Analysis of Information Technology Literacy Education Based on the Two-dimensional Frame Theory of Life Cycle

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Abstract

In recent years, with information technology, cloud computing, big data, artificial intelligence, and other new technologies that surpass traditional learning forms and learning methods, people have put forward more ideas about the education paradigm. Since 1983, the U.S. Department of Education, social organizations, and groups have successively issued 62 policy documents on information technology literacy education. 33 effective policy documents were screened out based on the comparison of the strength of the relevance with the research topic and the argumentation of experts in the field. The research has established a two-dimensional analysis framework based on policy tool theory and technology standardization life cycle theory, with core keywords such as "information technology support" and "financial support" in the horizontal X-axis secondary index dimensions, and then the vertical Y-axis two The level indicator dimensions are classified again, supplemented by the software NVivo 11 to organize the text content analysis units, and present the overall classification and distribution status and data analysis of the code content units in the policy documents. The study found that the United States focuses on the application of supply-based policy tools and environmental policy tools while ignoring the application of demand-based policy tools. The development of information technology literacy education in the United States focuses on the development of knowledge acquisition and creation and development, weakening the development of the implementation period and the promotion period. The United States should apply policy tools in a balanced, coordinated manner according to different development stages, and apply policy tools in a diversified, differentiated, and combined manner according to development needs; scientific, systematic, and reasonable layout to ensure long-term effectiveness of policy tools.

Keywords: Policy tools, Information technology literacy, Life cycle theory, Two-dimensional framework, Technical standardization

1. Introduction

How to predict and grasp the trend of future education development? This is an important topic before the people of the world, and it is also an important topic that many researchers and educators pay attention to. New technologies such as information technology, cloud computing, big data, and artificial intelligence that have been developed in recent decades have surpassed traditional learning forms and learning methods, providing people with the possibility of breaking through the traditional education paradigm. In 2019, the American Teach Thought research organization released the "2018 American Education Trends" report, which analyzed

20 future educational development trends that American educators are concerned about, such as growth-oriented thinking, maker learning, and distribution. Rum's educational target taxonomy and its application target taxonomy, information literacy, personalized learning, etc. [1]. It can be seen that most of the educational development trends are related to the development of information technology literacy education. The reason for such a trend is inseparable from the vigorous promotion of information technology literacy education in the United States. The report "The State is in Crisis: Education Reform Is Imperative" issued by the Quality Education Commission of the United States directly prompted the United States to vigorously develop information technology literacy education. Since 1983, the United States has promulgated a series of national strategies to promote the development of information technology literacy education in the United States according to different development stages and different educational technology backgrounds. For example, the "National Educational Technology Plan" has carried out a relatively comprehensive and systematic programmatic plan for the development of information technology literacy education in the United States. Successive governments in the United States have continued to introduce new ideas based on this principle. The former President of the United States, Trump, broke the convention and historically shortened the policy update cycle to one year. At the same time, social organizations and groups are encouraged to continuously update policies, standards, and measures related to the development of information technology literacy education, and to continuously improve the overall layout and planning of information technology literacy education in the United States.

However, as far as the U.S. information technology literacy education development policy system is concerned, how does the U.S. carry out the three types of information technology literacy education development policies that are supply-oriented, environmentally-oriented, and demand-oriented? These three types of information technology literacy education development policies What are the characteristics of the layout? How does the United States ensure that these three types of information technology literacy education development policies will exert the effectiveness of policy tools for a long time? This series of issues is the focus of research. Therefore, the research attempts to establish a two-dimensional framework based on policy tool theory and technology standardization life cycle theory to answer these questions, conduct a quantitative and qualitative analysis of the U.S. information technology literacy education development policy from 1983 to 2018, and visualize U.S. information The changing course, layout characteristics and future trends of the development of technology literacy education provide reference and reference for the improvement of my country's information technology literacy education system and future development plans.

2. Theoretical bases

2.1. Policy instrument theory

Educational policy is the overall regulation for the goals, approaches, and methods of educational work, and is the administrative norms formulated by the state or political parties to achieve the educational goals [3]. Policy tools are the linkage mechanism between policy goals and policy actions, that is to say, the ultimate goal of policy tools is to better achieve policy goals. The research on the theory of policy tools can be traced back to the classification of economic policy tools summarized by the Dutch economist Kirschen. In the 1990s, policy tool research continued to develop and became the focus of policy research [4]. Policy tools will manifest themselves in different classifications due to different standards. For example,

Rothwell & Zegveld (Rothwell & Zegveld) divide policy tools into three types: supply-type, environmental-type, and demand-type according to different levels of policy impact [5]. McDonnell (McDonnell) and others believe that policy tools should be divided into four types: command, incentive, capacity building, and system change [6]. According to the different resources used by the government, Woolthuis et al. divided the policy tools into four types: authoritative, information, fiscal and organizational [7]. Howlett et al. divide government tools into three types: voluntary tools (non-mandatory), compulsory tools, and mixed tools according to different levels of enforcement [8]. Therefore, based on comprehensive consideration of previous research results, the study finally draws on the classification method of Rothwell & Zegveld's classic policy tools as the research horizontal X dimension and analyzes the classification of the US information technology literacy education development policy. standard.

2.2. The life cycle theory of technology standardization driven by knowledge innovation

Technical standardization is a vertical standardization evolution process that has gone through the development stages of standard preparation, development, product development, implementation, use, and feedback [9]. The life cycle of technology standardization driven by knowledge innovation is a process in which knowledge can be activated, collided, diffused, integrated, and innovated based on acquisition, processing, and sharing, and ultimately value-added [10]. The SECI model proposed by Nonaka includes four spiraling stages of knowledge transformation, S (Socialization), E (Externalization), C (Combination), and I (Internalization) to realize the value-added of knowledge, and construct a spiral model of knowledge innovation-oriented to technology standardization [10]. Then construct the life cycle theory of technical standardization knowledge innovation based on the preparation period of knowledge acquisition, the development period of knowledge creation, the implementation period of knowledge application, and the promotion period of knowledge transfer. The research draws on Nonaka's theoretical framework as the research longitudinal Y dimension and analyzes the standards for the classification of US information technology literacy education development policies.

2.3. Basic framework construction

(1) Horizontal X dimension: basic policy tool dimension

The research adopted Rothwell and Zegveld's classification framework theory of policy tools. They believe that policy tools include three types: supply-based, environmental-based, and demand-based [5]. Among them, supply-oriented policy tools refer to the relevant elements required by the government to provide information technology literacy education reform, which can be divided into four categories: Talent Training, Technical Assistance, Financial Support, and Infrastructure Construction [11]. Environmental policy tools are to indirectly promote the strategic deployment of information technology literacy education reform by optimizing the innovation and entrepreneurial environment, which can be divided into five categories: Financial Support, Tax Preferences, Regulation and control, Strategic and Public Service [11]. Demand-based policy tools refer to the government's continuous support and attention to the reform of information technology literacy education, which can be specifically divided into four categories: Government Procurement, Outsourcing of Services, Operational Barriers, and Overseas Exchange [11]. There is an interactive relationship between the three types of tools. Among them, supply-based and demand-based policy tools directly provide impetus and driving force for the reform and development of information technology literacy education, and

environmental policy tools indirectly affect the reform and development of information technology literacy education, [Figure 1].
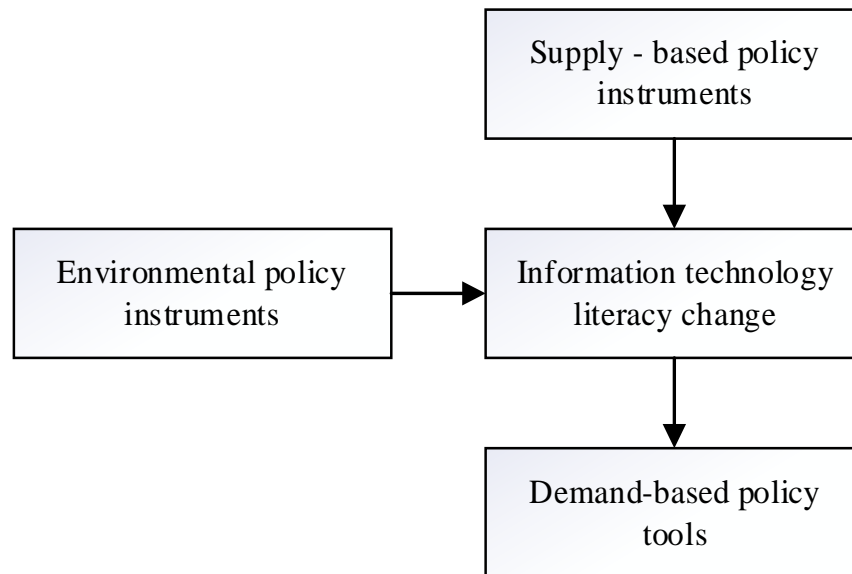

Figure 1. The role of information technology literacy education development policy tools

(2) Vertical Y dimension: the life cycle of technology standardization driven by knowledge innovation

The research draws on the knowledge innovation spiral model theory of technological standardization constructed by research scholars as to the longitudinal Y-dimension classification standard. Research believes that the life cycle of technology standardization driven by knowledge innovation should include four stages. Among them, the knowledge acquisition preparation period is the process of tacit knowledge exchange and sharing between individuals or enterprises, that is, the process of socialization and socialization activities are embodied as knowledge acquisition, providing knowledge and information sources for technical standardization. The knowledge creation and development period are the processes of transforming tacit knowledge into explicit knowledge. Technical standards are coded explicit knowledge. The research and development of technical standards is a process of knowledge externalization, and externalization activities are embodied as knowledge creation. Lay a technical foundation for technical standardization. The implementation period of knowledge application is the process of integrating various manifested explicit knowledge into a more complex knowledge system, that is, the process of combination. Combination activities are embodied into knowledge applications, which is a necessary way for the commercialization of technical standards. The knowledge transfer promotion period is the process of internalization, which is the transformation of explicit knowledge into tacit knowledge, and internalization activities are embodied as knowledge transfer, which promotes the diffusion and upgrading of technical standards.

(3) X-Y two-dimensionality: a two-dimensional framework for the analysis of U.S. information technology education development policy

Study the integration of policy tool theory and technology standardization life cycle theory, define the X-axis as three types of supply-based policy tools, environmental policy tools, and demand-based policy tools, and define the Y-axis as the knowledge acquisition preparation

period and the knowledge creation and development period 4. Four development stages: the implementation period of knowledge application and the promotion period of knowledge transfer. Finally, establish an X-Y two-dimensional analysis framework based on policy tool theory and technology standardization life cycle theory, [Figure 2].
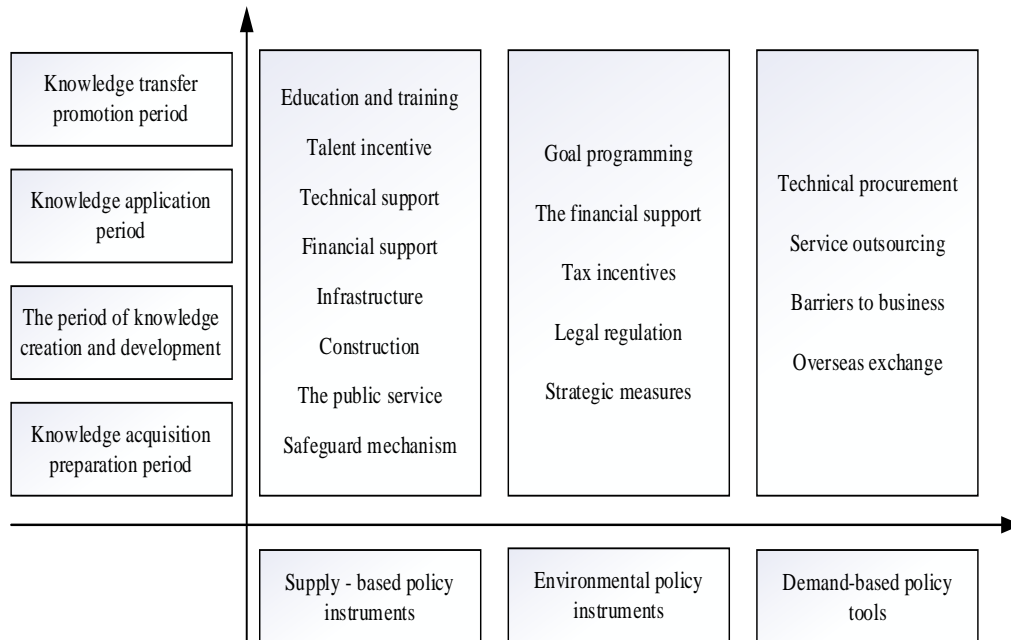

Figure 2. A two-dimensional analytical framework for information technology literacy education development policies

3. Research process and methods

3.1. Sample selection of policies

To ensure the authoritative and scientific nature of the research samples, the research samples come from public data on the US government website and copies of policy documents in the collections of some US libraries. The selection of research samples follows the following criteria: One is to follow the principles of authority and openness of policy documents, which are all selected from relevant policies officially issued by the US government. The second is to study related policies with the theme of "information technology literacy", aiming to analyze and study the layout of the development policy of information technology literacy education in the United States. The third is that the time for the release of policy documents is between 1983 and 2018. Therefore, the study used core concepts such as Technical Literacy, Educational Technology, Technology Use, and Information Technology as the subject headings, and collected 62 relevant policy documents. The policy documents with weaker relevance to the subject were eliminated, and 33 policy documents between 1983 and 2018 were finally screened out, [Table 1]. To ensure the scientific, rationality, and accuracy of the sample content analysis, the research also invited experts in related fields to demonstrate and confirm.

Table 1. U.S. information technology literacy education development policy from 1983 to 2018 (some excerpts)

Serial number	Time	Policy document name	Posting body
1	1991	American 2000: An Education Strategy	U. S. Department of Education, Washington, DC.
		……	
8	1996	Getting Americas Students Ready for the 21st Century: Meeting the Technology Literacy Challenge	U. S. Department of Commerce, Washington, DC. Information
		……	
30	2016	Future Ready Learning Reimagining: The Role of Technology in Education	U. S. Department of Education, Washington, DC.
		……	
33	2018	U. S. Department of Education Strategic Plan for Fiscal Years 2018 − 2022	U. S. Department of Education, Washington, DC.

3.2. Analysis methods of policy documents

Based on the X-Y two-dimensional analysis framework of policy tool theory and technology standardization life cycle theory constructed in the previous article, the study selected 33 policy documents with core concepts such as Technology Literacy, Educational Technology, Technology Use, and Information Technology as themes. It is divided into specific units and specific coding marks. At the same time, it is supplemented by the software NVivo11 to organize the text content analysis units of the policy documents. The codes are established in the style of "policy number policy-specific chapters/terms serial number specific terms" style, summary, management, and statistics. Similarly, the analysis and classification of the analysis units of the secondary index dimensions are all divided into specific units and marked with specific codes based on the index dimensions as the subject terms, such as Investment in Educational Technology, Technology Goal Technology Plan, etc. The research samples are all from the official websites of the United States and the websites of related research institutions, and they are all English policy samples. Therefore, there are differences in translation from other studies, but the overall situation does not affect the topic of this research and the frequency distribution of the application of various indicators. In the end, the study draws a policy analysis coding table for the development of information technology literacy education based on the aforementioned X-Y two-dimensional policy tool as a framework, [Table 2].

Table 2. Information technology literacy education development policy text analysis unit code list (partial excerpt)

Serial number	File title	Content analysis unit	coding
8	Preparing American Students for the 21st Century: Meeting the Challenge of Technological Literacy (NETP1996[a])	Teachers in the United States will get the training and support they need to help students learn using computers and information technology [12].	8-5-1-1
		……	

14	Digital learning: so that all children can get a world-class education at any time (NETP2000[b])	All teachers across the country will get the training and support they need to help students learn using computers and information highways [13].	14-1
		......	
19	Towards the Golden Age of American Education: The Internet, Law, and Contemporary Student Prospects (NETP2004[c])	Today's students are very proficient in technology, have a strong sense of the positive value of technology, and regard technology as an important and preferred component of every aspect of their lives [13].	19-2
30	Learning for the future: reshaping the role of technology in education (NETP2016[d])	The National Educational Technology Plan has developed a national vision and plans to use technology to promote learning based on the work of leading education researchers.	30-2
		......	

4. Research analysis

4.1. Data analysis results

(1) The application layout of horizontal X-dimensional policy tools

Based on the horizontal X-dimensional policy tool classification standard, the study conducted classification analysis and data aggregation on 33 policy samples. The research is based on the specific index classification of the three types of policy tools on the horizontal X-axis in the previous theory, and the text is divided into specific units and specific codes are marked. For example, in the secondary indicators of supply-oriented policy tools, the frequency of occurrence of content units related to information technology support (A) is 26 times. The frequency of the content unit related to the public service (B) is 23 times. The frequency of content units related to infrastructure construction (C) is 15 times and so on. By analogy, the specific frequency of the secondary indicators of environmental policy tools and demand-based policy tools is shown in [Table 3]. From the perspective of the overall macro application layout, the US government has considered the overall application layout of supply-based policy tools, environmental policy tools, and demand-based policy tools.

Table 3. the specific frequency of the secondary indicators of environmental policy tools and demand-based policy tools

Types	Policy tools	Coding	Frequency	Percentage
Supply-oriented policy tools	D	5－5－2、9－3－1－4、16－5－6、......21－5－6、8－4－3、	7	45.1%
	G	8－4－1	1	
	A	2－2－1、......4－1－2－1、4－1－2－4、4－1－2－7、5－3－3、5－4－2、8－4－1、......9－3－3－2－7、12－3－2、14－4－4、......22－5－2	26	
	E	5－4－3、8－4－2、8－5－2、16－5－1、	4	
	C	1－4、......1－8、3－1－2、4－1－3－1、4－1－3－2、5－3－1、......5－5－2、9－2－2－2、16－5－3、18－4	15	

	B	2−2−3、……2−5、4−1−2−6、5−6、8−4−2、……9−2−2−3、……10−2−5、14−4−3、15−4−6、16−5−3、16−5−7	23	
	F	9−6−3、15−5−1	2	
Environmental policy tools	I	1−3、6−2−2、7−4、8−3−3、8−3−4、9−2−1、……9−7−1、……15−3−3、18−6、19−6、26−5、30−2、30−3	21	47.9%
	J	9−3−1、……9−3−3−2−2、10−2−7−2、15−4−7、21−5−8、27−2、33−5、33−6	10	
	L	5−4、8−5−2、9−6−2、5−4−4	4	
	H	2−2−5、3−2−1、4−1−3−3、5−5、8−4−3、……8−6−3、9−3−2−4、12−3−4、……13−1、15−4−5、16−5−4、……24−1、25−1、28−2、29−2、31−2、32−2	42	
	K	1−3、3−1−3、6−3、6−4、14−5、15−4−3−3、	6	
Demand-based policy tools	Q	N/A	N/A	7%
	P	N/A	N/A	
	M	5−4−1、5−5−1、7−3、7−6、8−3−2、9−5、18−7、	7	
	O	10−2−6	1	
	N	4−1−2−2、4−1−2−3、4−1−2−5、6−5	4	

Note: A: information technology support; B: public services; C: infrastructure construction; D: education and training; E: financial support; F: guarantee mechanism; G: talent incentives; H: regulatory control; I: target planning; J: Financial support; K: strategic measures; L: tax incentives; M: business barriers; N: technology certification; O: overseas exchanges; P: service outsourcing; Q: technology procurement; N/A means not applicable.

Among them, supply-oriented policy tools (information technology support, public services, infrastructure construction, education and training, financial support, guarantee mechanisms, and talent incentives) accounted for 45.1% of the overall proportion of policy tools. Environmental policy tools (regulatory control, target planning, financial support, strategic measures, and tax incentives) accounted for 47.9% of the overall proportion of policy tools. Demand-based policy tools (management barriers, technical identification, and overseas exchanges) account for 7% of the overall proportion of policy tools [Figure 3]. It can be seen that there is a big difference in the application of the three, which also shows to a certain extent that the United States focuses on the application of supply-oriented policy tools and environmental policy tools in the policy layout of information technology education development in the United States, and there is a policy tool application for both. Overflow. While the application of demand-based policy tools is neglected, the application of tools is insufficient. Therefore, there is an imbalance in the overall application layout of policy tools. From a micro level, the application of environmental policy tools accounted for 47.9% of the overall proportion of policy tools. Regulations, target planning, and financial support applications are widely distributed, and strategic measures and tax incentives are relatively weak as shown in [Figure 4]. The distribution of data on the application of environmental policy tools shows that the U.S. government is committed to promoting the development of information technology literacy reform in the United States and the construction and improvement of the information technology literacy policy system, formulating national-level strategic information technology literacy guiding policies for information technology developers and education Managers and teachers provide top-level strategic design, as well as

financial support, tax incentives, and strategic measures required for the construction of the institutional system.
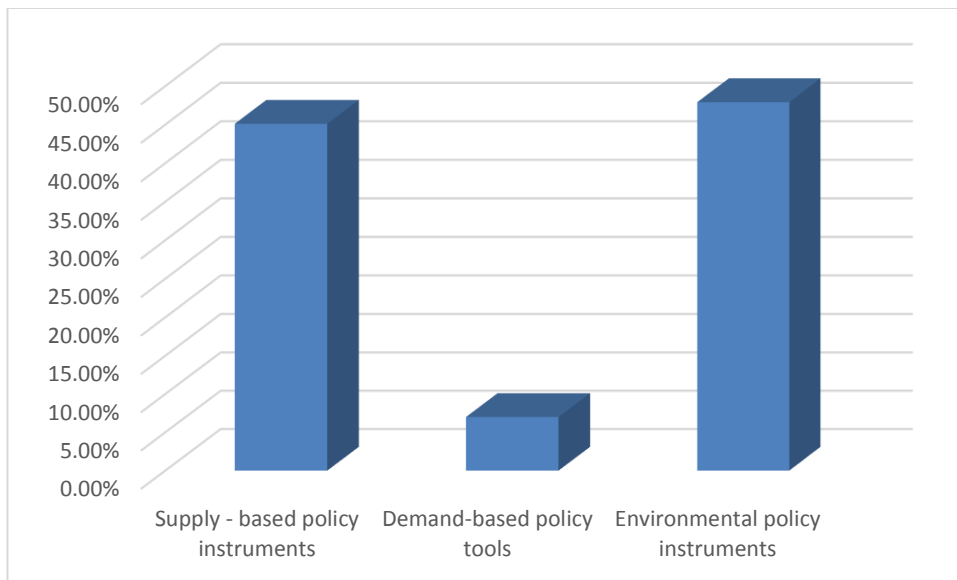

Figure 3. The application proportion of the three types of policy tools is overall distributed
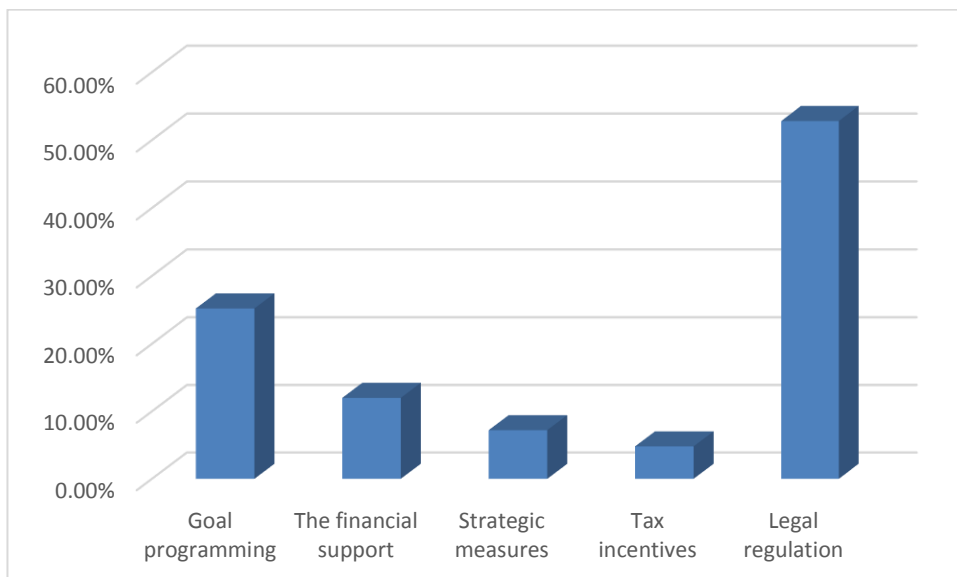

Figure 4. Proportional distribution of environmental policy tools

The application of supply-oriented policy tools accounted for 45. 10% of the overall proportion of policy tools, and the distribution of tool applications was relatively large, including information technology support (accounting for 33.34%), public services (accounting for 29.50%), and infrastructure construction (accounting for 19. 23%) are more frequent applications, but education and training (8.97%), financial support (5.12%), guarantee mechanism (2.56%) and talent incentives (1.28%) are more frequent. Weak (as shown in Figure

5). It can be seen that the reform of information technology literacy in the United States focuses on the support of information technology, improving public services, perfecting infrastructure construction to establish an information technology literacy environment based on complete basic information facilities, shaping good information technology literacy education awareness, and focusing on the information ecology at the social level. Construction.

Demand-based policy tools account for 7.0% of the overall proportion of policy tools, and demand-based policy tools are relatively weak as a whole. Operating barriers (58.33%) and technical certification (33.33%) are more frequent in the application of tools, but overseas exchanges (8.34%) are relatively weak, [Figure 6]. Demand-based policy tools mainly adopt tools such as overseas exchanges, business barriers, and technology identification to reduce the instability of the reform and development of information technology literacy in the United States. Their role in promoting the reform and development of information technology literacy in the United States is to a certain extent than that of environmental policy tools. Faster and more direct. However, the application of demand-oriented policy tools for the reform and development of information technology literacy in the United States is insufficient, and there is an uneven development in dimensions such as business barriers, technology identification, and overseas exchanges.
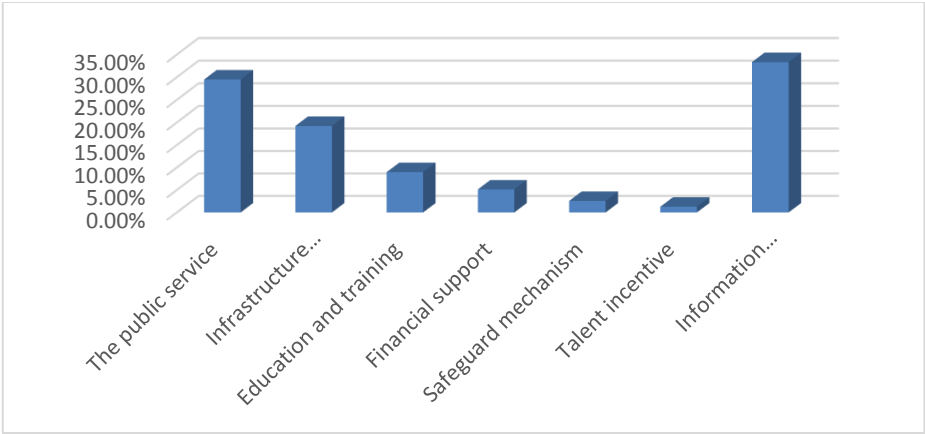

Figure 5. Proportional distribution of application of supply-oriented policy tools
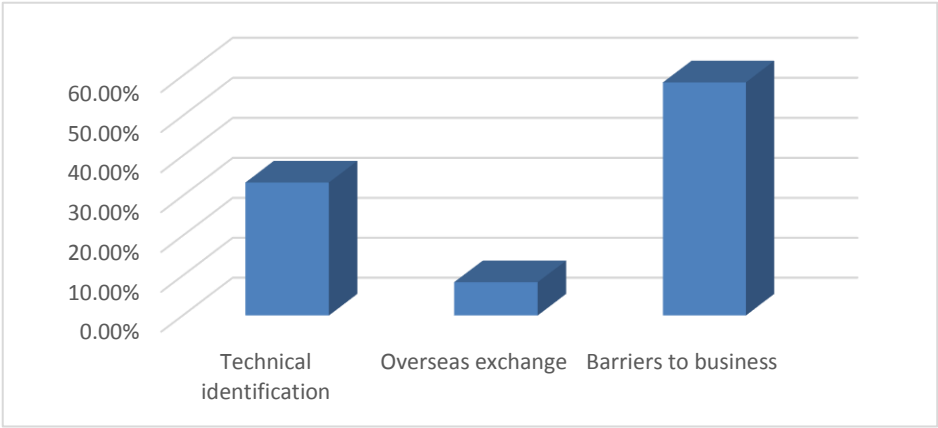

Figure 6 Proportional distribution of demand-based policy tools

(2) The application layout of X-Y two-dimensional policy tools

This research constructs an X-Y two-dimensional analysis framework based on the theory of integrated policy tools and the life cycle theory of technology standardization driven by knowledge innovation. The distribution of the policy document analysis unit based on the two-dimensional analysis of the horizontal X-axis and the vertical Y-axis as shown in [Figure 7], and the development and distribution of the vertical Y-axis technology standardization life cycle. Among them, the knowledge acquisition preparation period accounted for 21.97%, the knowledge creation and development period accounted for 43.82%, the knowledge application implementation period accounted for 15.61%, and the knowledge transfer promotion period accounted for 17.34%. It can be seen that the development of information technology literacy education in the United States focuses on the knowledge creation and development period, that is, the basic theoretical research of information technology and educational research and development. The implementation period and the promotion period are relatively weak, indicating that the United States has deliberately weakened the implementation period and promotion in the layout of the life cycle. The period may be based on a comprehensive consideration of intellectual property protection.

	Supply policies	Environmental policy	Demand-oriented policy	
Knowledge transfer promotion period	5-5-2、16-5-6、...... 21-5-6、8-4-3、8-4-1	1-3、...... 5-4、 8-5-2、9-6-2	5-4-1、...... 18-7、...... 4-1-2-5	17.34%
Knowledge application period	2-2-3、......2-5、 5-4-3、8-4-2、8-5-2 16-5-1	N/A	4-1-2-2、...... 6-5、10-2-6	15.61%
The period of knowledge creation and development	2-2-1、4-1-2-1、 5-3-3 8-4-1、......12-3-2、 14-4-4、......22-5-2	2-2-5、3-2-1、 4-1-3-3、5-5 8-4-3、...... 33-5、 33-6	N/A	43.82%
Knowledge acquisition preparation period	1-4、......1-8、3-1-2 4-1-3-1、........5-5-2 9-2-2-2、16-5-3 18-4、9-6-3、15-5-1	1-3、6-2-2、7-4 8-3-3、8-3-4、...... 9-7-1、10-2-1 14-2、......18-6 19-6、26-5、30-2、 30-3	N/A	21.97%
	45.10%	47.90%	7.00%	

Note: N/A means not applicable.

Figure 7. Information technology literacy education policy two-dimensional analysis framework distribution

4.2. Features of U.S. information technology quality education development policy application layout

The analysis results show that in the historical changes in the development of information technology literacy education in the United States, macro policies have considered the full application of supply-based policy tools, environmental policy tools, and demand-based policy tools, and promoted the role of policy tools in stimulating and promoting changes in information technology literacy. However, in the overall layout of policy tools, the focus is on the application of supply-based policy tools and environmental policy tools, while the application of demand-based policy tools is relatively weak, and there is an imbalance in the overall application layout. Among them, supply-oriented policy tools have invested heavily in information technology support, public services, and infrastructure construction, while relatively weak in education and training, financial support, guarantee mechanisms, and talent incentives. Environmental policy tools are lacking in financial support, strategic measures, and tax incentives. Support should be increased to promote the balanced development of various influencing factors. The application of demand-based policy tools in technology procurement and service outsourcing has not yet been fully considered. The US information technology literacy education development policy layout has the following characteristics.

First, according to the dynamic needs of different development stages, scientifically, systematically, and rationally arrange policy tools to promote the balance of internal and external values of information technology literacy education. The formulation of information technology literacy reform and development policies should be developed in a coordinated and balanced manner, and appropriate adjustments should be made according to the need for tool development. Over or lack of application of policy tools is not the best choice for the application of policy tools. A good policy tool layout should be based on the subjective goals of policy development and the needs of the objective situation, and the type of policy tool application and the level of policy tool usage should be reasonably selected, to avoid over-application of policy tools or lack of policy tools leading to over-strengthening the functions of some policy tools or weaken, to maximize the effectiveness of the application of policy tools. From the perspective of the distribution of the application of policy tools in the United States, the information technology literacy education in the United States should achieve the following points in the policy. One is to improve the policy environment for the development of information technology. Improving the policy environment for the development of information technology aims to deregulate the original information technology industry, mobilize social resources, and activate market competition in information technology. Second, increase investment in information technology research and development. The U.S. government continues to increase its investment in information technology research and development, especially cutting-edge information technology, national strategic information technology, and technologies that affect future technological development. Third, promote the popularization of information technology. For example, the goal in the "National Information Infrastructure (NII)" issued by the Ministry of Commerce, the White House Office of Science and Technology Policy, and the National Economic Commission are to expand "universal service" to promote the popularization of information technology and promote the vertical and horizontal development of information technology. According to the dynamic development of policy tools, it is necessary to coordinate the balanced development of the application of policy tools. According to the national development situation, environmental changes, the abundance of social resources, and the development of human resources, we will make scientific and dynamic

adjustments in a timely, appropriate, and appropriate manner, and scientifically deploy policy tools.

Second, depending on the application needs of policy tools, diversified, differentiated, and combined use of policy tools to ensure the effective and long-term effectiveness of the information technology literacy education development policy. The distribution of the application of policy tools shows that the experience of the development policy of information technology literacy education in the United States lies in: First, focus on the basic theoretical research and scientific research technology research and development of information technology. Specifically, in the application of supply-oriented policy tools, the US government has increased the construction of information technology support, infrastructure, and guarantee mechanisms, such as "National Information Infrastructure (NII)", connecting K-12 schools and the information highway Wait. Target planning, regulatory control, and financial support for environmental policy tools, such as the Higher Education Law Amendment, the No Child Left Behind Act (NCLB), and the Five-Year Strategic Plan: 2011-2015 Annual Financial Plan. Second, the selection of policy tools for information technology literacy education development policies should be based on the functional application of policy tools, and diversified, differentiated, and combined methods should be selected to use policy tools. Diversified and differentiated policy tools provide more possibilities for achieving educational goals. Achieving the goal of information technology literacy education reform depends on the support of diversified policies related to it. The use of combined policy tools points to the effective realization of multiple educational goals and is a win-win situation for the interest groups participating in the reform of information technology literacy education, which is difficult to achieve with a single policy tool. The use of combined policy tools lies in the rational allocation of resources of interest groups in the game within the combination, the complementation of policy functions, the coordination of operating mechanisms, and the rational optimization of internal structures, forming resource sharing, mechanism interaction, and complementary advantages among different policy tools, and then Achieve an appropriate balance between different policy tools, and ultimately ensure the effective and long-term effectiveness of policy tools.

5. Conclusion

By constructing a two-dimensional framework based on the US information technology literacy education policy, it visually presents the characteristics and current situation of the US information technology literacy education policy layout since 1983. The United States gives special attention to areas with weaker basic conditions and basic resource construction in the form of policy-oriented and national or local government financial subsidies. The top-level design of the development policy of information technology literacy education should have sufficient inspection, investigation, and cost-benefit evaluation in response to the level of economic and social development, social resources, especially the development stage of information technology literacy education. Promote the balance between the internal value and the external value of the information technology literacy education reform. One should not lose sight of the other. The two should be effectively balanced, and the two should be coordinated and balanced for common development.

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