

# *A New Model of Distance Education*

## *--Take Advantage of Constructivism and Montessori Education Concepts*

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**Abstract:** After experiencing the ravages of the COVID-19 pandemic, we realize that distance education has become a necessary requirement based on the increasingly advanced technology. Even though distance education has many advantages, it still has some limitations, such as the equipment lack or students self-control and so on. Such an important approach of education has been practiced in many places, but the existing problems have still not been solved. However, the educational concepts of constructivism and Montessori may be able to fill this gap. Although there is no special research on using the two theories into distance education, according to the analysis, the benefits of the two theories are indeed perfectly combined with distance education like Lego bricks.

**Keywords:** distance education, constructivism, Montessori

### **1. Introduction**

With the advent of scientific and technological networks, every aspect of life has been infiltrated by Internet. The emergence of the Internet has increased the connection of people around the world, and people can choose what they want to know very broadly. Obviously, the Internet is also combined with education, "The Internet has rendered it easier to give training less expensive than traditional face-to-face classroom, allowing students to take part in more courses." "It eases time management and gives them the opportunity to do other thing" [1], "Distance education (DE) is not a new concept; it has evolved over several stages as a result of technological advancements over the years." [2] As early as the 1940s, people broadcast online courses in the form of movies, which is the earliest form of distance education. Distance education can be said to be a supplement to traditional education. Students often preview the courses to be taught in advance through some relevant videos on the Internet, or after class, they will find targeted online courses to make up for their knowledge shortcomings if they are not clear about the content in class and need to supplement it. Distance education (DE) is not only helpful for students, but also an effective means of learning knowledge for teachers, for principals, for any scholar who wants to learn knowledge, Through the combination of technology and education, learners will be helped to acquire as precise and ordered knowledge as possible. So, distance education is an essential contemporary requirement.

Distance education has brought great benefits to people, especially in the COVID-19 pandemic, to avoid the rapid spread of cluster virus, people have to study at home. Distance education has become the main way for students to learn. Through various "online conference" apps on the market,

teachers can impart knowledge and communicate with students face to face on the screen, which ensures the orderly conduct of teaching. In addition to that, "The Internet has rendered it easier to give training less expensive than traditional face-to-face classroom, allowing students to take part in more courses. "[3]. This not only saves students money for buying a lot of books, but also greatly reduces wood consumption and protects the environment. Moreover, students who like violin can also realize their dreams without considering the expensive offline teacher guidance. They just need to open the online platform and choose the violin basic course suitable for them. The most important point is that distance education provides students with many opportunities to use their time effectively. Students don't need to worry about traveling too far and consuming a lot of time, and they don't need to worry that their course time will conflict with some urgent events. It is entirely up to the learner to decide when and how long to attend classes. This greatly improves the efficiency of learning, so that the allocation of time between study and entertainment is no longer in a tense opposition position. At the same time, distance education can greatly promote students' learning motivation. "When distance learning was integrated into our learning and teaching environment so that my students can access the class easily, this increased my students' motivation. Having high motivation, brings them success in a learning environment." [1] Rich and diverse network images can help students understand obscure and abstract concepts, and teachers can intuitively show the content of the lecture to students through modeling and other ways. "Digital and non-digital media have an impact on academic skills." [4] Even in chemistry class, teachers can explain phenomena to students directly by showing experiments on the screen. Compared with looking for chemical materials or dealing with uncontrollable events encountered in the experiment process, this greatly reduces the burden of teachers and helps students understand knowledge.

Even though distance education has so many important advantages, according to the experience of some learners learning online, there are still some disadvantages that need to be remedied at present. A common problem is that distance education tests students' self-control ability. Many students reported that they could not ignore some messages or advertising information that popped up on the screen, even during class, they would involuntarily click the pop-up window. This greatly reduces students' learning focus and learning efficiency, which will eventually be reflected in students' retrograde results. Equipment problem is also a very core problem, unstable network or cannot open the computer normally, and even some students do not have a computer, at this time distance education cannot play a role because distance education cannot even be carried out. The third thing to consider is, "Many learners thought that diplomas earned by online courses were inferior to certificates earned by traditional classroom programs. This may influence students' ability to take online courses. "[3] However, because they are not adapted to distance education, their grades will be degraded. As a result, distance education will not be able to show the true level of students. Or some students may cheat in the distance education quizzes, which also seriously undermines the fairness of education. Even distance education can provide an environment where students and teachers can talk face to face, compared with traditional education, teachers can observe students' learning status more accurately, which shows that schools cannot be replaced, and teachers cannot be replaced. Even in the case of such advanced science and technology, in the learning process of learners, teachers cannot be replaced. The role of teachers is still necessary. Students can indeed learn knowledge by themselves, but teachers can effectively help students find their own interests and hobbies in the process of learning and provide an environment to stimulate students' learning. Just like a ship cannot be without a lighthouse, students cannot be without the help of teachers, and the guiding role of teachers cannot be simply replaced by high technology.

At present, there are a lot of research on distance education, but they focus on the history and the analysis of advantages and disadvantages. Distance education is so important, how can we maintain the advantages of distance education and eliminate the negative impact of distance education? Based

on constructivism theory and Montessori education concept. We may wish to combine distance education with traditional education based on these two theories, Distance education, using television and the Internet and other communication media teaching methods, mainly by clicking on the online courseware (or CD-ROM courseware) to complete the course learning. How to combine with the traditional classroom?namely: Teachers choose to present knowledge in the form of science and technology according to policies and teaching plans. In class, they can use distance education to play videos to complete the teaching content of this lesson. In other words, in the Montessori education concept, teachers provide students with learning materials and work, but teachers need to be an observer to observe students' learning and pass students' tests and homework feedback. Research and develop different ways of inspiration to help students learn knowledge, find their interests and career plans. This can first solve the problem of students being distracted in class, because the teacher is closely observing students when they are taking class, even if the students are not thinking while watching the video, the teacher can remind them in time. More importantly, this model is very credible, teachers can work with students, face to face communication in the internet and give them feedback, so that students who do well in the traditional classroom will also do well in the new model, even if there are maladaptive situations, teachers find problems in the observation, can help students solve. Any tests and homework quizzes are also carried out within the teacher's visual range, and students cannot cheat in the traditional classroom, nor can they cheat in the new model. It can be seen that the new model can greatly solve the shortcomings of distance education, but it can still maintain the advantages of distance education and improve the original traditional model. In the process of student learning, teachers observe students, assist students, and combine Montessori and constructivism theories to provide students with the best learning environment.

In the work, this paper will be analyzed from the perspectives of "community environment", "teacher function" and "learning materials" and explain the new model of distance education by combining these two theories.

## 2. Take advantage of Montessori concepts

Montessori believed that mental defects and psychosis in children were primarily educational problems, not medical problems, and that educational training was more effective than medical treatment. In its early days, Montessori designed Special teaching materials based on her opinions about how children learn and built children's homes. "As the program has grown, the Montessori movement has gained traction in the United States and exists in a variety of Settings, currently serving students from infants through eighth grade." [5] "Children often freely choose their activities, conferring a sense of freedom, but the teacher, however subtly, still leads them." [6]Montessori education has several core elements, The main core idea of Montessori is to provide a prepared environment for students, and teachers help children develop themselves. In this way, the relationship between the student and the teacher will not be between the dominant and the dominated, but between the assisted and the assisted "The role of the adult for the child's education during this period is to guide the desire to learn and understand this environment that the child absorbs like a sponge in its nature. Therefore, a Montessori educator is a good observer above all." [2] Unlike traditional classrooms, Montessori classrooms are based on collaboration, "older students may take great pride in helping younger ones (thereby allowing them to anchor their knowledge through repetition and rephrasing), and younger ones feel great satisfaction in interacting with and possibly learning from their elders. " [7] "Montessori pedagogy has been very successful in recent decades. This pedagogy has a very positive image in the media and has enthusiastic testimonials from former students and educators. Promoters of this pedagogy often rely on research results. For example, Lillard" [7] Montessori helps develop children's mathematical thinking, excellent language skills, operational development of thinking forms the motivation for lifelong learning and enables students to focus and

give learners the opportunity to correct themselves. “Specifically oriented Peace Axioms guide Peace Table processes. They are taught to “speak from the heart, “to tell the truth about what they really think, to listen without interrupting and refrain from name calling or blaming.”[8] So effective, how can Montessori effectively integrate with distance education?

### **2.1. In terms of cooperation – set "mixed age" groups**

The good thing about distance education is that it is like forming a new community, and all learners who are interested in the same project can participate in the conference. There are learners of different cultures, ages and majors in this conference. This is very much in line with the Montessori concept of cooperation. Learners help each other to solve a project, and students who are good at physics will assist students who are good at history, which will complement each other and effectively combine. This works well with Montessori collaboration, where older students help younger students, and the classroom is less about competition and more about collaboration. In a distance education classroom, even if all students can enjoy the same lesson together, the ability to grasp knowledge will be different. Students can be divided into small groups in class, and different small rooms can be set up in remote class for students to communicate and discuss. In this way, older children can provide care and help for younger children, which increases the self-esteem and confidence of older children to a certain extent. The younger child, while receiving help from the older child, will also use the older child as a role model. The younger children complete the teaching objectives by imitating the older children in the learning process, and the older children deepen their understanding and summary of knowledge in the process of helping the younger children. In this process, their language ability and thinking ability have been improved.

### **2.2. Teacher function – Observe students with data**

The teacher provides the learners with learning materials, which may be class videos or game software. Different from traditional education, teachers can save the time of imparting knowledge, teachers will use this time to observe students and assist students. Teacher provides learners with learning materials, this material may be video class, may also be a game software. Different from traditional education, teachers can save the time of imparting knowledge, teachers will use this time to observe students and assist students. This not only satisfies the Montessori principle of providing an environment for students to learn independently, but also gives teachers sufficient time to assist students. Traditional teachers teach according to different teachers' different teaching styles and subjective understanding of knowledge. It may mislead students to learn some knowledge, for example, when teaching students pronunciation, some teachers' habitual pronunciation may be wrong, so that students will be difficult to change the wrong knowledge. If the teacher chooses the material suitable for students' learning according to the teaching plan, the students will already understand the knowledge content by watching the video. Currently, teachers only serve as providers and observers of teaching materials. Teachers do not have to be tired in class but use their energy effectively to promote student learning. In addition, distance education can also provide teachers with a way to access digital tools when they are observing. Many teachers still use paper recording and do not choose digital tools. However, in the atmosphere of distance education with bright data and the use of the network, it is not easy to use digital tools. This will also promote the use of digital tools by teachers. “A teacher must apply appropriate evaluations and use recognition and evaluation techniques to be informed about the progress of the child; and therefore get information about whether there is any change in his/her development.” [2] “It is observed that Montessori educators in the world and our country have been using a digital assessment tool to monitor each child and record observation data for the child.” [6]

digital tools can record students' performance more comprehensively and analyze students more clearly from the perspective of data. This is very helpful in the role of teacher observer.

### **2.3. Teaching materials – Learn by doing**

Montessori believes that teaching materials are central, so how can students be provided with effective materials? Montessori advocates providing an effective environment for students to learn naturally and correct their mistakes naturally, without rewards or punishments. In distance education, how to help students comprehend knowledge and check whether students have grasped knowledge in class, teachers should look for materials that can help students learn. In addition to videos, teachers can also provide game-type enlightening apps. For example, when students are learning algorithms, there is a problem that a square has four corners and how many corners are left after cutting one corner. At this time, simply playing videos to explain the concept may not be very helpful, because this problem needs to consider multiple possibilities. Students instinctively believe that there is only one answer to a math problem, so they will only use basic concepts to answer a single answer. However, if the teacher sets a video game for the students, the students can intuitively cut the square on the computer, and through hands-on operation and communication with their peers, the students will find out independently that there may be 3, 4 or 5 squares left after cutting. Currently, the students not only solve the problem by trying to do it themselves, but also cultivate the habit of thinking more closely. This teaching material is effective. In the DE classroom, it is also easy for teachers to provide video games, just by sending the games to students to help them operate.

Combining Montessori with distance education is based on the principles and strengths of Montessori. In distance education, students' learning efficiency and self-control ability have always been a headache for teachers and parents. In combination with the observation and assistance of Montessori teachers, interesting teaching materials can effectively solve the problem of declining learning efficiency of students, while "mixed age" assignment groups can exercise students' language ability and social skills.

So far, our new model combines the Montessori education concept with the traditional distance education, adding the division of mixed-age groups, the observation function of teachers and the use of data tools to summarize the observed data, and providing a variety of e-learning teaching materials.

## **3. Take advantage of constructivism concept**

At present, in the 21st century, with the higher and higher requirements for education, the simple old model is no longer suitable for the present education. "Constructivism is an approach to learning that posits individuals as active creators of their own knowledge, suggesting that reality is shaped by the learner's experiences." [9] In constructivism, "education is three-dimensional: teacher, student, and social setting." [9] Compared with behaviorism and cognitivism, constructivism emphasizes that students create cognitive conflicts through real experiences to establish new knowledge, and students create learning experiences through participation in activities, which is like Montessori's educational concept. So, based on the previous model of Montessori combined with distance education, constructivism is now added to make the model complete.

### **3.1. In terms of cooperation – set "mixed culture" groups**

Constructivism holds that knowledge does not arise from the human brain, but from activity. In other words, real experience and human interaction are essential in the production of knowledge. "According to the theory of cognitive development, social interaction plays a crucial role in cognitive development." Distance education and "mixed age" groups provide a social environment for constructivist learning. People of different cultures and ages learn together, and in the process of

talking to each other, different ideas will help students reconstruct their previous knowledge. Therefore, in addition to simply grouping students according to age, teachers need to group students according to their learning background and real-life background. In this way, a class may consist of 30 people and a group of five people. In each group, there are children of different ages and from different regions, who have different customs and life experiences. In the process of their communication and discussion, cognitive conflict will inevitably occur, and the contradiction of knowledge will promote and improve their learning motivation. They will take the initiative to collect information or ask teachers to verify new information. In this process, students' language ability and information collection ability are improved, and at the same time, they can repeatedly deepen their understanding and mastery of new knowledge, which is conducive to students' learning. "Students rely on others to help them develop their own knowledge and reality, and learning from others helps them do so." [9] At present, most distance education is only taught by teachers, and there is a lack of communication between students. But one of the most valuable advantages of distance education is the ability to bring together learners of different cultures and ages if this can be exploited according to constructivism. Students will effectively acquire knowledge and improve skills in a diverse environment.

### **3.2. Teacher function – help students engage activities.**

"Teachers are very different from what they were a decade ago. As the education system changes, teachers must advance with it and be relatively confident in their ability to adopt new methods of teaching instead of following the old chalk and talk system." [10] "collaboration with others, instruction requires the use of alternative assessments, such as graded classroom discussions and project-based assignments, instead of the traditional multiple-choice tests." [11] Similarly, the role of the teacher is still to assist students and involve them in activities. So how to build a constructivist classroom in distance education? The role of teachers remains crucial. "One of the biggest jobs of the teacher in the constructivist approach is asking good questions." [10] On the basis of Montessori's previous addition to the distance education model, teachers need to further assist students in learning according to their own observations. At this time, teachers can raise a good question, which can not only trigger students' thinking, but also guide students to learn knowledge correctly. Teachers should ask questions to the group, so that students can start discussions spontaneously and participate in activities, which is in line with the requirements of constructivism and promotes students to learn knowledge. In addition to engaging students in discussion, constructivism also requires teachers to understand students' learning background and proximal development zone in order to facilitate students' learning. What we have added previously is very helpful for teachers to use data tools to analyze students. Teachers will be able to clearly browse the different backgrounds of each student without ignoring the individual distinction. "The role of the teacher in the social constructivist classroom is to make their students feel safe to learn freely and help build their knowledge." [10] Combined with the previous established new model, because the teacher does not provide a reward and punishment system, students will not feel ashamed because they answer the questions incorrectly and thus face the discussion and study negatively. Teachers provide students with a very safe environment in which students build and update their own knowledge system through peer cooperation and their own new experiences in the process of operation. For example, for the "cut corners" problem mentioned earlier, the teacher does not directly tell the students the answer or make comments on the students' answers. The older students of a group of students may have a higher level of thinking and will find different answers, or the students from economically strong areas may have been exposed to the concept of different answers to a math problem. Therefore, in a group, according to different students to express their own views, through continuous hands-on verification, will eventually establish a variety of answers to the mathematical ideas.

### 3.3. Learning materials – the students do the experiments themselves

Since activity is so important in constructivism, how can it be applied to distance education? We all know that the advantage of distance education is the ability to communicate, but distance education cannot be like the traditional education, everyone around hand in hand to play games. Therefore, combined with the model established above, it is necessary to organize effective activities suitable for distance education network. The game app we used before is the prototype of the activity, through the students' cooperative hands-on operation, intuitive observation of phenomena. For example, in the chemistry class, we want to explore that the density of oxygen is lower than that of water. The teacher provides the students with teaching materials in a game app that can be used to do experiments. According to the teaching video, the students can find that the "drainage method" can be used to collect oxygen, and the teacher can ask the group why the length of the pipe is different. In group discussions, students will make various guesses based on their own life experience. Through hands-on operation on the software, students find that oxygen can only be collected when it enters the glass bottle from the short tube and comes out from the long tube. The video game on the screen shows that oxygen will float on top of the water after it enters the water. If you go in through the long tube, then the oxygen will go out through the short tube, so you can't collect oxygen. This is because oxygen is less dense than water. This knowledge is based on students' real activities. Compared with watching a video and remembering that oxygen is less dense than water, this way students can gain more knowledge.

At this point, our new model is built. Compared with distance education, the new model is to group students according to mixed age and culture, and the teacher is no longer a simple teaching task, but the role of observing and helping students participate in activities and raising effective questions. The teaching materials are no longer simply transformed into videos but include game apps and other materials that can promote students' participation in activities.

## 4. Discussion

The new model retains the advantages of the original distance education, continues to be able to learn anytime, anywhere, the content of the rich and save students time and money. Student-owned textbooks will be replaced by electronic documents presented by teachers on the Web, which will also greatly protect the environment, while rich and interesting teaching materials will continue to increase students' motivation. New model combining Montessori education ideas and constructionism, makes remote education more perfect and effective, has solved the remote education of parents and teachers worry about students' self-control ability and learning efficiency of students. The teacher will accompany the students throughout the class, observe the learning process of the students, and provide feedback and assistance to the students according to the observed data. Unlike in the past, parents need to apply for leave to go to school to communicate with teachers about students' learning situation, parents can also observe students' learning status and work with teachers to assist students' learning according to teachers' feedback, which will further strengthen the close home-school cooperation relationship. At the same time, the new model not only reduces the workload of teachers, teachers no longer have to interact with students in the form of traditional education classes but spend these hours promoting students' thinking. In traditional education, teachers not only need to impart knowledge but also analyze students' learning process. Teachers are often too tired to observe students, or their efficiency is very low after one class. This new model only requires teachers to help students learn, which will improve teachers' work efficiency and relieve their pressure. This new model also has great benefits for students, who can choose their own courses of interest, and can converse with learners of different ages and cultures, promoting thinking development and language skills.

## 5. Limitation

Of course, the new model also has many shortcomings, for example, the new model has high requirements for teachers to master learning theories, and it also has high requirements for teachers to be skilled in using computers, because teachers need to provide students with some visual game software and use data analysis tools. In addition, the new model also has restrictions and requirements on the number of a class, which is not suitable for large class teaching. If there are too many students, teachers will not be able to observe every student, which will not be in line with the new model. The new model also has limitations for students. Students need to have a certain knowledge reserve, and students need to be able to talk actively with their peers, which is not so effective for some students who only like to learn by listening and reading books, and even brings some pressure.

## 6. Conclusion

Although science and technology are so developed now, robots will replace some professions, but teachers cannot be replaced by robots, because the group teachers face is students, and the behaviors of students in the learning process, even if the data can be explained, are only auxiliary teachers who need to help and guide students according to different situations. The core of students' learning efficiency in distance education should be how teachers help students learn. Can the new model enable students to participate in it and effectively construct knowledge through group cooperation and discussion? After the teacher plays the teaching video, the students form the preliminary knowledge, and then continue to communicate with the students of different ages and cultures in the group. In this process, cognitive conflict occurs. With the help of the teaching materials provided by the teacher, they practice and self-correct, and finally complete the construction of knowledge. The core of the new model is that teachers play the role of observers, and their main task is to help students learn, which includes observing students and providing students with teaching materials to promote students' learning. At the same time, knowledge is built on human sociability, so the new model divides students into different ideas in the process of discussion. The relationship between students and students is not competition but cooperation, and through cooperation, language skills can be improved, and thinking can be opened. Compared with traditional distance education, the new model provides students with a platform to effectively construct their own knowledge, provides teachers with an opportunity to assist students in learning, and provides people from all over the world with an opportunity to exchange knowledge and broaden their horizons. The new model still has some limitations and shortcomings, but it can optimize the current distance education, which is only teaching and discussion, so the new model is effective to a certain extent.

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