Factors Affecting the Role of State in the context of Digital Transformation of Education in Vietnam

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Abstract

Education 4.0 (EDUC4) is a trend that is completely changing the way of teaching and learning at all levels from preschool, elementary school, high school to university in the 4.0 industrial era. This concept encourages learners to equip themselves with skills and knowledge through virtual learning environments and advanced technologies such as the Internet of Things (IoT) and artificial intelligence (AI). However, to implement EDUC4 effectively and fairly, the role of the state is very important. The state needs to develop supportive policies, invest in technology infrastructure and digital skills training for teachers. Synchronization between policy and practice is a key factor to create a modern, flexible education system that meets the requirements of the Fourth Industrial Revolution. In Vietnam, digital transformation in education is institutionalized in documents from the Prime Minister and the Ministry of Education and Training. The national digital transformation program to 2025, with a vision to 2030, has changed teaching methods from traditional to active, improving the quality of education and saving time. The Ministry of Education and Training has built a database to manage detailed information of all schools from preschool to high school, digitized and connected the education sector database with the national database about population. Although many positive results have been achieved, Vietnam still has many limitations in implementing EDUC4, such as difficulties with network infrastructure in remote areas, control of digital learning materials, and legal regulations. Incomplete. A strong effort from the state is needed to overcome these challenges and ensure that all learners have access to modern and effective education. Through this article, the author provides a qualitative research model from previous studies on factors affecting the role of the state in EDUC4, thereby conducting linear regression analysis and providing solutions suitable recommendations.

Keywords: Vietnam, EDUC4; Digital Transformation, Management of Education

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Introduction

Education 4.0 (EDUC4) is a concept that has been changing the way of teaching and learning in the 4.0 industrial era. From encouraging learners to equip themselves with the necessary skills and information to using virtual learning environments and smart technologies such as the Internet of Things (IoT) and artificial intelligence (AI), EDUC4 opens up a new door to contemporary education (Fisk, 2017; Dunwill, 2021; Huba, 2016; Ciolacu, 2021; Vodenko, 2020; Jamaludin, 2020). However, to implement EDUC4 effectively and fairly, the role of the state is undeniable. The state needs to develop supportive policies, invest in technology infrastructure and digital skills training for teachers. Only when there is synchronization between policy and practice can we create a modern, flexible and effective education system that meets the requirements of the Fourth Industrial Revolution.

Countries such as Thailand, Malaysia and Singapore have pioneered specific initiatives such as the "Thais 4.0" plan and the Smart Nation initiative, which serve as benchmarks for the adoption of EDUC4 elsewhere. However, developing countries face unique infrastructure and financial challenges and need strong support from the state to implement EDUC4 equitably and effectively.

One of the biggest challenges is that managing the education system in EDUC4 requires many digital skills, especially in higher education institutions. Training the workforce with these skills is a necessary step to meet the demands of the new era (Costan et al., 2021; Puncreobutr, 2016; Benešová, 2017; Butt et al., 2020). Fostering public-private collaboration and finding innovative financing measures are key to overcoming infrastructure and financing barriers. Only with strong intervention and support from the state can we overcome current challenges and ensure that every learner has the opportunity to access and benefit from technological advances in education. (Indrajit et al., 2021).

Generally, implementing EDUC4 requires consensus and joint efforts from all stakeholders, but the role of the state is irreplaceable. Policy and support from the state are key to ensuring that education is on the right track and meets the needs of the new era.

In Vietnam, the implementation of digital transformation is institutionalized in written actions of the Prime Minister and the Ministry of Education and Training to carry out the task of applying information technology and digital transformation, specifically National digital transformation program to 2025, orientation to 2030 approved by the Prime Minister, education and training is one of the priority areas for digital transformation. This has gradually changed teaching methods from traditional to active, helping teachers and learners develop their thinking ability, creativity, initiative and efficiency. Not only does it improve the quality of education, but it also saves time, teachers have more time for their expertise, and work closer to students. The results of information technology application and digital transformation of the Ministry of Education and Training have achieved some important results: For preschool and general education, the Ministry of Education and Training has built a database system to manage detailed information of all schools from preschool to high school, including database components. Component data (including schools, classes, students, teachers, facilities, finances...) and synthesize data information from 63 Departments of Education and Training

(provincial level), 710 Departments of Education and Training (district level). Thereby, we have digitized and attached identification codes of nearly 24 million student records (digitizing information about background, learning process, training, health...), more than 1.5 million teacher records, staff and managers (profiles, professional qualifications, standard assessments) from 53 thousand schools and information about school facilities and toilets. The Ministry of Education and Training has successfully connected the Education Sector Database with the National Population Database (managed by the Ministry of Public Security). Thereby, synchronizing, authenticating citizen identification codes and sharing data of more than 1.5 million teachers (reaching 95%) and nearly 21 million student records (reaching 92%).

Application of information technology to serve the high school graduation exam and university admission work is implemented synchronously and thoroughly. From registering for the exam, applying for admission to paying the admission fee and confirming admission, all are done online for all candidates.

The application of information technology in teaching is increasingly deployed throughout the industry. The Ministry of Education and Training has issued instructions on building digital learning materials and online courses. The industry-wide digital learning resource warehouse was built and contributed to the Vietnamese Knowledge System to digitize more than 7,000 quality E-learning lectures and more than 2,000 lectures on television. Currently, the Ministry of Education and Training plans to provide free management software for educational institutions (high schools and preschools). The software meets basic school administration requirements, meets the Ministry's data standards and connects 100% of data with the Education sector database. It can be seen that the application of information technology and digital transformation is an inevitable trend of the 4.0 era, with the positive results from digital transformation of education achieved recently will be an important motivation, from That is to continue to strive for fundamental and comprehensive innovation in education at the present time as well as in the coming time. Thereby, contributing to improving the quality of human resources and creating momentum for Vietnamese education to make a breakthrough in a more comprehensive digital transformation process.

However, Vietnam still has many limitations in implementing EDUC4.0:

Firstly, the process of accessing online knowledge in remote areas faces many difficulties: for mountainous or remote areas. In remote areas, network infrastructure and information technology equipment are not guaranteed, causing a great impact on educational management in teaching and learning. This is the problem that must be prioritized to overcome for successful implementation, especially the need for online teaching and learning when direct learning conditions do not allow.

Second, there is no close and comprehensive control of digital learning materials to meet the learning and research needs of learners, requiring an accurate digital document repository. However, our country's human and financial resources are still unable to meet this task. Therefore, there are currently many situations where digital learning materials are widespread, lack authenticity, and are not strictly controlled in terms of quality and

content. From there, it causes inconsistency in knowledge and creates many other consequences such as financial wastage and time wasting.

Third, legal regulations on education have not yet been completed: this is a big problem affecting intellectual property rights as well as information security... At the same time, this is also an opportunity to complete Improve regulations on time and how to check and recognize online learning results. However, these issues are currently not being implemented consistently, clearly and strictly, thereby causing many inadequacies in the digital transformation process (Hue, 2022).

Literature Review

According to Fisk (2017), the new vision of learning encourages learners to equip themselves with the necessary skills and information, and to seek resources to support the learning process. Learning is based on an understanding of where and how to learn, with performance tracked and customized based on data. Dunwill (2021) reports that technological innovation continuously changes teaching methods and learning environments. In the context of Education 4.0 (EDUC4), the learning process may require the use of virtual learning environments (VLEs) to combine physical and virtual materials (Huba, 2016), along with intelligent learning processes. Smart integration of the Internet of Things (IoT) through wearable's and smart sensors (Ciolacu, 2021) and artificial intelligence (AI) to automate systems (Vodenko, 2020). Curriculum design in EDUC4, especially in higher education institutions (HEIs), needs to reflect this technologically advanced environment (Jamaludin, 2020).

The role of the state in implementing EDUC4 is extremely important. The state needs to develop supportive policies, invest in technology infrastructure, and promote digital skills training for teachers. Only when there is synchronization between policy and practice can we create a modern, flexible and effective education system that meets the requirements of the Fourth Industrial Revolution. Countries such as Thailand, Malaysia, and Singapore have launched specific initiatives, such as the "Thais 4.0" plan and the Smart Nation initiative that set the standard for other countries to adopt Use EDUC4. The state also needs to promote public-private collaboration and innovative financing measures to overcome infrastructure and financing barriers, ensuring effective and equitable implementation of EDUC4 (Costan et al., 2021).

Managing education systems in Education 4.0 (EDUC4) requires many digital skills to use intelligent agents, mobile technology, cloud computing, and many other technologies (Puncreobutr, 2016; Benešová, 2017). While these skills are often taught in technology-intensive programs such as engineering, computer science, and information technology, they are not as common in educational programs that focus on pedagogy. This observation suggests that the training of educators at universities is one of the reasons for the shortage of digitally skilled education professionals, which hinders the effective implementation of EDUC4.

Therefore, higher education needs to improve the skills of the workforce to meet the requirements of EDUC4 (Butt et al., 2020).

Puncreobutr (2016) highlighted ten powerful teaching tools of EDUC4, including: visual learning, evolving currency, personalization, gamification, social media, game-based learning play, connection, project-based learning, and the fusion of physical and digital. Equipping these tools requires teachers to become more dynamic and adaptive, in contrast to the usual rigid pedagogical approach. However, despite the presence of these tools, education continues to be viewed primarily through a traditional lens (Abrams and Merchant, 2019), with formalist approaches applying broad knowledge of syntax and form (Oxman, 2008).

The growth of new knowledge and its increasing availability through digital media requires educators to be more flexible and creative in their teaching methods to keep up with innovation industry. Infrastructure requirements, such as internet connectivity, digital communications suites, data centers and networks, and digital hardware, are essential to achieve this goal. Unfortunately, these requirements are among the most difficult challenges universities face, especially in developing economies. Information and communication technology (ICT) supporting infrastructure is one of the core components of EDUC4 (Miranda et al., 2021), while financial resources are the driving force of educational reform (Zajda, 2015). The lack of resources typical in developing countries requires the adoption of alternative infrastructure to deploy EDUC4. A systematic investigation of these barriers would greatly benefit the implementation of EDUC4 in financially constrained areas.

Hershock et al (2007) reported that institutional change among universities lags behind the growth of technological innovation. One of the main reasons for this slow response is the asymmetry in the strategies of organizations implementing Education 4.0 (EDUC4) and the capacity of learners to meet or comply with its requirements. Thorell et al (2015) emphasize the need to tailor EDUC4 implementation strategies to learners' needs and abilities. For example, strategies offered by higher education institutions may require learners to own a personal computer. However, in developing countries, this strategy may not be feasible due to the limited financial capacity of many families. Instead, universities can provide access to computers and local area networks (LANs) on campus, but this requires learners to share the cost through additional tuition fees. Addition, making EDUC4 unfair to students from financially disadvantaged households. The state needs to ensure that education policies and financial support are designed to reduce the financial burden on learners, especially those from low-income families. Furthermore, the state needs to invest in technology infrastructure at universities, such as internet networks, computers and other supporting equipment, to create conditions for all students to have the opportunity to access technology in a fair way. At the same time, the state also needs to promote public-private cooperation to mobilize the necessary resources to support the comprehensive and effective implementation of EDUC4. Only with strong intervention and support from the state can we overcome current shortcomings and challenges, ensuring that all learners have the opportunity to access and benefit from technological advances in education.

A major challenge in digital education is how policymakers can more effectively evaluate and build the EDUC4 development platform (Tan et al., 2017). From the previous discussions,

it is clear that there is a need to develop public-private partnerships, promote mindset changes and provide critical skill sets to teachers and learners to implement EDUC4. Addressing these concerns is critical to creating resilient and productive professionals in technology-driven environments (Tapsir and Puteh, 2018).

Indrajit et al (2021) emphasize that it is vital for governments and senior management of universities in developing economies to initiate proactive measures to address these constraints. Financial concerns related to EDUC4 implementation. The role of the state is to provide policy support and funding to reduce the financial burden on educational institutions and learners. Governments need to invest in technology infrastructure, such as internet networks, digital devices and other supporting technologies, to facilitate the implementation of EDUC4. At the same time, the state also needs to promote public-private cooperation to mobilize resources and build a comprehensive digital education ecosystem. Strong intervention and support from the state is a prerequisite to overcome current challenges, ensuring that every learner has the opportunity to access and benefit from technological advances in education.

From the above content, it can be seen that the role of the state in providing solutions to overcome barriers in human resources, facilities, finance, linkages and educational management in the context of digital transformation of education.

Research Methodology

The research was conducted from January 2024 to March 2024 and applied the following specific methods: Qualitative research through synthesizing theories and results from previous researchers related to the role of the state in the context of EDUC4.0, thereby proposing hypotheses and building a research model in the direction of adjustment, supplementation, ensuring compatibility with the context of digital transformation in education in Vietnam ; Afterwards, the author conducted a discussion with 10 experts (these are managers and researchers working in the field of education and training at all levels: preschool, primary school, secondary school and university) to calibrate and supplement scales and research models to better suit the research context. Quantitative research was conducted by the author through basic analyzes such as statistics, Cronbach's alpha reliability assessment, EFA factor analysis, linear regression model from survey data of 250 subjects. The subjects were education officials from central government to local government, teachers at preschools, primary and secondary schools, lecturers at universities in Vietnam and collected 226 valid samples with Data collection period from April 2024 to May 2024.

Table 1. Summary of survey samples

No	Area	Number of survey form issued	Number of valid survey forms
1	Northern	85	73
2	Central	80	77
3	Southern	85	76

Total	250	226

Source: Compiled by author

The quantitative research results specifically reflect the factors affecting the role of the state in EDUC4. The size of the sample applied in the study is based on the requirements of exploratory factor analysis (EFA). According to research by Hair et al. (1998), according to Trong. H., Ngoc. C.N.M. (2008) from Bollen's (1989) study, the sample size must be at least 5 times the number of variables in factor analysis. With the number of observed variables being 25, the minimum sample size must be 125. With the expectation that a valid sample will have a proportion greater than 50% of the total number of samples collected, the study chose a sample size of n=250. The research sample was conducted randomly, mainly based on relationships. The study took data from education sector officials in 08 provinces and cities; 10 major universities and 05 preschools and high schools.

The study sent out 250 questionnaires (200 online and 50 in person), resulting in 226 responses (176 online and 50 in person). The income survey form was checked for validity and reliability to eliminate unsatisfactory answer sheets, including blank answer sheets, inappropriate respondents, and answer sheets with only 01 answer to most questions... For online answer sheets, the study used statistical functions on Excel software to select. With answer sheets directly on paper, selective research is done using the manual ballot counting method. After screening, the remaining answer sheets were 226, coded and analyzed using SPSS 20 software.

The study took random data, evenly distributed on gender variables: female (46.5%) and male (54.5%). Regarding educational level, the data focuses on bachelor degrees (42.9%) and postgraduate degrees (49.6%). Regarding age, the data shows that the majority of people surveyed are long-time workers with a lot of experience, focusing on the age group from 25 to 35 years old (36.7%) and the age group from 35 to 45 years old (27.4%). Regarding workplace, there is an equal distribution of survey questionnaires at state management agencies in education and universities, preschools, primary schools and high schools, including universities and high schools. Colleges and universities account for the highest proportion (53.1%).

Table 2. Descriptive statistical results

Variable	Content	Frequency (person)	Rate (%)
Gender	Female	105	46.5
	Male	121	54.5
Academic level	Associate Degree	17	7.5
	Bachelor Degree	97	42.9
	Post graduate	112	49.6
Age	Under 25	55	24.3
	From 25 to 35	83	36.7
	From 35 to 45	62	27.4

Variable	Content	Frequency (person)	Rate (%)
	Over 45	26	11.5
Workplace	Ministry of Education and Training	15	6.6
	Department of Education and Training	20	8.9
	Division of Education and Training	15	6.6
	University, College and Academy	120	53.1
	Kindergarten, primary school, high school	56	24.8

Source: SPSS 20 analysis results

Table 3 below presents the results of the scale of factors in the research model, based on the criteria presented in the theoretical overview of the research, including: connectivity, human resources, management of education, infrastructure and finance.

Table 3. Scales of factors in the research model

| No	Factor	Encode	Scale	Source
1	Finance	FN1	The state has a clear financial policy, promoting digital transformation in education.	Zajda (2015); Miranda et al. (2021); Costan et al. (2021)
		FN2	Schools use financial policies for digital transformation.	
		FN3	Autonomous financial resources are not enough for schools to carry out digital transformation.	
		FN4	State budget for digital transformation in education should be increased.	
		FN5	State budget on digital transformation in education should increase allocation to remote provinces with difficult living conditions.	
2	Infrastructure	IS1	The State has issued specific instructions and regulations on the arrangement of facilities to serve digital transformation in education.	Miranda et al. (2021); Fisk (2017); Dunwill (2021); Huba, (2016); Ciolacu (2021); Vodenko (2020);
		IS2	Facilities for digital transformation in education are guaranteed.	
		IS3	Internet, computer, and wifi systems ensure teaching and learning.	

No	Factor	Encode	Scale	Source
		IS4	Digitally converted classrooms ensure full equipment and amenities for teaching and learning.	Jamaludin (2020)
		IS5	The network environment with digital learning resources ensures teaching and learning.	
		ME1	The State issues clear and specific regulations on digital transformation in education.	
		ME2	Schools issue regulations on digital transformation in education in accordance with the practices of each educational level.	
3	Management of Education	ME3	The management and professional document system is digitized and fully deployed in the network environment.	Costan et al. (2021); Puncreobutr (2016); Benešová (2017); Butt et al. (2020)
		ME4	Training programs with output standards ensure adaptation to digital transformation in education.	
		ME5	The State conducts inspections, inspections and accreditation of educational quality for schools, ensuring educational quality in the context of digital transformation.	
		HR1	The State promulgates regulations on focusing on developing the quality of human resources in the context of educational digital transformation.	
		HR2	Schools have strategies and plans to develop the quality of human resources in the context of educational digital transformation.	Puncreobutr (2016); Dunwill (2021); Jamaludin, 2020
4	Human Resources	HR3	The content of personnel training and fostering focuses on skills and teaching methods appropriate to the context of educational digital transformation.	
		HR4	The staff is interested in improving professional quality and professionalism	
		HR5	Diverse digital learning resources, ensuring staff research.	

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No	Factor	Encode	Scale	Source
5	Connectivity	CN1	The State promulgates regulations on encouraging public-private cooperation in educational digital transformation	Indrajit et al. (2021); Costan et al. (2021)
		CN2	Schools issue policies inviting public-private cooperation in educational digital transformation.	
		CN3	Socialized capital is invested in physical facilities and information technology infrastructure, ensuring digital transformation in education.	
		CN4	Ensure the rights of all parties in public-private cooperation.	
		CN5	Businesses feel excited about investing in education.	
6	Role of State in EDUC4	RS1	Businesses feel excited about investing in education.	Costan et al. (2021); Miranda et al. (2021)
		RS2	The state strengthens accreditation to evaluate the level of digital transformation in education in schools.	
		RS3	The State strengthens its role in encouraging and mobilizing businesses to participate in public-private cooperation in digital transformation of education.	

We have the following research model:
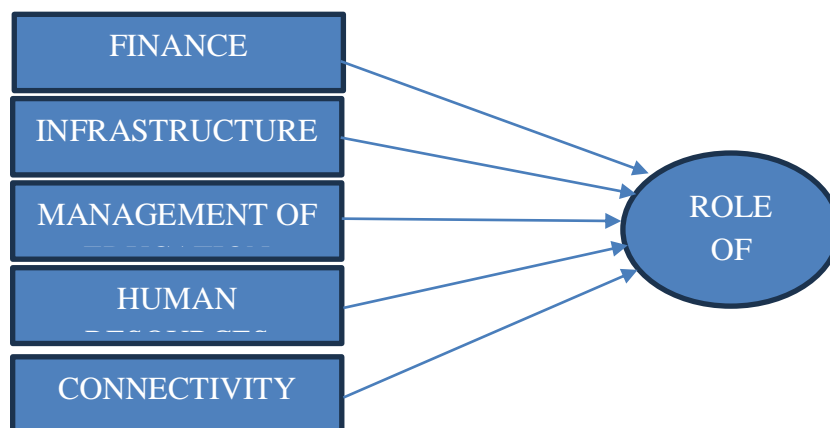
Figure 1. Research model

Result and Discussion

Assessing the reliability of Cronbach's alpha is the first step in implementing a linear regression model, with 28 variables of 6 factor groups included in the analysis, including: FN (Finance), IS (Infrastructure), ME (Management of Education), HR (Human Resources), CN (Connectivity) and RS (Role of State in EDUC4), all variables meet the requirements (total variable correlation coefficients are greater than 0.3). Along with that, all Cronbach's Alpha coefficients are 0.6 or higher.

Table 4. Summary of Cronbach's alpha coefficient

Factor	Number of initial variables	Cronbach's alpha coefficient	Number of valid variables
Finance	5	0.790	5
Infrastructure	5	0.832	5
Management of education	5	0.861	5
Human Resources	5	0.848	5
Connectivity	5	0.806	5
Role of State in EDUC4	3	0.619	3

Source: SPSS 20 analysis results

Thus, after evaluating the reliability of Cronbach's alpha, the study had 28 suitable variables belonging to 6 factors to include in the EFA factor analysis to explore the scale structure of 05 independent factor groups, namely FN (Finance), IS (Infrastructure), ME (Management of Education), HR (Human Resources), CN (Connectivity) and 01 dependent factor is RS (Role of State in EDUC4). Results of EFA factor analysis of variables belonging to independent factors with KMO coefficient reaching 0.741, greater than 0.5; this confirms that the EFA results of the variables belonging to the independent factors are completely suitable for exploring the structure of the scales; along with that, Barlett test with Sig coefficient less than 5%, showing that the results of EFA factor analysis of variables belonging to independent factors are completely statistically significant.

Table 5. Results of EFA analysis of variables belonging to independent factors

	Component				
	1	2	3	4	5
IF2	.858				
IF3	.810				
IF5	.782				
IF1	.772				
IF4	.767				

	1	2	3	4	5
ME2	.857				
ME3	.793				
ME1	.785				
ME5	.778				
ME4	.708				
FN2		.860			
FN5		.783			
FN3		.746			
FN4		.744			
FN1		.710			
HR1			.833		
HR2			.797		
HR4			.784		
HR3			.668		
HR5			.626		
CN1				.825	
CN4				.808	
CN2				.757	
CN3				.727	
CN5				.556	
KMO = 0.741; Bartlett's Test of Sphericity = 2452.066; Sig. = 0.000					
Eigenvalues	4.269	2.986	2.863	2.607	2.461
Variance (%)	17.075	11.945	11.452	10.429	9.842
Cumulative (%)	17.075	29.020	40.473	50.902	60.744

Source: SPSS 20 analysis results

Besides, the results of EFA factor analysis of variables belonging to independent factors show that the breakpoint is at the 5th line with an eigenvalue of 2.461 greater than 1, this confirms that the variables included in the analysis are arranged into 5 groups of factors and the cumulative in the 5th line is 60.744%, greater than 50%; shows that the variability of the data is explained up to 60.744%. Not only that, the factor rotation results show that 25 variables belonging to the independent factors included in the analysis are specifically arranged into 05 factor groups FN (Finance), IS (Infrastructure), ME (Management of Education), HR (Human Resources), CN (Connectivity) in Table 5.

Table 6. Results of EFA analysis of variables belonging to the dependent factor

	Component
RS1	.838
RS2	.831
RS3	.585

KMO = 0.583; Bartlett's Test of Sphericity = 101.918; Sig. = 0.000	
Eigenvalues	1.735
Cumulative (%)	57.835

Source: SPSS 20 analysis results

Along with that, the results of EFA factor analysis of variables belonging to the state role factor in EDUC4 (RS) in table 6 show that the KMO value is 0.583, greater than 0.5; This confirms the KMO value, ensuring the appropriateness of exploratory factor analysis and the meaningfulness of the data included in factor analysis. The Chi-Square statistic of the Bartlett test has a value of 101.918 with a significance level of Sig. = 0.000 is less than 0.05, this shows that the KMO test results are completely statistically significant at the 5% significance level.

The analysis of the cumulative for the dependent variables shows that the cumulative reaches a value of 57.835%, this value is at an average level, so 57.835% of the variation in the data is explained by 01 factor, measurement scales were derived and accepted. The stopping point when extracting factors at the first factor with Eigenvalues is 1.735. The factor loading coefficients of the component variables RS1, RS2, RS3 are 0.838 respectively; 0.831; 0.585 is greater than 0.5; This shows that the component variables of the entrepreneurial intention factor warrant inclusion in data analysis.

Based on the results of correlation analysis of factors in Table 7, we see that the dependent factor of entrepreneurial intention has a positive/same direction correlation with the independent factors, specifically, the Pearson correlation value of the factors CN (Connectivity), IF (Infrastructure), ME (Management of Education), FN (Finance), HR (Human Resources) with the role of the state in EDUC4 are 0.374 respectively; 0.527; 0.523; 0.546; 0.505 is greater than 0 and the coefficients Sig. of the factors are all less than 0.05. This ensures that the correlation between factors is statistically significant for the author to conduct linear regression model analysis.

Table 7. Results of Pearson correlation analysis

		Connec-tivity	Infra-structure	Manage-ment of Education	Finance	Human Re-sources	Role of State in EDUC4
Connect-ivity	Pearson Correlation	1					
	Sig. (2-tailed)						
Infra-structure	Pearson Correlation	.028	1				
	Sig. (2-tailed)	.676					
Manage-ment of Educa-tion	Pearson Correlation	.011	.096	1			

		.870	.152			
	Sig. (2-tailed)					
Finance	Pearson Correlation	.067	.111	.115	1	
	Sig. (2-tailed)	.319	.095	.084		
Human Re-sources	Pearson Correlation	.016	.116	.184[**]	.089	1
	Sig. (2-tailed)	.817	.082	.005	.180	
Role of State in EDUC4	Pearson Correlation	.374[**]	.527[**]	.523[**]	.546[**]	.505[**]	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).
Listwise N=226

Source: SPSS 20 analysis results

The results of the regression model analysis in Table 8 show that factors affecting the role of the state in EDUC4, including: CN (Connectivity), IF (Infrastructure), ME (Management of Education), FN (Finance), HR (Human Resources); that is, these variables affect RS (the role of the state in EDUC4) in the same direction. And R square is 0.923; this result shows that the model's suitability is 92.3%, or in other words, 92.3% of the variation in the state's role factor in EDUC4 is explained by 05 factors: CN (Connectivity), IF (Infrastructure), ME (Management of Education), FN (Finance), HR (Human Resources). Using the F test in ANOVA analysis of variance shows that the F value is 529.071 with a significance level of Sig. is 0.000 less than 0.05; this shows that the combination of five independent factors in the model can explain the change in the role of the state in EDUC4.

Table 8. Results of linear regression analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	-.093	.066		-1.406	.161		
Connectivity	.165	.009	.327	17.445	.000	.995	1.005
Infrastructure	.177	.008	.397	20.953	.000	.972	1.029
Management of Education	.165	.009	.371	19.353	.000	.952	1.050
Finance	.183	.009	.406	21.374	.000	.969	1.032
Human Resources	.173	.009	.349	18.254	.000	.953	1.050

R square = 0.923; Adjusted R square = 0.921; F = 529.071 (Sig. = 0.000); Durbin Watson = 2.002
Dependent Variable: Role of State in EDUC4.

Source: SPSS 20 analysis results

Thus, the regression analysis model is implemented as follows:

$$RS = \beta_0 + \beta_1 CN + \beta_2 IF + \beta_3 ME + \beta_4 FN + \beta_5 HR + \varepsilon$$

The unstandardized regression equation shows the relationship between factors affecting RS (The role of the state in EDUC4) as follows:

$$RS = -0.93 + 0.165*CN + 0.177*IF + 0.165*ME + 0.183*FN + 0.173*HR + \varepsilon$$

The regression equation according to the standardized coefficient Beta shows the relationship between factors affecting RS (The role of the state in EDUC4) as follows:

$$RS = 0.327*CN + 0.397*IF + 0.371*ME + 0.406*FN + 0.349*HR + \varepsilon$$

Based on the standardized Beta coefficient, we can see that the highest level of influence on RS (The role of the state in EDUC4) is the Finance factor (FN has Beta = 0.406; influence in the same direction), when the Finance factor is better (increased by 1 unit), the role of the state in EDUC4 increases to 0.406 units. Next, the Infrastructure factor (IF has Beta = 0.397; same direction effect), when the infrastructure factor is better (increased by 1 unit), the role of the state in EDUC4 increases to 0.397 units. Management of Education factor (ME has Beta = 0.371; influence in the same direction), when the Management of Education factor (increases by 1 unit), the role of the state in EDUC4 increases by 0.371 units. Human Resources factor (HR has Beta = 0.349; influence in the same direction), when the Human Resources factor is better (increased by 1 unit), the role of the state in EDUC4 increases to 0.349 units. Finally, there is the Connectivity factor (CN has Beta = 0.327; influence in the same direction). When the Connectivity factor is better (increased by 1 unit), the role of the state in EDUC4 increases by 0.327 units.

Along with that, the results show that the VIF coefficient of the factors CN (Connectivity), IF (Infrastructure), ME (Management of Education), FN (Finance), HR (Human Resources) are 1.005 respectively; 1,029; 1,050; 1,032; 1,050 is within the allowable level (less than 2), showing that the model does not suffer from multicollinearity. And the value d (Durbin Watson) = 2.02 is in the acceptance range (from 1.5 to 2.5), meaning the model does not have autocorrelation at lag 1.

Conclusion

This study focuses on clarifying the factors affecting the role of the state in EDUC4 in Vietnam today. Thereby, the author has presented relevant foundational theories. Based on the results of previous studies, the author has synthesized measurement scales and proposed a research model, and used SPSS 20 statistical software to conduct qualitative research, adjust scales and model to suit the real context.

The results of the study show the factors affecting the role of the state in EDUC4 in Vietnam today, including: (1) Connectivity, (2) Infrastructure, (3) Management of Education, (4) Finance, (5) Human Resources.

Based on the results of the research model, the author proposes the following recommendations to promote the role of the state in EDUC4:

Finance: The State needs to prioritize increasing budget for digital transformation projects in education, especially in difficult areas such as remote areas. This includes financial support so schools can purchase technology equipment and ensure online learning conditions. In addition, seek and take advantage of capital sources from international organizations and development funds to supplement finance for digital transformation projects, ensuring abundant and sustainable financial resources.

Infrastructure: develop technology infrastructure, invest heavily in internet networks and information technology infrastructure, especially in mountainous and remote areas to ensure every student All students can access online education effectively; Establishing high-quality digital learning data centers, providing diverse and accurate learning materials, ensuring easy access for teachers and students.

Public-private cooperation: Encourage technology businesses to participate in educational projects through tax incentive policies and other support mechanisms. Develop a public-private partnership model in developing educational software, providing technological equipment and building digital learning material content; Organize forums and seminars to connect stakeholders, thereby creating practical initiatives and solutions for digital transformation in education.

Management of Education: improve management capacity, increase training and fostering digital skills for educational management staff, ensuring they have enough capacity to implement and monitor transformation projects. change number. At the same time, complete the legal framework, update and complete legal regulations related to online education, intellectual property rights protection, information security and regulations on testing and recognition of online learning results.

Human resources: Implement in-depth training programs on digital skills and use of technology in teaching for teachers; Support teachers in accessing online materials and courses to improve their qualifications. Focus on attractive remuneration policies to attract highly qualified human resources in the fields of information technology and education. Create a friendly working environment and professional development opportunities for teachers and administrators.

The above recommendations aim to enhance the role of the state in promoting digital transformation of education, ensuring efficiency and equity, helping Vietnam catch up with the 4.0 education trend in the world.

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