

Research on Innovative Teaching Mode of Art Education in the Age of Convergence of Media

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Abstract—With the advent of converged media, a qualitative change in the efficiency of dissemination and development of information has occurred, and this has had a positive impact on audiences. Research on the integration and development of traditional media with new media is recent, and has been focused, across the world, on the educational context. This study most specifically looks at art education. Or art teachers in further and higher education, the use of electronic media may not only lead to better work, creatively, but also more efficient real-time interaction, and the more effective collection of student feedback. Modern students' lifestyles and the teaching environment they are subject to, have created the basis for convergence media; within such an environment, cultural knowledge can be more quickly and conveniently accessed. Based on an analysis of innovative art education teaching methods within this era of convergent media, this paper proposes a design framework for the sharing of such high-quality teaching resources and the design of a shared teaching platform; these proposals are informed by the use of the 'extreme value' method to optimize the allocation of high-quality teaching resources in the framework design during the sharing process. The identification of an objective function can be effective in this context. The participation of an objective function within resource allocation can better guarantee that the best teachers can arrange the teaching programs that are most effective for particular courses - so that high-quality teaching programs can be better spread across the media available and so that the students can better accept and absorb this new teaching mode.

Keywords—Convergence Media, shared teaching, optimized distribution, teaching mode

1 Convergence Media

Because of the development of information technology and social media, the methods and channels used for conveying knowledge and information for learning and living are no longer so limited by time and space constraints. Traditional teaching methods have been unable to meet the current requirements of students in terms of content and timeliness. New-media based teaching methods, like, for instance, live broadcasts, are gradually becoming accepted by students. In line with the influence of decentralization, the dominant position of traditional teaching methods has been shaken; However, its broad audience base and authority-basis are not necessarily available to the new online media. In order to adapt to the times, traditional teaching methods and online new media teaching methods should converge ^[1]. The two kinds of media should be made to cooperate with each other, giving play to their individual advantages, realizing their complementary advantages – by practicing integration and mutual development. The financial media, for instance, are in the process of creating in-depth fusions of various contents from both old and new media sources in order to meet the requirements of the times. Convergence media has the distinctive characteristics of the times, and it is closely related to the current level of scientific and technological development. Rapidly updated and iterative broadcasting technology, digital technology, and information technology have directly promoted the improvement of the level of convergence in media. This process emphasizes the need to give full play to both the old and the new. The respective characteristics of the media in convergence employ each other's advantages in order to achieve changes in concepts, content, mechanisms, management, etc. This is done while breaking through the communication boundary between the two, scientifically integrating the information content disseminated, and providing users with in-depth content, branded products, and interactive services ^[2]. At present, most scholars habitually divide the media into traditional media and emerging/convergence media, each of which has its own advantages, as shown in Figure 1.

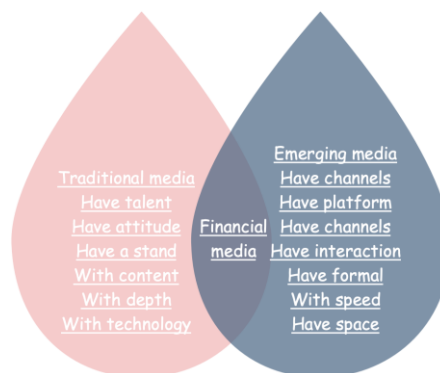


Fig. 1. Advantages of traditional and emerging media in the context of finance

Traditional multimedia teaching technology operates in a one-way manner, from the media to the audience, and it is difficult for the audience's feedback and interactions to

be conveyed back to the media. This affects the reception and use of feedback in the traditional media's communication environment and is not conducive to the more effective development of traditional media nor indeed to students' grasp of the knowledge being conveyed. Convergence media was born under these circumstances, taking the best from traditional media. Information can be released simultaneously through both traditional media and online multimedia, and real-time information feedback can be obtained more easily through convergence media^[3]. In terms of the comprehensive integration of media resources, the financial media has gone one step further, breaking down the original audience restrictions such that each audience member can also be a source of media content. This greatly increases the efficiency of information transmission, expands the channels available for information transmission, and motivates the students further.

In the era of convergence media, where various media forms are fused, content, subjects, and methods of information dissemination have all started to exhibit new characteristics. The innovative teaching methods using convergence media have the following features compared with traditional teaching methods.

First, within the convergence media environment, participation by people in education, i.e., students, is very noticeable. As mentioned above, such participation is difficult to implement within the traditional media environment. Using traditional media, art educators can only broadcast information. Information is transmitted to the college students, and these can only passively receive the information transmitted by the educators. In the convergence media environment, everything is different. College students may use various electronic devices to receive information^[4]. Moreover, they can communicate and interact with the information publishers at any time. Thus, one-way transmission has become two-way transmission the changes have greatly improved the enthusiasm and initiative of college students across the majority of art courses.

Second, compared with traditional media, convergence media can often reduce the effects of barriers caused by issues relating to time and locations and they have wide coverage. At present, in domestic (Chinese) universities, there are relatively few professionals specializing in art education. A classroom teacher needs to tutor multiple classes, multiple majors, and even multiple grades^[5]. In terms of time and cost, it is often impossible to perform one-to-one teaching. In the convergence media environment, teachers can reduce the effects of these kinds of barrier, using media platforms to achieve one-on-one learning exchanges with students. They can also check student progress in a timely manner, and produce summaries on a continuous basis. In conclusion, convergence media can not only save manpower costs and capital costs but also can support art education generally.

Third, the use of convergence media as the basis for teaching methods can better stimulate college students' enthusiasm, and interest in, art education. Most of the conventional multimedia teaching methods use a single teaching method, PPT, but in addition to this, teaching methods based on convergence media, such as live broadcast and small video (made available via the Internet) can be used by art educators in colleges and universities. Effective work development methods are not only more efficient but also stimulate college students' enthusiasm and interest in ideological and political education^[6].

The term convergence media refers to new forms of media that use a variety of technologies to produce three-dimensional displays of communication content, and at the same time employ various types of communication in order to perform information dissemination. The era of converged media provides new spaces for education reform and development [7]. In addition to curriculum learning, college students can also use a variety of tools and application platforms based on converged media to build a more personalized learning space founded on their own individual needs and interests. They can subscribe to well-known experts in relevant fields on WeChat and other public accounts, join professional or topical discussion communities, and so come to understand and master, in a timely fashion, and master the latest knowledge regarding the latest disciplines at home and abroad. At the same time, in addition to traditional laboratory training, college students' skills training can also employ convergence media to build skills remotely and share platforms with professional practices.

The core of current media thinking is also convergence. At present, some universities have used media technologies and tools effectively to build learning exchange networks and academic research platforms based on various different disciplinary backgrounds, across boundaries of time and space; promote cross-disciplinary integration; broaden the academic horizon of college students; and enhance their academic innovation capabilities^[8,9]. This requires college teachers to carry out teaching innovation in the areas of speculation, innovation, integration, and so on. The relationship between speculation, innovation, convergence, and integration is shown in Figure 2.

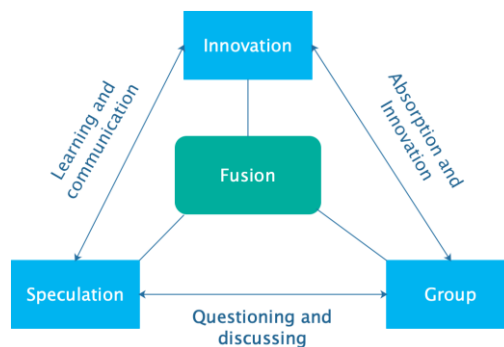


Fig. 2. Competence for innovative teaching in a converged media environment

2 Sharing of High-Quality Art Education Resources in the Convergence Media

Convergence media is a relatively mature multimedia operational concept. It mainly concerns the different forms of media technologies, and the communication advantages created as a result of deep integration; these can be regarded as the essential attributes of all media convergence activities. Convergence media, as a concept, first appeared, of course, in the media field, and has very clear directionality and operability^[10]. Convergence media is built on a detailed understanding of both traditional media and new

media. It integrates the advantages of various different types of media, such as the timeliness of network media, the advantages of having mobile terminal audiences, and the advantages of instant interactive feedback via the Internet. In order to master such advantages in-depth, we must skillfully connect the differences and complementarities which exist between them to maximize the benefits of a network-like form of information release, and diversified supply. The objects to be processed by the media include various media elements such as text, data, graphics, images, animations, sounds, and videos. The expression carrier covers traditional media such as newspapers, radio, and television; and new media, such as the Internet, and mobile terminals. Technological means are used to achieve a deep integration between the elements of communication, and the elements of media forms, and new media forms result from these fusions^[11]. In addition, Convergence media focuses on user experience or the needs of the audience. In the process of communication (via convergence media), it is possible to meet audiences' needs to the greatest extent possible, so that audiences can obtain the most timely, optimized, and diverse communications receiving experience.

2.1 Shared scientific connotations

There is an inevitable trend in the development of teaching resources in the era of converged media towards shared development, and innovation is the fundamental driving force and support for shared development. Development is the eternal theme of human history and the foundation and key to solving all problems. The concept of the shared development of educational resources is based on using people as the starting point and endpoint; this fully reflects the status and role of people, as such, and is a profound and comprehensive reflection of the people-oriented concept. Share means to enjoy and together reflects the relationship between people, and share reflects the relationship between people and things.

2.2 Shared value

The term teaching resource sharing represents the scientifically orientated means by which available teaching resources can be shared in a scientific way – which can be discovered, obtained, and used. Once this has been done, the value of such shared educational resources can be brought into play to promote the development of education. Such educational efforts have an important part to play in social development, scientific decision-making, and improving the quality of life (as this is related to information). First, such efforts can improve teachers' work efficiency. In the era of integrated media, educational resources have become an important type of information resource. Educational resource sharing takes advantage of the parallel processing possible with media and network information sharing to adjust and optimize teaching resources and so improve the efficiency and effectiveness of their management and utilization. Second, it is necessary to ensure decision-making in this regard is objective and scientific. In the era of converging media, the various educational decision-making environments used for supporting learning are becoming more and more complex, and the timeliness of responding to problems has also become more critical, requiring accurate and

comprehensive information sharing support. Therefore, to cope with complex problems and in order to put forward scientific solutions to these, cross-sectoral and comprehensive education resource sharing is required ^[12]. The sharing of art education resources provides the possibility of integrating various, multifarious types of information, and avoids, very effectively, the instigation of repeated collections, repeated investigations, and investment waste. At the same time, the sharing of these resources provides individuals, institutions, organizations, and countries with sufficient credible information via which to improve scientific decision-making. Third, this sharing can be used to improve the quality of students' learning. In the context of integrated media, students face the dual dilemma of information flooding and information paucity. On the one hand, the application of educational information technology has led to a great expansion in the human capacity to produce information, and various kinds of information are ubiquitous. On the other hand, there are relatively few high-quality educational information resources that meet the needs of the public. In such a complex environment, the proportion of real and credible information to questionable information is relatively small. By integrating and sharing real, objective, and effective educational resources, we provide students with high-quality educational information services and raise the level of students' education.

2.3 Teaching sharing platform architecture design

The sharing model proposed here can be divided into a service layer, an application standard, a protocol layer, a data layer, and a big-data infrastructure and environment layer. Mostly, the open data sharing system is attached to and contained in the big-data infrastructure and environment level, and the other three levels make up its subsystems. The internal functions of each subsystem are highly coupled ^[13]. These subsystems integrate data organically. Trends and related service functions have formed a unified teaching platform. The shared module framework for an innovative teaching mode is shown in Figure 3.

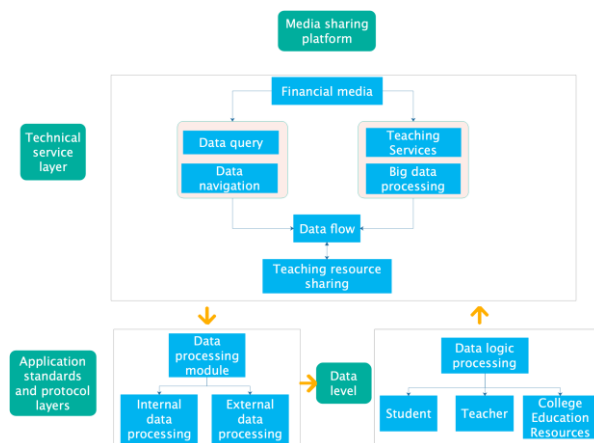


Fig. 3. Framework diagram of sharing module of innovative teaching mode

1. The big-data infrastructure and environment layer – the big data infrastructure covers any high-performance host servers, large-capacity data storage hardware devices, and big data network cloud platforms. These serve as the hardware infrastructure foundation for the big data technology-driven open data-sharing model, ensuring services that can effectively utilize network clouds and providing a platform for big data analysis and application. The environmental level mainly refers to the soft environment, and specifically includes the guarantee of relevant policies and regulations, standards, and norms that enable the open data sharing system.
2. Application standards and protocol layers – this implements a unified service window which facilitates access to data sharing application standards and protocol levels for open data sharing services. It combines internal and external data processing and also application platforms in order to support all aspects of data processing, analysis, scheduling and other data services, so that these services can share all types of data resources with all other customers as they wish.
3. The data layer – this includes teacher data resources, science and technology data resources, college data resources, etc., plus the logical processing necessary to maintain a database which can achieve the purpose of shared teaching.

2.4 System design

In the era of converged media, resource sharing for innovative teaching models should include technical support for the Internet of Things, big data, and Cloud computing. The application of correct technical means and scientific data processing methods is reflected in the processes of data collection, sorting, transmission, processing, and utilization, these things run through the entire process of big data processing [14]. Only in this way, the quality of big data guarantee for educational integration media in terms of data, and ensure that teachers are given better teaching services. Because of this background of the rapid development of emerging technologies, such as big-data technology, data has become an indispensable part of people's daily lives. The use of big data is becoming more and more common in the public arena and more important in research [15,16]. Therefore, since student education is fundamental, core innovative teaching methods will rely on big data technology. The framework/structure of our teaching resource sharing model for the era of converged media is shown in Figure 4.

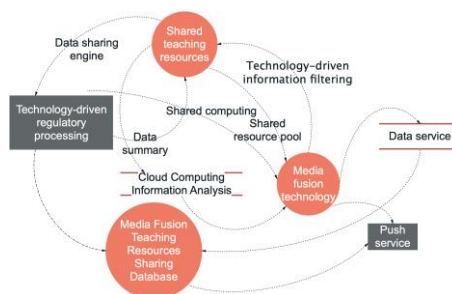


Fig. 4. Framework Structure of Data Processing for Teaching Resource Sharing Mode in the Era of Convergence Media

In the above structure diagram, are included work sequences such as data collection, shared storage, shared computing, shared push, and shared data services. The structure integrates education into the ubiquitous network composed of the Internet of Things, Cloud computing, and big data. It integrates the entire process of data processing and application, from the process of sharing resources to the data push service. The data sharing engine performs full Cloud computing analysis of the data resources stored in the data sharing pool and provides this to the all-media shared data push pool. In addition, the technology-driven supervisory process can also push data resources directly to the all-media shared data push pool. The multiple data processing process ensures the quality of the data resources in the push pool and can achieve the purpose of data sharing push. The data resources that are managed by the push service are filtered by technology-driven information, and then can be returned to their original state in the data-sharing resources, and so enter the shared resource pool again, forming a process of recycling and value mining of shared data. This technology integration and driving framework is the focus of the big data technology used here, driving the open and shared data model.

3 Optimal Allocation of High-Quality Teaching Resources in the Era of Convergence Media

3.1 Optimized allocation of teacher resources

Any innovative teaching mode requires the use of high-quality resource sharing. In the teaching resource sharing module, it is necessary to optimize the allocation of teachers' teaching resources. For this process of optimizing the allocation of resources, it is necessary to use effective art education professionals – for the art foundation, the music foundation, the dance foundation, and the drama foundation materials. Ten teachers of five professional courses in performance basics, repertoire creation, and planning allowed for the optimal allocation of teacher resources ^[17].

1. Module selection

Set the basic art course code as $M1$, the music foundation as $M2$, the dance foundation as $M3$, the drama performance foundation as $M4$, and the repertoire creation and planning course as $M5$. The ten basic class teachers are coded as $T1-T10$. The standards evaluation uses a questionnaire survey.

2. Extreme value problem

The resource sharing module requires the co-optimized configuration of a number of high-quality modules and teacher resources. During the configuration process, the mathematical analysis known as extreme value calculation is required. The purpose of extreme value calculation is to ensure an overall optimum.

3. Determine the variables

Let the variable that the i teacher can choose on the j module be x_{ij} .

$$x_{ij} \begin{cases} 1 & \text{Teacher } i \text{ chooses module } j \\ 0 & \text{Teacher } i \text{ does not choose module } j \end{cases} \quad \begin{matrix} i = 1,2,3 \dots n \\ j = 1,2,3 \dots n \end{matrix} \quad (1)$$

a_{ij} represents the benefit value of the j module selected by the i teacher, $a_{ij}x_{ij}$

Students taking one (or more) of the five basic courses are taught, in terms of effectiveness, according to teaching attitude (20%), teaching ability (45%), teaching effect (30%), and the purpose of the course (5%).

The selection of excellent (1), good (0.8), medium (0.6), poor (0.4), and poor (0.2) gives the benefit value. After collating the questionnaire data, a co-ordination of the 10 teachers and the five basic courses was obtained a_{ij} .

Table 1. Statistical table of 10 teachers and five basic courses

Attributes	Art foundation M1	Music foundation M2	Dance Basics M3	Drama Performance Basics M4	Repertory creation and planning M5
Teacher T1	0.8231	0.6725	0.8756	0.5982	0.7897
Teacher T2	0.7291	0.7692	0.8033	0.7591	0.7245
Teacher T3	0.7475	0.6644	0.8539	0.6014	0.7191
Teacher T4	0.6925	0.7382	0.8306	0.6043	0.6685
Teacher T5	0.6652	0.6732	0.8535	0.7382	0.6282
Teacher T6	0.6082	0.7863	0.8562	0.7872	0.7824
Teacher T7	0.5521	0.8138	0.8901	0.7823	0.6781
Teacher T8	0.7682	0.8782	0.6556	0.8783	0.7935
Teacher T9	0.8242	0.7623	0.7892	0.8943	0.8358
Teacher T10	0.8923	0.6778	0.6923	0.8724	0.7824

4. Optimal algorithm

The optimization problem is also the extreme value problem of the function. If it is optimal, the maximum value of the total benefit is found [18].

The first teacher T1 is assigned to the first-course module M1, denoted as x_{11} , the first teacher T1 is assigned to the second-course module M2, denoted as x_{12} and so on. Thus, we obtain the optimized configuration table 2.

Table 2. Teacher and course module optimization configuration table

Attributes	Art foundationM1	Music foundationM2	Dance Basics M3	Drama performance Basics M4	Repertory creation and planning M5
Teacher T1	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
Teacher T2	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}
Teacher T3	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}
Teacher T4	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}
Teacher T5	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}
Teacher T6	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}
Teacher T7	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}
Teacher T8	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}
Teacher T9	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}
Teacher T10	x_{101}	x_{102}	x_{103}	x_{104}	x_{105}

Finally, we get the objective function:

$$\max f(x) = \sum_{i=1}^n \sum_{j=1}^n a_{ij}x_{ij} \tag{2}$$

The lingo software used by the objective function can solve the problem of how to configure while ensuring the maximum benefit value, that is, selecting the attribute value of $x_{ij}=1$.

4 Analysis of Innovative Teaching Mode in the Era of Convergence Media

The convergence media teaching mode is based on emerging media technology and long-term media work experience. It overcomes the shortcomings of traditional multi-media teaching modes and draws on the advantages of new media. It was found that the novel ideas had unparalleled superiority.

1. Innovative art education and teaching modes in the era of convergence media is a contemporary arena.

The era we are in is one of information technology and the knowledge economy, of the global mobile internet, and of the courage to change and innovate. The teaching environments of colleges and universities must also grasp the trends of development – from traditional teaching modes to the innovative teaching modes offered by the era of convergence media. The concepts involved in the innovative teaching modes offered by convergence media are themselves innovative and have been developed on the basis of inheriting the traditional teaching modes and innovating in developments based on these. First, it incorporates the traditional modes of thinking about teaching. It not only borrows its authority and depth from the traditional teaching model, but in addition uses the new media's resources: interaction, customization, fans, simplicity, sharing, precision, entertainment, data, and new thinking ^[19]. Socialization and big data, etc. have won the favor of students.

2. The innovative art education teaching mode for the era of convergence media is more multi-directional.

Teaching content is at the core of a teacher's work. The teaching mode for the era of convergence media uses the aggregation of teaching content to a great extent. On the one hand, this aggregation takes place with regard to the teaching content on the presentation platform. Traditional teaching content is known for its depth and authority, but the content is single-sourced and does not allow for the absorption of knowledge from elsewhere. The teaching mode for the era of convergence media has broadened the breadth of students' sources of information. Many different disciplines and various professional knowledge-sets are displayed via the media in a shared form. Mass teaching content and a multiplicity of different learning courses provide students with more freedom and choice.

3. The art education teaching mode for the era of convergence media is innovative.

The innovative art education teaching mode for the era of convergence media is integrated with both new and traditional media educational forms. This is so that the kinds of student information available on the campuses of colleges and universities are not limited to text and pictures. Short videos and other visual and personalized forms should become available. A series of beautifully arranged pictures, the attitude of an audio subject, vivid expressions made available through a video lens, and the lively and concise use of language can together make the classroom content more expressive, more original, and so easier to accept.

4. The innovative art education teaching mode for the era of convergence media is uniform.

In the era of convergence media, the unity of innovative art education and teaching models can be coordinated, using, to the full, the advantages of the division of labor and cooperation. On the same teaching course, gather group strengths based on shared resources, plan hierarchically by using different discourse styles and forms of expression, and give play to their respective advantages in order to narrate or show and echo each other, cooperate with each other, provide more levels, build momentum, and complement each other and interact.

5 Conclusion

The key to the cultivation of improvements in college students' knowledge and abilities in the era of converged media lies in innovative communication methods. In the process of disseminating knowledge, in addition to using traditional teaching modes, the most important thing is to use the various online media platforms and new media in teaching. The era of convergence media is also a new opportunity for the reform and progressing of art education teaching modes in colleges and universities. Converged media is a product of the times. A new type of media, it is both connected and different from traditional media and emerging media. The innovative teaching mode made

possible via the fusion paradigm is based on the combination of the traditional teaching mode and the teaching mode made available by the emerging media. It can have the advantages of both – through a process of deep integration of the systems, and the use of special communication methods and communication skills to teach, for instance, art education in colleges. The resources are optimized for supporting the teaching content, break the boundaries of time and space, and provide new ideas for the innovation of teaching models in the new era.

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