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An Analysis of Core Competencies for Youth Development in the Age of Artificial Intelligence

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Abstract: This paper, through in-depth interviews with 32 people from different groups in four provinces and municipalities, uses the NVivo14 qualitative analysis tool and grounded theory to construct a core literacy system for teenagers in the AI era, which includes three dimensions and 11 elements of knowledge, ability, attitude, and values. Based on the analysis of the interview data, suggestions for cultivating core competencies of teenagers in the AI era, namely AI literacy, innovation literacy, social and emotional literacy, and labor literacy, are proposed.

Keywords: AI era; Teenagers; Core competencies; Innovation literacy; Labor literacy

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1. Introduction

According to the World Economic Forum's Future of Jobs 2025 report, 22 percent of jobs will be at risk of change by 2030, with 92 million jobs being replaced. At the same time, 78 million new jobs will be created, but the workforce will need to upgrade its skills to be ready. In the age of AI, what core competencies teenagers should have to cope with the rapidly changing environment has become an important issue that urgently needs to be studied today.

2. Research background

Core literacy is a key predictor of an individual's future adaptation to social development and their lifelong development. It reflects the level of change and development of an individual in terms of knowledge, ability, attitude, and values, and is a condition for cultivating innovative talents and the comprehensive ability to deal with future complex challenges [1]. Teenagers are the core force of global development in the new era. Strengthening the cultivation of their core competencies is an important measure to enhance the ability to adapt to changing environments. The OECD Learning Guide 2030 presents a three-dimensional "global literacy" framework of

cognitive ability, social and emotional ability, and value orientation, which is characterized by interdisciplinarity and universality [2]. The framework of Core Literacy for Chinese Students defines core literacy as a comprehensive system of individual qualities aimed at moral education, covering three dimensions: cultural foundation, autonomous development, and social participation. There are also significant differences in the focus of cultivation and development paths [3]. Based on the perspective of the demand for talent cultivation in the AI era, this paper is a comprehensive ecosystem of the interactive links among knowledge, abilities, attitudes, and values that teenagers need to face the rapidly changing environment brought about by the AI era.

3. Research methods

3.1. Research methods and tools

This paper designs an interview outline based on existing research, which focuses on core issues such as the specific demands for core competencies of teenagers in the AI era, the realistic predicaments faced in the current education and training process, and possible solutions.

3.2. Data collection and processing

3.2.1. Data collection

This study selected 32 interviewees from Beijing, Shanghai, Binzhou City of Shandong Province, and Jinan City, covering primary and secondary school principals, key teachers, university scholars, founders of enterprises, heads of government departments, etc. The types of respondents' units were diverse and closely related to the development and growth of teenagers, making them representative.

3.2.2. Data coding and analysis

The study employed the grounded theory of Glaser and Strauss (1967) to code the interview texts step by step in the order of open coding, main axis coding, and selective coding [4]. The specific encoding process is as follows:

First, open encoding. Screening the primary elements of adolescent core literacy, extracting nodes frequently mentioned by multiple respondents, ultimately obtaining 171 nodes, 60 initial concepts, and 24 categories.

Next, the main axis encoding. The 24 categories were clustered and integrated to define the categorical structure of the constituent characteristics of adolescent core literacy, and ultimately, 12 main categories were extracted.

Finally, selective coding. In combination with the research objective, the 12 main categories were repeatedly compared, analyzed, and summarized to extract the category types of adolescent core literacy indicators, and finally, three core categories were determined, namely: knowledge, ability, attitude, and values (**Table 1**).

Table 1. Selective coding

Core categories	Main category	Category connotations
Knowledge	AI understanding and Application	Understand the basic concepts, principles and applications of AI technology, master AI algorithms and programming languages for data analysis and problem-solving.
	Data intelligence and decision-making	Master the basic concepts of data intelligence, data analysis methods, and decision theory, and understand the basic methods of AI information creation and problem-solving.
Ability	Disciplinary integration and application	Grasp the principles of mathematical logic and interdisciplinary studies, and form interdisciplinary methods and paths for solving problems.
	Innovation and Practice	Use innovative thinking to deal with actual problems and engage in innovative activities in technical practice.
	Intelligent labor	Use smart tools to complete tasks and practice smart labor.
	Outcome creation and transformation	Transform the results of labor into practical applications, create valuable results, and master the basic methods of result creation and transformation.
	Communication and collaboration	Be proficient in using smart tools to achieve the goal of teamwork and complete basic expression and communication-related matters.
	Thinking training and logic	Be able to use scientific methods and logical reasoning to conduct systematic analysis of problems.
Attitudes and Values	Emotions and Psychological management	Use emotion management-related methods to regulate your emotions and thereby maintain a positive mental state.
	Personal development and resilience	By leveraging self-management-related methods, one can enhance personal capabilities and focus on cultivating adaptability and survival skills.
	Ethics and Responsibility	Adhere strictly to all kinds of norms regarding AI ethics and be fully aware of the moral and social responsibilities that AI technology shoulders.
	A global perspective and cross-cultural	Leverage AI technology to deepen your understanding of global diversity for collaboration in a cross-cultural context.

4. Analysis of core competencies of teenagers in the AI age

4.1. Knowledge literacy

4.1.1. AI understanding and application

Understanding and applying the basic principles and practical tools of AI can be said to be a core part of the knowledge base. It focuses on an individual's deep understanding of the basic concepts and principles of AI technology and their ability to apply them flexibly in practice [5]. It specifically covers understanding and recognizing AI technology and the innovative use and application of AI tools. Understanding AI technology is the first step to getting started in the AI era. In today's digital age, teenagers need not only to know what machine learning is all about, but also to be able to use the tools flexibly in specific scenarios.

4.1.2. Data Intelligence and decision-making

Data intelligence and decision-making are a prominent manifestation of knowledge literacy in the information age, emphasizing the use of AI technology to handle problems efficiently and create valuable information when faced with vast amounts of data, which has become a key criterion for measuring an individual's decision-making ability [8]. This category emphasizes the comprehensive qualities of data analysis, pattern recognition, and intelligent decision-making, which can help individuals make accurate and efficient judgments in complex

situations. In AI technology, data is the basis for decision-making and judgment.

4.1.3. Disciplinary integration and application

Interdisciplinary integration and application is an advanced manifestation of knowledge literacy, characterized by the integration of knowledge from different fields without the barriers of various disciplines to carry out innovative activities in response to the complex challenges presented in the real world [6]. It mainly covers the application of mathematical logic and the cultivation of interdisciplinary problem-solving abilities. Mathematical basic operations and mathematical applications are mutually reinforcing and complementary in the field of mathematical logic application, which is of extremely crucial significance for teenagers to build a complete mathematical knowledge system and to enhance their ability to solve practical problems.

4.2. Competence and literacy

4.2.1. Innovation and practice

Innovation and practice are particularly important foundational conditions of competence and quality, emphasizing the application of various technological innovations on the basis of traditional thinking, specifically including innovative thinking and technological practice innovation. Innovative thinking is the logical starting point of competence, focusing on the ability throughout the entire chain from identifying problems to proposing creative solutions [7]. The key lies in multi-path thinking and cross-disciplinary integration of knowledge, which encompasses three extremely important dimensions: the cultivation of innovative thinking, the application of divergent thinking, and the application of creativity.

4.2.2. Intelligent labor

Intelligent labor is a concrete manifestation of competence in the intelligent age, which requires individuals to have the ability in AI skills and to demonstrate high adaptability and creativity in an intelligent working environment [8]. Intelligent labor mainly covers two different aspects of labor in the intelligent age and intelligent labor practice, which actually reflects the reshaping of the form of labor by the continuous iteration and development of technology.

4.2.3. Creation and transformation of outcomes

Outcome creation and transformation are the links where the value of competence and quality is realized. Emphasis is placed on the creation of valuable results by individuals in the course of labor activities, and it also attaches great importance to the effective transformation and application of the results, thereby bringing tangible benefits to society and maximizing the value of knowledge to the greatest extent. It mainly covers two different aspects [9]: the creation of labor results and the quality of labor. The three dimensions of the glory of labor, enthusiasm for work, and positivity [14].

4.2.4. Communication and collaboration

Communication and collaboration are concrete manifestations of competence in social practice. It requires individuals to have the ability to express themselves clearly and to play an active role in the context of intelligent teamwork [10]. It covers two main aspects: basic expression and intelligent team collaboration. Including both verbal and written expressions, the development of collaborative abilities in intelligent teams requires systematic construction from three different dimensions: teamwork, division of labor and coordination, and interpersonal

communication.

4.2.5. Thinking training and logic

Thinking training and logic are the cognitive foundation of competence, emphasizing that individuals should receive more systematic training in scientific thinking in order to cultivate rigorous logical reasoning ability. It mainly covers two different aspects: scientific thinking training and logical reasoning ability [11]. Build up the relevant competencies of teenagers systematically from three dimensions: critical thinking, scientific understanding, and scientific application.

4.3. Attitude and values literacy

4.3.1. Emotional and psychological management

Emotion and mental management are an extension of attitudinal literacy in the specific field of mental health. It is necessary to use methods related to emotion management to regulate one's emotions in order to maintain a positive mental state [12]. It is necessary to focus on developing positive emotional qualities and the ability to manage emotions. In terms of emotional and psychological management for teenagers, systematic construction should be carried out from three different dimensions: emotion recognition, effective regulation of emotions, and stress regulation.

4.3.2. Personal development and resilience

Personal development and adaptability are a combination of attitudes and values as an individual grows. It mainly includes aspects related to adaptation, including two dimensions of survival skills and self-management. It has an incentive effect on the individual, promoting the gradual improvement of the individual's adaptability [13]. It is not difficult for the individual to maintain a leading position in a highly competitive social environment.

4.3.3. Ethics and responsibility

In the context of the widespread use of AI technology, ethics and responsibility have become an indispensable moral dimension in core competencies. It mainly covers two different aspects of AI professional ethics and AI social responsibility practices, which can guide teenagers to abide by the corresponding ethical norms and take on the social responsibilities they need to undertake when using AI technology. AI professional ethics unfold from two dimensions: self-management and professional ethics, as well as self-awareness.

4.3.4. Global vision and cross-cultural

Teenagers need to have a sharp sense of observation, enabling them to promptly detect problems emerging in the field of globalization and accurately assess risks related to international affairs. By participating in international projects and learning foreign languages, teenagers can broaden their international perspective, enhance their understanding of global events, and thus better adapt to the many challenges brought about by globalization [14].

4.4. Suggestions for development

4.4.1. Emphasize the core position of AI literacy and cultivate people who master AI tools, make rational judgments, and make good use of AI technology

Possessing the basic capabilities of a future digital citizen, not only mastering core algorithms and proficiently applying AI systems, but also having critical thinking, information integration ability and ethical judgment ability,

and being good at using AI for interdisciplinary integration, improving learning efficiency and serving social needs, to become an intelligent age teenager who can master technology, lead change and promote development.

4.4.2. Encourage technological innovation and cross-border integration, and cultivate people who can identify problems, practice technology, and adapt to complex and changing environments

Teenagers should have the sensitivity to practical problems and the ability to design solutions, the practical ability to quickly transform new knowledge into innovative achievements, the comprehensive ability of continuous optimization, cross-border connection, lifelong learning and rapid iteration, and become people who are diligent in experimentation, good at creation, proactive in updating, constantly improving, and capable of efficient collaboration and transformative innovation in the AI society [15].

4.4.3. Advocate empathy and collaboration, and cultivate people who are emotionally stable, understanding, cooperative, and socially responsible

Teenagers should be able to recognize and regulate their own emotions, understand and respect others' viewpoints, maintain a positive mental state, have cross-cultural communication skills, be able to build trust relationships among diverse groups, construct good communication mechanisms, and become empathetic teenagers with team spirit, cultural understanding, and social responsibility.

4.4.4. Attach importance to labor awareness and practical ability, and cultivate people who love labor, have solid skills, are diligent in practice, and courageous in taking on responsibilities

Young people in the new era should be able to carry out tasks and create results in real situations, possess certain professional skills and the ability to operate intelligent tools, be able to plan their career directions and practical paths, establish labor values close to the development needs of the country, and become compound practical talents with a clear professional awareness, the courage to do hands-on work, the ability to innovate, and the courage to undertake social responsibilities.

5. Conclusion

Based on grounded theory, this study constructed a three-dimensional core literacy system of "Knowledge-Ability-Attitude and Values" for adolescents in the AI era through in-depth interviews with multiple groups in four provinces and municipalities, and clarified the specific connotations of 11 key elements. The study found that AI literacy, innovative literacy, social and emotional literacy, and labor literacy are the core priorities for responding to changes in the AI era. Future education should be guided by this system: by strengthening the ability to apply AI technology, fostering innovative and interdisciplinary thinking, consolidating the foundation of social emotions, and improving the level of intelligent labor practice, it will help adolescents build comprehensive literacy that adapts to future employment changes and lifelong development, and provide theoretical support and practical paths for cultivating new-era talents who can master technology and take responsibility.

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