

Research on the Design of Adult Online Learning Activities Based on Open University Integration Platform: From the Perspective of Activity Theory

Tiezhui Liu^{1,a,*}, Lingjia Chen^{2,b}

¹Ningbo Open University, Ningbo, 315016, China

²Ningbo Technician School, Ningbo, 315016, China

^aliucraft@qq.com, ^b1016457854@qq.com

*Corresponding author

Abstract: *The Open University Integration Platform is an essential measure of the strategy of creating excellence and improving the quality of China open universities. It is a significant project benefiting the majority of adult learners. Based on the Open University Integration Platform and guided by activity theory, this paper discusses the concept, connotation, and implementation method of online learning activity design for adult learners. According to the characteristics of adult learners, the design framework of adult learning activities in a fusion platform environment is constructed, and based on this, the teaching practice of computer courses is carried out, and the students' positive evaluation is obtained. This paper helps provide a theoretical framework and practical reference for Chinese and global adult online learning designers.*

Keywords: *Online learning; Activity theory; Learning activity design; Fusion platform; Adult Learning*

1. Introduction

One of the significant achievements of "Internet + Education" is that online learning plays an essential role in reforming the educational teaching model, improving academic fairness, and carrying out lifelong learning[1]. The 46th Statistical Report on the Development of the Internet in China by the China Internet Network Information Center (CNNIC) pointed out that online learning has shown a sudden growth, with 381 million users of online education in Chinese by June 2020, The total number of Internet users is 40.5%, and the number of mobile phone users is 377 million, accounting for 40.4%. It predicts that the integration of online and offline education is the general trend in the future. The Horizon 2022 Report, released recently, indicates the "mainstreaming of online, blended learning," Especially in the context of the global spread of the COVID epidemic, educators and students, and administrators need to become more comfortable with online learning as a long-term competence.

1.1 China Open University

China Open University has a nationwide online education network[2]. As of 2019, China Open University has enrolled more than 20.5 million students, with nearly 4.05 million students studying online. In August 2020, the Ministry of Education of China issued the "Comprehensive Reform Plan for National Open Universities," which requires "radio and television universities" to transform into "open universities". Actively adapt to the development trend of digital, intelligent, lifelong and integrated education, and strive to solve the problems of unclear positioning, imperfect system, and low quality to build a new university with substantial influence in the field of open education in the world. The Open University system actively promotes the development of "Internet + education" and serves the business of China's open education. Focus on building a public service platform for lifelong learning, provide lifelong education and services for the whole people, and promote "everyone can learn, everywhere, anytime"[3].

1.2 Open University Convergence Platform

The Open University Integration Platform is the essential work of China's Open University system entering the stage of high-quality development. Previously, the Open University system design did not

fully cover the teaching arrangement, teaching operation, and process monitoring links, and did not realize that the whole professional process management and course life cycle management and business and data integration is low. There are still some problems in online courses, such as presenting curriculum resources, not paying attention to teacher-student interaction and the design of teaching activities. How to encourage teachers to actively explore the learning process of adult learners, design and implement learning activities in line with the characteristics of adult learner behavior, and then achieve the goal of creating excellence and improving quality has become an urgent problem to be solved in the new development stage of Open University. Fortunately, the integration portal of teaching, learning, management, assessment, and examination, which The National Open University leads, is expected to achieve a line of enrollment eligibility screening, study management, examination management, and graduation audit. Teachers and students can access the whole process and share all resources through one account from enrollment to graduation.

1.3 Learning the Discoveries of Science

Many studies in learning science have shown that the main problem of online learning is not the presentation of content but how to organize quality teaching content to facilitate learning. Organizing online learning based on activities is consistent with the laws of human cognitive development. No matter the development of people's thinking and wisdom, or the formation of emotions, attitudes, and values, it is through interaction between subjects and objects to achieve. The interaction of the intermediary is the student's participation in various activities[4]. Learning activities can promote the development of students' subjectivity. The education objects' development should depend on their internal activities and efforts in the final analysis. Education must let students participate in activities as the main body to obtain the internal power of individual physical and mental development. Online teaching can realize the social interaction of different roles and improve students' learning autonomy through activities, so learning activities become an essential solution to solve the problem of online learning.

1.4 The existing problems of adult online learning

1.4.1 Poor information literacy and online learning habits

Compared with full-time students, adult learners generally have lower information literacy. They are not "digital natives", and they do not have a good opportunity to receive training related to information literacy. On the other hand, adult learners' study time is not fixed, the contradiction between work and study time is prominent, the anti-interference ability in the learning process is insufficient, the learning process is easily interrupted by other affairs, and the learning initiative and learning habits are poor. Therefore, the online learning effect on adult learners is not optimistic. In addition to equipping adult students with lecture teachers and after-school tutors, the learning platform itself must be suitable for the learning characteristics of adults.

1.4.2 Not much participation in online learning activities

Adult learners pay more attention to passive listening to lectures and homework, rely too much on the teacher's "teaching", turn a blind eye to other learning activities, and have unclear cognition of the learning subject. Adult students adapt to the linear learning process, the learning behavior is mainly driven by the learning goals, and the activation process is decomposed into a sequence of mechanical processes. When encountering learning difficulties, they tend to seek help from teachers immediately, rather than solving them by participating in learning activities or turning to learn partners.

1.4.3 Emphasize knowledge transfer and ignore ability development

The traditional distance education model emphasizes the passive transmission of knowledge. Adult schools organize teaching in the form of on-demand resources or live teaching by teachers, which is not conducive to cultivating students' ability to adapt to work and future development. With the development of society, the work of knowledge memory will be replaced by artificial intelligence in the future. Education should not emphasize mechanical and repeated work but should focus on training students' thinking, collaboration, and creativity. It is urgent to cultivate the abilities mentioned above of adult learners.

1.4.4 Learning organization is difficult to rebuild

Offline teaching activities are carried out, teachers will guide students to learn in an organized way, and students will influence each other. During the learning process, teachers and classmates play the role

of supervision and guidance to a certain extent. Due to the separation of time and space between teachers and students, and students and students, it is difficult for teachers to understand the learning status and learning level of students in online teaching, and there are also difficulties in helping each other among classmates. Teachers and students should form a close learning community, and the learning content should be systematically organized, but all this is difficult to rebuild.

2. The connotation and enlightenment of activity theory

2.1 Activity theory and online learning

With the development of information technology, activity theory is applied to online learning. To investigate the research situation in foreign countries, we used the Web of Science (WOS) database, selected "Activity Theory" and "Online Learning" as keywords to search, and returned a total of 568 data, including 537 papers, 32 online publications, and reviews. There are 28 articles, of which the research popularity continues to rise from 2012 to 2021. From earlier literature, Levy examined the application of activity theory in e-learning and the establishment of e-learning groups[5]. According to recent research, Maimaiti et al. studied the teaching situation of teachers and students using a web-based video conferencing system during the epidemic. They looked at the contradictions in teaching and their suggestions from the perspective of activity theory[6]. Iyamu et al. used activity theory to guide Information system research[7]. Overall, foreign research started early, developed rapidly, and penetrated sub-fields such as learning analytics.

2.2 Enlightenment of activity theory

Activity theory is an interdisciplinary theory; the main contents of its research include the two-way interaction between human beings and the physical and social environments that constitute things and the process and results of the development of human practice under the specific historical and cultural background. According to this principle, Rubenshtein put forward the idea of "human activity as the basic unit of psychological analysis," which refers to the concept of "activity", which belongs to the category of philosophy to psychology. After that, it was gradually enriched by the study of Vygotsky, Leont'ev, and others. In 1987, Engeström, a Finnish scholar, researched and developed the activity theory after Vygotsky and proposed a new generation of activity theory. The well-known "triangular model" is proposed (Figure 1). In this model, the subject is the individual or group in the activity; the object is the object operated by the subject, which is transformed into the result (knowledge). A community is made up of people who share objects and construct their own unique community culture; Tools include all things that transform objects into results and can be physical and mental tools; Rules are regulations, laws, policies, and practices that restrict activity; The division of labor is the horizontal distribution of tasks and vertical distribution of rights and status among community members. The six elements form four small triangles, production, dissemination, circulation, and consumption. At the beginning of the 21st century, Engeström analyzed all kinds of disadvantages a school brings and put forward the idea of using "learner collective" and "advanced learning network" to break through school's limitations, link activities, and form a more extensive activity system[8]. The improved model increases the openness and interactivity of activities (Figure 2). With the development of information technology, activity theory is also applied to online learning.

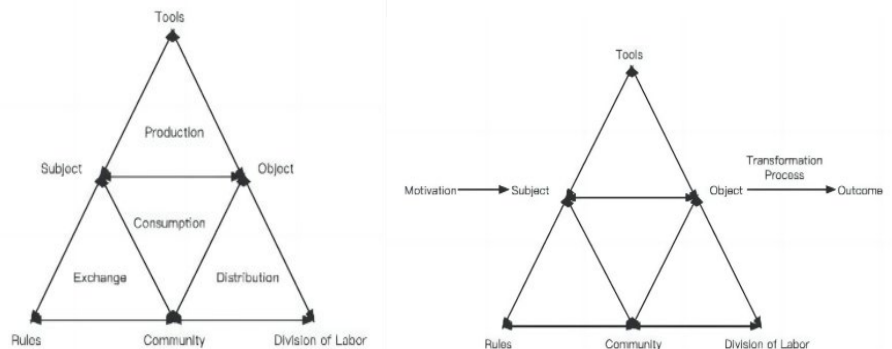


Figure 1 & 2: Triangular model

Table 1: The six steps framework

No	Step	Implementation suggestion
1 Determine the purpose of the learning activity		
1.1	Determining Outcomes	Complete learning activities, meet course requirements, and earn course credit.
1.2	understand the motivation of the subject	Adult learners use short free time to solve problems in real time, obtain practical information, use time segments to train skills, and more.
1.3	Analyze the context associated with the activity	Prepare software and hardware for online learning, use the integrated platform to carry out learning, and the platform provides the necessary conditions for learning activities.
1.4	Anticipate problems that will arise	Whether it is necessary to join the form of mobile learning, and whether it is possible to distract students' attention, and then have a negative impact on the final effect of learning.
2 Analyze the core elements of learning activities		
2.1	main body	Subjects are adults or lifelong learners. Pay attention to factors such as gender, intelligence level, learning style, learning motivation, computer literacy, interpersonal characteristics, etc., and comprehensively grasp the characteristics of the main activity, so as to provide a basis for realizing more personalized learning.
2.2	community	The community is other learners who complete the learning task together with the subject. The ideal grouping method is to try to be as heterogeneous as possible within the group, and preferably to be homogeneous between groups.
2.3	object	The objects are learning objectives, learning tasks or learning content, all of which are presented on the fusion platform. According to the degree of utilitarianism, the purpose of learning can be divided into: acquiring information, acquiring knowledge, improving skills, changing attitudes or concepts.
3 Analyze mediators		
3.1	tool mediator	In addition to the technological environment that supports learning, learners should also be provided with a variety of learning tools that promote cognition and develop thinking skills, including cognitive tools such as concept maps, mind maps, communication tools such as email, chat rooms, information resource.
3.2	rule mediator	The relevant regulations and standards to regulate the behavior of learners are divided into task completion rules, reward and punishment rules, evaluation rules, cooperation and communication rules, etc.
3.3	role mediator	If the collaborative learning method is adopted, then the learning activities need to have a clear division of labor, so that each member of the learning group can clearly define the division of tasks, their own rights and obligations, etc.
4 The structure of the analysis activity		
4.1	Analyze the activity itself	Document the transitions that take place in the learning activity, and the stages of transition, to realize the activity and finally satisfy the motivation.
4.2	Break down activities into actions	According to the stage, the purpose is divided into multiple specific goals, and the relationship between the goals is explored; the behavior of completing each goal and the executor of the behavior are recorded.
4.3	Break down behavior into actions	Record specific actions required to achieve goals, analyze existing conditions, and match actions;
5 The environment in which the design activity takes place		
5.1	Design Context	Encourage the "embedding" of real and vivid learning tasks into learners' daily life and social activities, so that they can apply knowledge to solve real problems or complete various practical tasks in the context of learning activities based on real life.
6. Evaluate the effect of activities		
6.1	Constantly modify and improve	Teachers get feedback on learners' learning behavior, so that the entire design process can be continuously revised and improved.
6.2	Multiple evaluation	Learning evaluation methods, evaluation dimensions, evaluation standards and other aspects should reflect diversity, both quantitative evaluation and qualitative evaluation; both teacher evaluation and self-evaluation; Formative evaluation of the process of activity is also emphasized.

At the end of the 20th century and the beginning of the 21st century, the applied research of education and teaching under the activity theory reached a peak in China. Tian Huisheng, Zheng Tainian, and Yang Lijuan introduce the connotation of activity teaching from the perspective of theory. From a new learning environment perspective, we introduce the activity theory and carry out intentional, practical exploration.

3. Adult online learning activities design steps

Activity theory researchers propose general conceptual frameworks for analyzing and understanding human activity, and it can provide a basis for the more specific theory. It can also guide human learning activities, but it does not propose a sequence of analytical activities and specific methods to carry out relevant design research, especially for adults. David H Jonassen, an American constructivist psychologist, uses activity theory as an analytical framework and thinks it can be applied to constructivism learning environment design[9]. He put forward the design steps of learning activities from six steps and 15 sub-steps, which are to determine the purpose of the activities, analyze the core elements of the activity, analyze the structure, analyze the medium, analyze the environment and analyze the development of the activity. Based on Jonathan's research, we examine real-life learning activities of adult learners in fusion platforms; the content of the sixth step is amended to "evaluate the effect of activities," and the suggestions for the implementation of learning activities design steps are perfected, which lays a good foundation for the next step frame design. More details are in Table 1.

4. Design of Adult Online Learning Activities Based on Fusion Platform

Activity theory provides a complete theoretical framework for analyzing adult learning activities on the fusion platform. It can explain the role and relationship of different elements in learning activities and then construct the design framework of learning activities. As shown in Figure 3, the framework includes six essential links: activity requirements design, core elements design, task design, mediation design, context design, and evaluation design.

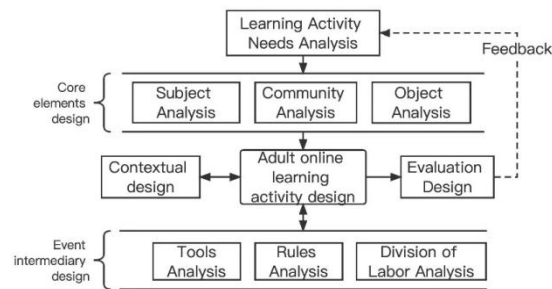


Figure 3: The design framework of learning activities

(1) Analysis of learning activity needs

The activity needs analysis involves learning objectives and learner analysis. Before designing learning activities, teachers must identify adult learning goals. Based on Benjamin Bloom's goal classification, three-dimensional knowledge, skills, and attitudes are widely used (Meirion, 2006). As far as the knowledge dimension is concerned, it can be divided into four kinds of knowledge from concrete to abstract: factual, conceptual, procedural, and metacognitive knowledge. Skills are divided into six cognitive processes: memory, understanding, application, analysis, evaluation, and creation. Emotional dimensions can be further divided into acceptance, reaction, evaluation, organization, and internalization.

Whether the teaching goal can be achieved, the most important thing is to embody adult learners' cognition and development in the learning activities. The adult learner has his characteristics in the learning process, so the analysis of adult learners must be attached importance. Adult learners are primarily social workers with little learning time and fragmentation. According to Malcolm S. Knowles, an American adult education theorist, the characteristics of six aspects of adult learning (Knowles, 2002). When they study, they often bring personal experience and have specific thinking habits; Clear learning objectives, practical, do not like to be brainwashed; Like independent thinking and independent learning; Enjoy work-related learning, such as practical topics; Learning is often problem-driven and willing to learn solution ideas. Therefore, when designing online learning activities for adults, we need to provide an open and relaxed learning environment, pay attention to overcoming learners' physical and psychological obstacles and save their learning time. In addition, the premise of learning activities in the integration platform is that adult learners can operate the platform skillfully, so it is necessary to analyze their familiarity with the platform before learning activities.

(2) Design of Core Elements of Learning Activities

The main body in the learning activity system of the fusion platform is adult learners, who have

independent solid learning abilities and learning desires. Adult learners selectively study objects according to their own professional development needs and demands and achieve specific learning goals by completing certain learning tasks. The community is made up of adult learners. Individual or community learning activities include reading, reflection, brainstorming, problem-solving, case analysis, discussion, homework, and online testing. According to the cognitive goal analysis theory and knowledge dimension classification, we can conclude the applicable scope of various forms of learning activities, see Table 2.

Table 2: Applicable scope of learning activity form

Knowledge Dimension	Memory	Understand	Use	Analyze	Evaluation	Create
Factual knowledge	Reading	Reading				
Conceptual knowledge	Reading	Brainstorming, Reading	Problem solving	Problem solving, Reflection	Brainstorming, Reflection	
Procedural knowledge			Problem solving	case study, reflection	Case study, Reflection	Problem solved
Metacognitive knowledge		Discussion	Reflection	Reflection	Reflection	Problem solved

(3) Design of Learning Activity Tasks

The design of activity tasks includes task situations, learning process suggestions, and task results. Research shows that students in diversified situations are more likely to abstract the relevant characteristics of concepts. For adult learners, creating scientific and rational situations is conducive to stimulating adult learning motivation and then helping to acquire knowledge and skills. The types of learning situations are task, problem, real, and virtual, which are more conducive to adult learning. In the learning process design, teachers should design problem-solving strategies and methods through a "mission statement/learning proposal" to protect students' initiative for autonomous learning. The most common way is infusion platforms through plain text narration and graphics and video presentation.

(4) Design of learning activity rules

The rules of learning activities mainly include rules of activity supervision, rules of role and responsibility, and selecting tools. The activity regulation rules are highlighted here. Supervision rules refer to the code of conduct that teachers and students abide by in the process of learning, including the arrangement of activity schedules and the division of tasks.

1) To effectively control the learning activities, teachers should make precise arrangements for the progress of the whole activity, including the time to complete the entire activity, the time required to submit the results of the activity, and the deadline for sub-activities. The time to complete the entire activity is best set at the beginning of the task design; The submission time of the activity results is usually in the form of a label before the task when assigning the activity result; The closing time of sub-activities should be set in each activity module of the fusion platform and inform students.

2) The division of tasks for activities is structured in two ways. First of all, the teacher's task division in each sub-activity, teachers have specific task division. For example, in the discussion activities, teachers proposed topics, students discussed, teachers summarized or student's online communication, put forward questions, teachers guided Q & A; Teachers checked the students' activity records in each module and gave the grades in the corresponding position. Teachers will evaluate the homework and reports submitted by students. Secondly, the community in the integration platform consists of learning groups, learning partners, teachers, and students. If the activity is collaborative, there must be some strict rules for study groups. The group needs to define the size of the group, the rules of group members, the selection of team leaders, the division of tasks, and the schedule. Teachers should flexibly grasp the grouping criteria according to the situation when designing group activities.

(5) Design of Learning Environment

The learning environment design is the integration of learning resources and learning tools. Because the learning environment supports learning activities, it must be based on learning activities. The converged platform provides various learning tools that support different learning activities differently. Table 3 below shows how much the learning tools support learning activities in the integrated platform.

Table 3: The degree of support of learning tools to learning activities

online learning activities	Teaching Platform										
	Live streaming	Discuss	Operation	Test	Teaching feedback	In-class quiz	Peer evaluation	Notes	Group study	Glossary	References
read											
discussion	**									***	***
case analysis	***	***							**	*	
Brainstorming	***	***	**			**	**		**		**
problem solved	***	***							**	*	
reflection	***	**	**	**	**	**	**		**		
online learning activities		**						**			
Division and cooperation		**					**		**		

Note: *** means high level of support, ** means medium level of support, * means low level of support

(6) Design of Evaluation of Learning Activities

The evaluation tools of the fusion platform include course grading mechanisms, discussion area grading systems, homework, test, and so on. There are various ways to measure the evaluation, including formative evaluation, summative evaluation, an electronic portfolio, and a combination of self-evaluation, teacher evaluation, and peer evaluation. The three measures of evaluation are listed below.

1) The main measure of the evaluation platform is formative evaluation and summative evaluation. The platform is specially marked with the red "Test Task" stamp and the blue "Final Test" stamp and in the course home page navigation bar to place "Exam" and "final test task," convenient for students to find. This is conducive to adult learners in the shortest time to find the assessment task and practice, reducing learning costs.

2) The e-learning file evaluation platform tracks students' learning process in real-time, such as specific learning content, learning time, login times, discussion, and communication posts. These data constitute the electronic learning files of students, which are convenient for teachers to analyze after class and serve as an important reference for adjusting teaching progress, the difficulty of learning tasks, and evaluating students. Compared with the previous CMS (Curriculum Management System), the new platform has perfect learning and analysis functions and more friendly interaction.

3) Self-evaluation, Teacher Evaluation, and Peer Evaluation Combine to Highlight the Concept of Process Evaluation. Students will upload their designed works to the platform. Before uploading, they can evaluate themselves according to the work standards. Each student in the group scored and commented on the other study partner's work; The remote instructor graded each student's work and observed the comments; The system informs students of total marks and comments.

5. Conclusion

Efficiently organizing online learning activities for adults is an important topic for adult education researchers. Firstly, this research starts from the existing problems of adult online learning and uses the activity theory as the guide to construct a theoretical model of adult online learning activities. The core element of learning activities is activity tasks. There is a direct causal relationship between activity tasks and teaching objectives. Adult online learning activities should be guided by learning objectives, and the design of steps should follow the same principles.

Secondly, the development and use of the Open University Convergence Platform bring together the collective wisdom of the Open University system. The Open University of China has proposed solutions with Chinese characteristics and a global vision. Based on the Open University integration platform, we redesign online learning activities to integrate teaching design ideas, including activity purpose analysis, activity core element design, activity task design, activity rule design, activity environment design, and activity evaluation design.

Thirdly, after three months of practical exploration, we used random interviews to obtain feedback from adult students. The students showed a high degree of satisfaction in 6 aspects. Because the design of online learning activities is a rather complicated process and is affected by many factors, the analysis of online learning activities is not comprehensive enough. The next step is to use an empirical approach to study the trial's effects further. It is believed that with the participation of more researchers and practitioners in the future, the design of online learning activities for adults will surely achieve fruitful

results in theory and practice.

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