnel are all managed through the system, with business and financial data updated simultaneously, achieving the integration of business and finance. Students can learn the application methods and connections of accounting information system modules on the basis of mastering the basic theory, design ideas, system structure, and basic professional knowledge of accounting informationization. Through the introduction of training projects, students can be implanted with lean management ideas in their daily work, learn the modular division method of enterprise management, including the implementation methods of system management and system initialization, and master the application operation methods and data management analysis methods of management software in financial management (including accounts receivable management, accounts payable management, salary management, fixed assets, cashier management, general ledger, and accounting reports), supply chain management (including procurement management, sales management, inventory management, and inventory accounting), budget management, and strategic analysis (Liu and Zhao, 2018).

3.2 AI Empowerment: Achieving Business Process Optimization and Restructuring

The training platform's various business processes are comprehensively reviewed, considering the possibility of optimizing and restructuring them with the support of information technology. The information team, together with students from enterprises and other departments, forms a project team that develops more than ten robots, including the "bank reconciliation robot", "invoice auto-filling robot", "raw material and accessory purchasing checklist robot", "external evaluation summary robot", and "information auto-publishing robot", targeting the business processes. They also develop a series of U8 initialization robots, including "account creation robot", "operator addition and maintenance permission robot", and "module initialization robot", which solve the problems of account creation, operator addition, and initialization data preconfiguration. The training position resources are formed, and the application of the software is improved to be consistent with the rule-based training and trial operation verification, meeting the real-time platform needs, which allows students to truly experience the role of information technology in improving labor efficiency, reducing costs, and the possibility of innovation in daily management.

3.3 Digital Transformation Driving Intelligent and Visualized Enterprise Management with Management Cockpit

3.3.1 Design and Implementation of a Panoramic Display of Enterprise Management Cockpit

As a digital platform for business management, the simulation platform should reflect its economic and management significance. It covers five dimensions of business, finance, products, internal operations, and learning and growth. By drawing a causal relationship map, the strategic goals of the enterprise are designed from top to bottom based on logical relationships. The indicator system is decomposed layer by layer, and indicator formulas are set at different management levels. Specific indicators are further decomposed, and selective qualitative and quantitative data are collected for terminal indicators. The value of this process lies in assisting management decisions, so data needs to be provided with high timeliness and accuracy. It is required to integrate data from various dimensions, such as positions, departments, and organizations, into the same information management platform to form

a dynamic and agile evaluation system. Eventually, a dashboard-style management cockpit is formed.

To meet the visual display needs of enterprise management data, the integration of business and financial data from accounting information systems should be linked together, which will allow enterprises to view their operational data and industry benchmarks from different levels and dimensions, determining their position in the competition. This process enables the fast and accurate acquisition of data, making it essential to have well-established accounting information systems to provide timely strategic data support for budgeting, decision-making, and process intervention.

3.3.2 Structured Data Extraction Method for Enterprise Management Cockpit

(I) Automated information fetching from the underlying database of a management information system (U8)

In order to achieve overall management of the entire virtual simulation training platform, digital statistics are conducted on each enterprise using the U8 management information system. Enterprise financial data is comprehensively analyzed, including but is not limited to the registration of raw materials, auxiliary materials, finished products, transaction amounts, contract data, and transportation costs. The initial goal of digital enterprise management has been achieved, and the U8 platform has been utilized to accurately understand the financial data of each enterprise, facilitating subsequent management. Each corresponding position in the enterprise needs to be familiar with the operation of the management information system, timely and correctly fill in the corresponding information based on real business and submit it. The whole process is similar to a real enterprise, and the digital platform is used to strengthen enterprise management. After completing the business entry of the information platform at each position, we obtain the operational and financial data of all enterprises. This is the absolute evaluation standard for scoring, which does not require manual judgment. There are still non-quantitative evaluation indicators for assessment, and the processing of these indicators differs essentially from that of quantitative data, so the platform cannot fully cover it, ensuring fairness.

After obtaining the U8 management information system, the data is still complex and redundant, making it inconvenient for managers to use and not suitable for direct use in the management cockpit. To address this issue and make the data clearer and user-friendly for enterprise management personnel, the extraction and analysis of data is necessary. A powerful tool for this is SQL language. SQL makes it easy to extract useful information from the U8 system and perform a series of simple calculations. However, the application of SQL language requires a high level of rigor and logic. Any errors in the process can result in significant issues. Although the development process may be relatively difficult, the practicality of using SQL is undeniable. In using SQL to extract data, the database is crucial since the U8 system's data is extensive and complex, encompassing data from dozens of enterprises and other external organizations, as well as multiple periods of virtual simulation training platform data. To effectively use SQL, it is essential to accurately identify the needed data and ensure that data, time, and space correspond correctly to produce usable results. However, many enterprises fail to follow the standard procedures or may overlook details when filling out information, which can affect the final outcome. Therefore, while correctly using SQL can ensure the final data's referenceability to a certain extent, human errors are difficult to address even with the use of tools.

During the training process, RPA system is used to empower the construction of the overall digital platform. In the process of data acquisition, digital programs are used to provide assistance for data acquisition. The use of automated processes greatly increases the efficiency of the platform. In the process of using the entire U8 system, initialization operations are required, including account creation, operator addition, operator permission allocation, initialization process for channel providers, producers, and account set deletion, etc. Because there are a large number of enterprises, if manual operations are performed separately, they are often mechanical and repetitive, and the

probability of errors is high. With the use of RPA, the pre-work can be accurately completed without human participation, greatly improving efficiency.

The combination of SQL statements and the U8 information system is a powerful tool that not only enables the management and statistical analysis of data from dozens of enterprises, but also provides decision-making information for managers. It is an essential tool in the digital transformation of finance and operations management for businesses.

(2) Horizontal comparison of non-quantitative information

Throughout the entire training process, the assessment of the course is not only based on the quality of enterprise data, but also on other evaluation items, such as academic competitions, various bonus activities, and good performance in participation, all of which will receive appropriate bonus rewards. However, these bonus options cannot be directly compared with financial data, so a more reasonable evaluation standard needs to be found, which will ultimately be reflected as one of the factors that affect decision-making in the eyes of the managers.

4. CONCLUSIONS

This article outlines the specific requirements for educational reform brought about by digital transformation. From the perspective of cultivating cross-disciplinary digital capabilities in management, modern educational technology is introduced to achieve teaching innovation and, to some extent, realize the transformation goals of diverse and efficient job training, task-driven process optimization, and dynamic and agile decision-making analysis. Based on the characteristics of multi-enterprise and multi-institution integrated training on a platform, after years of analysis and observation of enterprise human, financial, and material resources, the problem of supply chain management and financial work efficiency is solved through the use of management information systems to achieve enterprise informationization. With the help of RPA tools, the entire business process is planned, and key tasks are automated in each unit. Combined with the platform's inherent digital environment, an "enterprise management cockpit" has been developed to visualize enterprise management decision-making analysis. Through digital teaching methods and process innovation, a system for cultivating digital capabilities has been constructed and practiced, solving the problem of insufficient digital capability training for traditional business talent development (Wang et al., 2020).

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