

Intangible Cultural Heritage Based on AR Technology

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Abstract: *With the development of society and the improvement of people's material living standards, Internet technology has penetrated into all aspects of people's lives, and AR technology has gradually entered people's lives. At the same time, all sectors of society are paying more and more attention to the development and protection of ICH and other traditional cultures. Although many experts and scholars have conducted research and discussion in this area before and after, due to the late start time, shortage of technology and incomplete technical personnel and other issues, no good solution has been found, and little gain has been achieved. Based on this, this article adopts a new perspective, using the advantages of the modern big data society, through the current advanced AR technology and digital management, aiming to find the best plan for the development and protection of ICH, with a view to the domestic ICH Provide reference and reference for development and protection. This article uses data analysis, comparison and experiment methods. It first introduces the theoretical aspects of ICH and proposes specific measures for its digital development and protection, and then quotes the traditional cultural heritage of shadow play as as a specific example, 60 audiences were randomly surveyed by questionnaire survey, and divided into 3 groups according to age, and they were subjected to issues such as viewing attitude and effect of traditional shadow play based on AR technology and traditional shadow play according to the investigation, it is concluded that the traditional shadow play based on AR technology is more popular with the audience, and compared with the traditional shadow play, the viewing effect is better.*

Keywords: *AR technology, ICH, Digital development, Inheritance and protection*

1. Introduction

1.1. Background and Significance

The advent of the digital age makes it easier for people to obtain knowledge and various information. A variety of new ways of life and ideas, under the scouring of big data, has accelerated into our lives. The ICH and historical relics and historic sites that represent tradition and history are increasingly being eroded. The "survival" of various cultural heritages is also seriously threatened, and this phenomenon is especially evident in economically developed coastal cities. It is increasingly difficult for people to see the cultural symbols that can represent the local city, or "business cards" that reflect the cultural characteristics of the region. In the constant pursuit of the development of a highly developed material society, many ancient cultures and customs are gradually forgotten by modern people. The homogeneity of China's urbanization and the phenomenon of "one thousand cities" also make it more and more difficult to distinguish urban boundaries. At the same time, many valuable ICHs in my country have also been secretly and preemptively claimed by other countries. More and more ICH that can represent Chinese identity and symbol is facing a serious crisis. Protecting and inheriting the national ICH has become the unshirkable duty and responsibility of every Chinese descendant.

ICH is a bright and wonderful flower in the treasure trove of Chinese national culture. To protect ICH is to protect cultural diversity. The traditional method of protection mainly relies on word-of-mouth, which is not only inefficient but also small in scope. The use of digital protection is not only a beneficial supplement to traditional protection and development methods. Compared with traditional methods, digital protection is more in line with the characteristics of today's modern big data society, and it can quickly save and record non-endangering Material cultural heritage, to gain more time for subsequent protection and development work, in order to slow down the loss of ICH. At the same time, the use of the Internet to digitize cultural heritage can speed up its spread and broaden its spread, which is more conducive to strengthening cultural exchanges in various regions and expanding

the audience of ICH. The development and protection of non-legacy resources through digital platforms can also better enable modern people to accept traditional non-legacy culture. Therefore, the digital development and protection of ICH based on AR technology will become an inevitable trend.

1.2. Related Work

The theoretical model of combining ICH with AR technology and digital management has been studied by experts and scholars very early. Dimitropoulos K and others proposed a new integration law that goes beyond the pure digital ICH to protect and spread the ICH. That is, the use of compound technology puts the ICH (ICH) first and creates new cultural information. Extract high-level logos from the obtained data, allowing researchers to identify the concealment that exists between different ICH logos or analytical styles, and study the evolution of specific ICHs. You can access the i-boboss website (web) including other cultural resources in this document. The platform supports the exchange of knowledge among researchers, and supports ICH carriers to impart knowledge to students [1]. Xu Tonglei and Xu Long also proposed that the ICH is a living view of inheritance and development, and pointed out that the ICH is an important part of Chinese traditional culture and has profound development potential. In recent years, there have been more and more views on how to carry out productive protection. In the context of the new Internet era, the development of non-legacy industrial chains is an important way to achieve non-legacy productive protection. It is necessary to make good use of the advantages of big data in modern society to digitize and industrialize non-heritage, but it is worth noting that the industrialization of non-heritage culture must be realistic and adapt to local conditions, and must not be at the expense of traditional skills and cultural heritage of non-heritage [2].

1.3. Innovative Points in this Paper

The innovations of this article are mainly reflected in the following aspects: (1) Taking shadow play as an example, by comparing the audience analysis of shadow play based on AR technology with traditional shadow play, it is concluded that traditional shadow play based on AR technology is more popular with the audience; (2) Combining theory and practice through design experiments on digitalization, the design principles and design routes of digitalization of ICH are proposed.

2. Methods for the Development and Protection of ICH

2.1. Relevant Theories of ICH

2.1.1. Definition of the Concept of ICH

ICH refers to various traditional cultural expressions that exist in intangible form, are closely related to people's lives, and are passed on from generation to generation. They refer to various performances, expressions, knowledge skills, systems and related tools and objects that are regarded as cultural heritage, Handicrafts and cultural places [3, 4]. Through the interaction and change with nature, various groups and groups continue to give this generation of ICH a sense of history and identity, and continue to innovate in the inheritance, thereby promoting cultural diversity and human creation Force [5].

2.1.2. Classification of ICH

According to the "Convention on the Protection of ICH" adopted by the 32nd Conference of UNESCO, the ICH is divided into: language, literature, music, dance, games, mythology, etiquette, customs, crafts, architecture Technique and other arts [6]. China has also given its own definition of ICH after the international classification. The General Office of the State Council promulgated the "Interim Measures for the Assessment and Evaluation of National ICH Representatives" on March 26, 2005. For six aspects: oral traditions, including language as a cultural carrier; traditional performing arts; folk activities, etiquette, festivals; folk traditional knowledge and practice related to nature and the universe; traditional craft skills; and the above performance Form-related cultural space [7, 8].

2.1.3. Characteristics of ICH

The most notable feature of ICH is that it is closely related to human life and production methods, and is a "live" expression of national identity and national aesthetics. It exists in the form of human beings, using different sounds, images and skills as a means of expression, and has been continuously preserved and developed [9, 10]. Therefore, for the inheritance of ICH, it is particularly noteworthy that

its spread is done by humans. In addition, ICH also has the characteristics of traditionality, integrity and liveliness and wide coverage [11].

2.2. AR Technology and Digital Management

AR technology is an emerging scientific technology based on VR technology. The goal of AR technology is to nest the virtual information expressed by the computer in the real world and interact on the terminal device. Modern AR technology is a new technology and new method that includes multimedia, three-dimensional modeling, real-time video display and control, multi-sensor fusion, real-time tracking, registration, scene fusion and other functions [12, 13]. AR can provide an unprecedented user experience, and it is a capability to create a correspondence between the real world space where the user is located and the virtual space that visually models the content. When the application displays virtual content and real-time camera images, users will feel the augmentation of reality. This enhancement is the enhancement of the understanding and perception of reality, so as to achieve a sensory experience and information synthesis beyond reality [14, 15]. In recent years, there has been an upsurge of AR applications internationally, in which cultural heritage display is a key area of AR applications.

With the continuous development of augmented reality technology, AR technology has been widely used in people's daily lives and has become the most critical technology in people's lives. When this technology is applied, through targeted processing, it can create real scenes of different content for people, and at the same time can display virtual information, closely integrate virtual and reality, and provide convenience for people's daily life in learning and work, change people's lives [16]. It is believed that in the future development process, the technology will present better application effects and meet people's actual needs.

2.3. Non-legacy Digital Development and Protection Based on AR Technology

As mentioned earlier, due to the characteristics of ICH, the traditional methods of development and protection have gradually exposed their shortcomings and shortcomings, and are gradually being rejected by people. The AR technology in the new era has attracted more and more attention because of its convenient and efficient system digital management mode. This difference can be well seen by comparing big data with traditional survey data, as shown in Table 1.

At present, non-legacy digital development research includes three main areas: basic, technical and applied research. Basic research mainly focuses on the theoretical issues and principles of non-historical digitization, and provides theoretical support for non-digital practices; technical research mainly provides technical support, mainly focusing on non-digital technologies; and applied research mainly focuses on non-traditional digital applications (such as databases, computers application system, etc.) achievement model [17, 18]. Advanced electronic information acquisition and processing technologies provide strong technical support for the protection of ICH and expand the coverage of ICH protection. Non-heritage is mainly composed of traditional cultural activities and its cultural space: on the one hand, non-heritage traditional cultural activities can be restored only in a cultural and spatial environment conducive to sustainable development and inheritance; on the other hand, non-heritage cultural space It is mainly a non-genetic psychological space and consciousness space formed by abstract cultural connotations, and these psychological spaces and consciousness spaces must be carried out through subtle "development" and "practice", and these fields must rely on certain cultural activities or expressions [19, 20]. The two are independent and interrelated. Therefore, the digitization of non-heritage cultural space must also establish a complete relationship with non-heritage expression.

For the digital development and protection of ICH, this article thinks that it can be started from the following aspects:

2.3.1. Construct a Digital ICH Resource Classification System

Our country has a vast territory and a long history. As the saying goes, one side keeps one side. Different regions across the country have different folk customs and cultures. Cultural heritages are also presented in various forms. According to the foregoing, the ICH can be divided into six categories, non-legacy resources can be specifically subdivided, a resource system can be constructed, and digital management can be carried out. But at the same time, due to the diversity of ICH, its manifestations and forms will be different, and the methods of cultural creation will also be different. Therefore, digital methods must follow the universality and protection principles and methods of each culture.

According to the characteristics of their respective forms and connotations, adopt protective measures that adapt to local conditions and analyze specific issues.

2.3.2. Unified Data Technology Standards

The introduction of modern information technology is combined with the National Digital Library, Digital Museum and National Cultural Information Resources Exchange Project. Resources that create ICH must standardize their content descriptions, search keywords, etc., formulate uniform, scientific and technical intangible cultural management rules based on these standards, and effectively integrate resources through resource management methods [21].

2.3.3. Visual Expression

In terms of visualization technology, the material and ICH are very different. The former can be presented in the form of drawings, videos and cartoons; the latter's digital visualization is more in the category of knowledge visualization, and its visualization is more abstract and more it is focused on showing cultural connotation [22, 23]. The creation of digital images is a category of knowledge visualization. The visual expression of cultural heritage mainly includes four levels: knowledge source layer, knowledge interpretation layer, visual expression layer and knowledge program layer.

2.3.4. Archiving of ICH

On the surface, "ICH archives" mainly refers to the establishment of archives for ICH. Before the intangible heritage archives work is carried out, it is necessary to confirm which items belong to the ICH. In order to better guide this practical activity, the State Council clearly summarized the content of ICH archives as "collection, recording, classification and cataloguing" in the "Interim Measures for the Application and Evaluation of Representatives of National ICH" [24]. Specifically, it is to actively collect relevant physical objects and materials; use text, audio and video recording, and digital multimedia to record truthfully, comprehensively and systematically the protected objects; and then classify and catalogue them on this basis. It can be seen that "active recording and extensive collection" is the unique content of intangible heritage archives compared to traditional archives.

2.3.5. Build an Interactive Platform for ICH and Multimedia

It mainly introduces new methods and concepts for quickly creating 3D scenes of ICH through resource library model data, construction on high-precision terrain, and creation of interactive elements [25]. Use realistic facial character modeling techniques to create animated character models of cultural successors. Finally, use knowledge, behavior modeling and interaction, and other methods to achieve the productivity of ICH resources for effective interaction on the platform. The difference between big data and traditional survey data are show in Table 1.

Table 1: The difference between big data and traditional survey data

Survey data characteristics	Big data features	Big data description
Sampling data	All data	In the case of massive data, mining and analysis of all data can obtain more useful information
Accurate data	Mixed, imprecise	At present, more than 90% of the data is unstructured, and accepting non-precision data can make full use of unstructured data
Cause and effect relationship	Mutual relationship	The conclusions derived from the causal relationship are usually only a part of the thing, and the mutual relationship can more reflect the internal connection of the non-legacy

3. Experimental Design of Digitization of ICH Based on AR Technology

3.1. Design Principles of Digitalization of ICH Based on AR Technology

In the design of AR mobile interactive media with "non-legacy" inheritance and innovation, the three levels should be fully considered, namely: the combination of interface visual effects, product functions, and user emotional experience, bringing a market-based path to non-legacy culture, and through interesting User interaction conveys the connotation of national culture. The following principles should be followed: (1) Simplicity. The concise interface is to make the user easy to use, easy to understand, and reduce the possibility of wrong choices. (2) User language. The interface

should use the language that reflects the user itself, not the language of the user interface designer, that is, the principle of "user first". (3) Minimize memory burden. The human brain is not a computer. When designing an interface, it is necessary to consider the limits of processing information by the human brain. Human short-term memory is extremely unstable and very limited, with a forgetting rate of 25% in 24 hours. So for users, browsing information is easier than remembering. (4) Arrange. An orderly interface makes it easy for users to use. (5) Security. Users are free to make choices, and all choices are reversible. When the user makes a dangerous choice, there is a prompt of information intervention system. (6) Flexibility. To put it simply, it is to make it convenient for users to use, that is, interactive multiple, not limited to a single tool. (7) Humanization. High efficiency and user satisfaction are the embodiment of humanity.

3.2. Technical Route for Digitizing ICH Based on AR Technology

The AR system is divided into an application layer, an intermediate layer, and a platform layer. The platform layer is based on software and hardware support and is the bottom layer of the system. The application layer is the use of human-computer interaction interfaces and augmented reality application software. Interactive interface; the middle layer includes application programming interface, virtual and real interaction process, cloud storage service and broadband network technology, AR system hierarchy. Based on the terminal's AR technology workflow, taking a smart phone terminal as an example, using a mobile phone camera to collect a real scene, open a certain augmented reality mobile phone APP, through the function of scanning a QR code or cultural label, identify and propose rendering virtual objects, rendering The engine calls the virtual object like an interactive layer request. The virtual object is stored in the cloud storage server, and the virtual object is obtained by querying the virtual object database and returned to the rendering tool. The rendering tool renders the virtual object, so that the virtual object is It can be merged with real scene in real time to form a scene combining virtual and real. High-speed broadband network technology and cloud storage service technology provide massive space support for the storage of virtual digital content data, which can greatly reduce the operating load of mobile intelligent terminals, so that users can more easily, flexibly, and quickly experience cultural digitalization and strengthen culture. The joy of perception and experience.

4. Realization and Audience Analysis of ICH Based on AR Technology

4.1. Digital Realization of ICH Based on AR Technology



Figure 1: Digital realization of traditional shadow play based on AR technology

The creation of traditional shadow puppets based on AR technology has fully improved the traditional shadow puppets. At the same time, it also increased the flexibility and convenience of traditional shadow puppet performances, allowing visitors to watch them more intuitively. The advantage of this article is that it uses AR technology to place virtual objects in the real environment of ICH. Figure 1 shows the digital realization of a traditional shadow puppet show based on AR technology (this picture comes from Baidu). Compared with the development of the ICH resource industry, it has distinct characteristics and advantages. It can form a sustainable development industrial chain that combines research and industrial development projects, thereby forming the cultural asset composition and industry of the ICH. The development portfolio provides new technical tools and innovative ideas. In a practical sense, the content of ICH is digitally converted with digital technology to form digital cultural content corresponding to intangible culture. The digital cultural content formed by AR technology is displayed in real time and can be superimposed on scenes. The application of AR technology in the construction of ICH traditional shadow puppets is very important. First, the use of AR technology in traditional shadow puppets creates an interactive effect with the audience, allowing

the audience to have more cultural participation. Second, the localized development and operation of traditional shadow puppets and ICH resource industries based on AR technology has made traditional cartoons possible. A better cultural heritage is the harmony of traditional shadow puppets, which has very practical significance for successful development.

4.2. Audience's Evaluation of Traditional Shadow Play Based on AR Technology

4.2.1. Comprehensive Evaluation of Differences from Traditional Technologies

To further corroborate the accuracy of the audience evaluation of traditional shadow play based on AR technology, 60 participants were randomly selected to experience the evaluation of traditional shadow play based on AR technology and traditional shadow play, of which 20 under 10 years old, 10-29 20 years old, 20 people over 29 years old. After the comparison experience, the questionnaire survey was used to collect the evaluation data of these 60 candidates, as shown in Table 2 and Fig 2. It can be seen from the chart that children under the age of 10 generally underestimate the traditional shadow play based on AR technology. This may be because children under the age of 10 have not watched the shadow play before. Low sensitivity. And viewers over 29 years old have higher ratings than other age groups, with 14 people, accounting for 95% of the total sample. This shows that traditional shadow play based on AR technology is more popular.

Table 2: Audience evaluation analysis of digitization of traditional shadow play based on AR technology

Age stage	Better than traditional animation	Quite good	All very well	Relatively poor
Under 10	8	7	3	2
10—29	13	5	2	0
Over 29	14	5	1	0

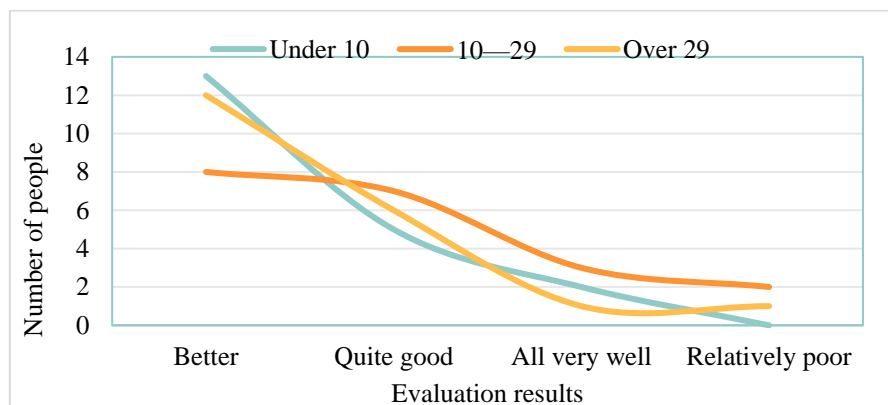


Figure 2: Audience evaluation analysis of digitization of traditional shadow play based on AR technology

4.2.2. Evaluation of Technical Advantages

At the same time, this study also conducted a comparative survey of the technical advantages of shadow Puppet Theater shown by AR technology. The results are shown in Table 3 and Fig 3. It can be seen from the chart that the audience's praise rate for the new technology is generally high. Among them, the praise rate of the picture clarity is 93.34%, which is higher than the traditional shadow play of 43.33%. The difference is relatively large, which shows that the AR technology is relatively clear the traditional method has greatly improved. At the same time, the praise rate of the softness of the color is 86.67%, while the traditional method is 16.67%, the difference is the most obvious. Through AR technology, the historical origin, types and performance of shadow puppets can be digitally superimposed and displayed to the audience through electronic devices such as mobile phones, which has revolutionized the ordinary "picture + text" display method in the past and can be displayed through animation and 3D images., more specific and vivid. The AR technology used for the shadow puppet culture communication in the exhibition hall can increase the diversity and interest of the communication. A new form of expression has reformed the previous pictures with text, English and Chinese expressions and will be accepted by the public, allowing the public to experience the exhibition the display of the museum is different from the display of books and videos, which plays an

important role in the development of shadow puppet culture.

Table 3: Audience's evaluation of the advantages of AR technology

	Clear picture	Delicate color	Good interaction	Flexibility	User friendly design
Number of people (AR)	56	49	52	51	47
Ratio (AR)	93.34%	81.67%	86.67%	85%	78.33%
Number of people (traditional technology)	26	31	10	23	26
Ratio (traditional technology)	43.33%	51.67%	16.67%	38.33%	43.33%

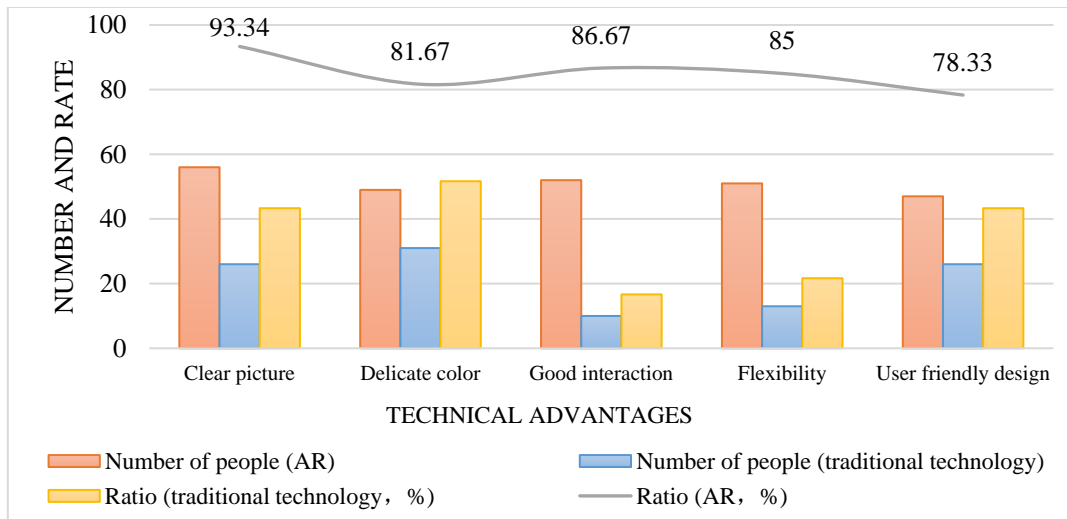


Figure 3: Audience's evaluation of the advantages of AR technology

4.2.3. Whether It Will Become a “Returning Customer” of Traditional Shadow Play Based on AR Technology

In order to better understand the audience popularity of traditional shadow play based on AR technology, this study finally conducted a survey on whether participants will become "return customers" of traditional shadow play based on AR technology. The survey results are shown in Fig 4. As can be seen from Fig 4, 80% of the audience said they would definitely become "return customers" of traditional shadow play based on AR technology, 17% of the audience said they might become, and only 3% of the audience said they would not watch again. This shows that the traditional shadow play based on AR technology has nearly 97% of the potential customer market, and its audience popularity is very high. It also shows once again that AR technology has a huge impact on ICH, and whether it is the inheritance and Protection or attractiveness to the audience has brought a lot of positive benefits.

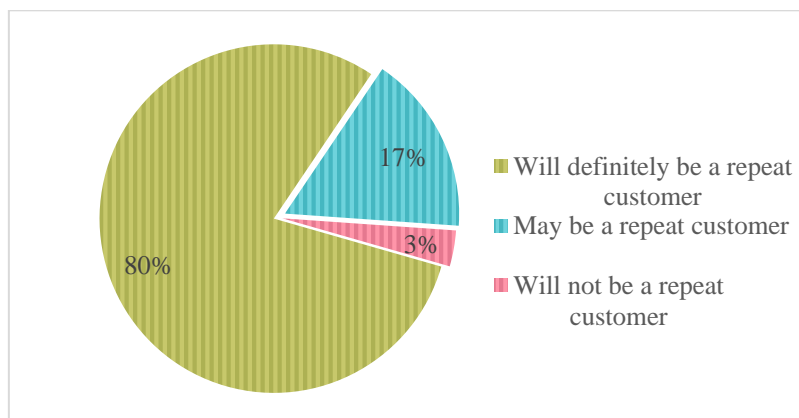


Figure 4: Audience analysis of whether it will become a “returning customer” of traditional shadow play based on AR technology

5. Conclusions

Transforming non-legacy into digital cultural form through digital technology is a typical application of modern science and technology involved in cultural protection. Aiming at the importance people attach to the protection of traditional culture in modern and contemporary society, and taking advantage of Internet technology, this paper proposes the digital development and protection of ICH based on AR technology, and proposes for digital development and protection: (1) construction digital ICH resource classification system; (2) unified data technology standards; (3) visual expression; (4) build ICH technology comprehensive application system; (5) build ICH and multimedia interactive platform and other specific measures.

This study puts forward the specific principles and technical routes of digital design through experiments. Based on theory and practice, it expounds the digital development and protection of ICH based on AR technology, which has practical and practical significance and value.

In this study, through the current digitalization of traditional shadow play, a random survey of 60 traditional shadow play audiences based on AR technology was conducted, and a questionnaire survey on the attitude and effect of traditional shadow play was conducted. After analyzing the results of the investigation It is concluded that the public's favorability of traditional shadow play based on AR technology is higher than that of traditional shadow play, and the picture effect, picture clarity and color softness of watching drama are better than traditional shadow play, and finally 97% of participants expressed that they will become "returning customers" of traditional shadow play based on AR technology, showing the great attraction of traditional shadow play based on AR technology to people, and further reflecting the huge importance of AR technology and digital technology to non-legacy positive influence.

Acknowledgments

Development and Research of Ceramic Expression Technology Using Mud Direct Injection Techniquer.

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