

# The Connotation and Composition of Teachers' Learning Design Competences in the Digital Age

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**Abstract:** The development of science and technology has changed the demand for education, and education will move towards the direction of refinement and personalization, which will bring new challenges to the implementation of teaching for teachers. Learning design as the competences to the implementation of teaching in the digital era has also been emphasized, and the ability that teachers should have as learning designers in the future needs to be further cultivated. Teachers' learning design competences is the competences of teachers to design students' learning by using digital technology, which can be divided into the competence of designing learning objectives, designing learning contents, the competence of designing learning activities, and the competence of applying digital technology. In the process of cultivating Teachers' learning design competences, it is possible to start from these aspects to continuously enhance Teachers' learning design competences.

**Keywords:** Digital Age, Learning Design competences, Composition of Learning Design competences, Teacher Education

## 1. Introduction

In the book *Being Digital*, Negroponte analogized the smallest unit of information, the bit, to DNA, revealing the close connection between information and human destiny [1]. Information technology has become an integral part of the educational ecology in the digital era, and students' learning requires personalized learning paths, autonomous learning spaces, and high levels of learning quality. These changes require corresponding adjustments and improvements in the role of the teacher, which is the emergence of the role of the teacher learning designer. Teachers should take advantage of technology to create autonomous learning spaces for students based on their individual learning needs.

## 2. The origins and connotations of Teachers' learning design competences

### 2.1 Development in the field of learning design

Design in the field of education as a teacher's teaching behavior has a long history. In order to promote students' understanding of the knowledge they teach, teachers often make prearranged arrangements and plans for the content and activities of teaching before the formal start of teaching. Instructional design, as a professional field, has undergone nearly a century of development since it sprouted in the United States at the beginning of the 20th century [2]. In the process of scientificization and professionalization, instructional design developed into an independent discipline under the field of educational technology [3]. However, the traditional process and steps of instructional design have gradually become rigid in application, and it has become difficult to adapt to the rapidly changing teaching situation in the digital era, and many people have even called for the abandonment of the formulaic process in this field and the adoption of a more flexible approach. Learning design began as a specification of methods and techniques to support the realization of e-learning, focusing on technical descriptions and design runs, and has not had a fundamental impact on teacher practice. Subsequently, the conceptual scope of learning design has expanded in the course of its development, and learning design has begun to focus on how teachers can use design wisely and combine appropriate resources and technologies to support student learning, and learning design has expanded from a technical specification to the level of instructional practice. Learning design can be regarded as the renewal and development of the main content of instructional design in the digital era, and it is the response of instructional design to the emerging theories of learning and teaching and the supplement to the traditional instructional design. The formation

and development of the field of learning design set the stage for the proposed Teachers' learning design competences.

## ***2.2 The definition of Teachers' learning design competences***

Information technology in the digital era provides more effective support for students' personalized learning paths, independent learning space, and high-level learning quality. Teachers can take advantage of emerging information technology to optimize teaching and create a more independent learning environment for students based on their individual learning needs. With the arrival of the digital era, the learning designer has become an important representation of the teacher's role [4]. At the same time, what kind of competences learning designers should have has become a question that must be answered in order to train teacher learning designers. Teachers' teaching competences in the digital era mainly refers to teachers' ability to utilize digital technology to promote teaching practice, Teachers' learning design competences is one kind of Teachers' teaching competences in the digital era, which is the ability of teachers to utilize digital technology to design for students' learning.

## **3. The basis for the construction of Teachers' learning design competence**

### ***3.1 Relevant research on the structure of instructional design competences***

As a part of teachers' teaching competence, scholars in the past have mostly studied instructional design competences from the overall perspective of teaching. With the deepening of the research and development of instructional design, more and more scholars have revisited and dissected the previously proposed instructional design competences from the field of instructional design and made a new construction of its connotation. From relevant research, it is clear that teachers' instructional design competences are a composite of teachers' awareness and attitudes, knowledge base, analytical and design skills. It involves in-depth understanding of subject content, identifying and analyzing students' needs and abilities, selecting and applying appropriate instructional strategies, and designing and adapting instructional activities and assessment methods. Teachers need to have the flexibility to adapt to changing teaching and learning environments and student feedback to ensure that teaching and learning objectives are met. Central to this is the ability to create an environment that supports active student engagement and deep learning, as well as the ability to effectively monitor and adjust the teaching and learning process. The combined application of these competences helps to improve the quality of teaching and learning and to promote the holistic development of students.

### ***3.2 Relevant teacher competency framework and professional standards***

Different countries and organizations have developed their own teacher competency frameworks and professional standards in response to the challenges posed to education in the digital age, with the aim of enhancing teachers' pedagogical literacy and quality, and constructing professional development paths and assessment systems. For example, China's Ministry of Education released *the Standard for Primary and Secondary School Teachers' Information Technology Application Competences (for Trial Implementation)* in 2014, which explicitly divides teachers' information technology application competences into two levels: optimizing classroom teaching and transforming learning styles, and emphasizes the need for student-centered teaching design and the use of digital resources to enhance learning experiences and opportunities. The subsequent *National Primary and Secondary School Teachers' IT Application Competences Enhancement Project 2.0 School-based Application Assessment Guidelines* and *the Teachers' Digital Literacy standards* further refine these competences requirements, such as instructional design competences in multimedia, blended learning and smart learning environments, reflecting the trend of moving away from traditional teaching towards a more personalized and student-centred mode of teaching.

Internationally, the development of teacher competency frameworks reflects similar trends. *The Core Teaching Standards Model and Teacher Learning Progression 1.0*, published by the Interstate Consortium for New Teacher Assessment and Development (INTASC) in the United States, as well as *the National Technology Standards for Teachers' Learning for Educators (ISTE Standards For Educators)*, emphasize Teachers' learning competences in designing personalized learning experiences, interdisciplinary learning activities, and creating digital learning environments. These standards not only focus on the professional development of teachers and the facilitation of student learning, but also emphasize the importance of teachers' collaboration with students, other educators, and the flexibility to

adapt instructional design based on assessment data.

In addition, *the Teachers' Competency Standards* published by the International Board for Standards in Training, Performance and Instruction (IBSTPI) even incorporate assessment and feedback of learning as a core area of instructional design, which contrasts with traditional frameworks that include assessment and feedback as part of instructional evaluation and highlights personalized learning and increased teacher autonomy in the assessment and feedback of student learning. Together, these national and international teacher competency frameworks and professional standards point to a shift in the education sector's demand for teacher competences that are adapted to the digital age and that promote active and deeper learning for students, and provide policy and standards support for educators' professional development.

#### 4. The composition of Teachers' learning design competences

Based on reference to existing studies related to the composition of instructional design competences and existing teacher competency frameworks and professional standards, the Teachers' learning design competences is mainly categorized into the competence of designing learning objectives, the competence of designing learning content, and the competence of designing learning activities, based on the learning elements that are mainly involved in the learning design carried out by teachers (Table 1). At the same time, based on the emphasis on teachers' use of technology to empower student learning in the digital era, the ability to apply digital technology is taken as a separate dimension.

*Table 1: Some domestic studies related to instructional design competences*

Design of learning objectives	Designing personal learning objectives to incorporate students' individual needs
	Developing and adjusting learning goals based on students' assessment data
	Designing short-term and long-term learning goals
Design of learning contents	Integrating and creating interdisciplinary learning content
	Designing a variety of optional learning resources and paths
	Flexibly adapting learning contents according to circumstances
Design of learning activities	Creating interdisciplinary, inquiry-based learning activities
	Designing diverse assessment of learning activities
	Flexibly adjusting learning contents according to circumstances
Applications of digital technology	Designing and developing new ways of integrating technology into teaching and learning
	Using digital technology resources to integrate and develop learning content
	Using digital technology resources to collect relevant data
	Detecting and analyzing the educational value behind the teaching data

##### 4.1 Design of learning objectives

Design of learning objectives can be refined as follows: Designing personal learning objectives to incorporate students' individual needs, developing and adjusting learning goals based on students' assessment data, and designing short-term and long-term learning goals.

First of all, every student has his/her unique learning style, ability and interest. When designing learning objectives, teachers should take these individualized characteristics into full consideration and set objectives that can stimulate individual potential and interest. This requires teachers not only to understand students' background knowledge, but also to be able to recognize students' interests and needs through observation and communication in daily learning life. Second, teachers need to use student learning data collected and analyzed by digital technology resources to understand how students perform

at specific stages of learning. On the basis of interpreting this data, teachers can adjust the learning objectives to make them more specific and in line with the needs of each student, and be able to better help students learn. Finally, teachers should be able to design learning goals that are both short-term and long-term. Short-term goals help students to focus on specific tasks and keep up with teaching progress. Long-term goals guide students to develop a holistic framework of knowledge, deeper understanding and higher-order thinking skills.

#### ***4.2 Design of learning contents***

Design of learning contents can be refined as follows: integrating and creating interdisciplinary learning contents, designing multiple optional learning resources and paths, and flexibly adapting learning contents according to situations.

At present, interdisciplinary learning has become one of the important trends in education. Teacher learning designers in the digital era should be able to cross disciplinary boundaries, integrate the content and methods of different disciplines, and help students establish cross-disciplinary connections and promote the development of higher-order thinking skills with rich learning experiences for students. Meanwhile, to meet the learning needs of different students, teachers should provide diverse learning resources and pathways. This includes traditional books and articles, as well as multimedia materials such as videos and online resources. In the process of teaching and learning implementation, teacher learning designers in the digital age should be able to flexibly adjust the learning content according to student learning. The teaching and learning process is dynamic, and student learning will change accordingly. Teachers need to flexibly adjust learning content according to students' progress, interest and feedback to ensure that the content is relevant and attractive.

#### ***4.3 Design of learning activities***

Design of learning contents can be refined into the creating interdisciplinary, inquiry-based learning activities, designing diverse assessment of learning activities, and the flexibly adjusting learning activities.

To begin with, interdisciplinary learning is a process in which students use knowledge from different subject areas to analyze and solve problems in a comprehensive way [5]. Inquiry-based learning approaches shift students from a passive state of learning to an active one, fostering their engagement in the exploration of knowledge. This student-centered methodology enhances their abilities for independent learning, collaboration, and cultivates skills essential for lifelong learning. Interdisciplinary and inquiry-based learning activities aim to broaden the field of knowledge and enhance comprehensive abilities by guiding students to make independent inquiries. To this end, teachers should design and develop interdisciplinary and inquiry-based learning activities that can stimulate students' curiosity and desire for inquiry, encourage students to think and solve problems across disciplines, encourage students to actively learn, explore knowledge through research, experiments and discussions, and cultivate critical thinking and problem-solving abilities. Secondly, evaluation in learning activities is a complex and important process, which not only concerns the quality of teaching and students' learning outcomes, but also the continuous improvement and innovation of the educational process. Teachers should utilize multiple and multidimensional assessment methods for evaluation, including but not limited to traditional exams and tests, as well as peer assessment, self-evaluation, project work and oral reports. In order to assess students' knowledge mastery, ability enhancement, literacy performance, attitude and emotion changes in the process of learning activities, all-round and objective assessment of students' process learning behavior performance, while increasing the interactivity and fun of learning. Finally, learning activity is a dynamic, interactive and flexible process, which requires educators to flexibly adjust learning activities according to students' learning situation and feedback. Teachers need to have the ability to make timely adjustments based on the actual results of learning activities and student feedback to ensure that the learning activities achieve the expected teaching goals, promote problem identification and optimize the learning process.

#### ***4.4 Applications of digital technology***

The applications of digital technology can be refined into designing and developing new ways of integrating technology into teaching and learning, using digital technology resources to integrate and develop learning content, using digital technology resources to collect relevant data, and detecting and analyzing the educational value behind the teaching data.

First, teachers can promote innovation and change in teaching methods by using digital technology resources. Teachers can provide strong support for new teaching modes such as blended teaching, immersive learning, flipped classroom, online courses and virtual experiments by introducing auxiliary tools such as interactive whiteboards, learning management systems (LMS) and online collaboration tools. Secondly, teachers can use digital technology resources to integrate and optimize educational resources, improve the efficiency and quality of producing learning resources, and provide students with rich and high-quality learning resources, which meets the diverse teaching and learning needs of students. In addition, teachers can use digital technology resources to obtain key data such as students' participation in learning, the speed and quality of task completion, etc., on the basis of which they can analyze the learning status and quality of learning, and improve the accuracy of teaching evaluation, so that teachers can have a deeper understanding of the learning situation and needs of the students, and provide support for the design of personalized and diversified learning programs. This process requires teachers to have the ability to recognize the educational value behind the data, to gain insights into the dynamics of the teaching and learning process through the data, and to adjust their teaching to meet the actual needs of students.

## 5. Conclusions

In the face of increasingly abundant and complex teaching resources and tools, teachers are faced with the challenge of how to select and organize these resources to better improve the quality of teaching and learning. In this process, Teachers should have the competence to design learning objectives, the competence to design learning content, the competence to design learning activities and the competence to apply digital technology. We can base on the composition of learning design competences to explore the countermeasures to develop Teachers' learning design competences.

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