The Interactive Design Strategy of Urban Public Culture Space: Exploratory research based on grounded theory

Jiarui Zhang*
Hoseo University, Asan City, South Chungcheong Province, South Korea 31499
A931362022@163.com

Abstract: Urban public cultural space interactive design is an effective medium for human-city surroundings interplay and influence. Space is step by step turning into an object of verbal exchange and interaction with people, rather than just being seen as space. This learn about comprehensively reviews and analyzes the concept of urban public cultural interactive design. Based on the literature, this find out about makes use of the grounded theory method to explore the characteristics, methods, and effects required for urban public cultural space interaction, and constructs a set of urban public cultural space interactive plan method models. The mannequin was once examined via empirical evidence of urban public cultural space interactive design. Based on the textual content facts of 50 cases of public cultural space interactive layout gathered from layout internet site platforms, semi-structured interviews had been performed with teachers from home sketch schools and enterprise designers to construct a theoretical mannequin the usage of grounded theory. The consequences confirmed that through the coding steps of grounded theory, 41 initial concepts, 21 initial categories, 6 main categories, and 1 core class had been obtained. The following two conclusions were drawn from the research: (1) Urban public cultural space interactive design has certain strategies: features (multimodal interaction., full-sensory interaction, experiential interaction), methods (user experience design, multimedia interactive technolog), and effects (gamification interaction, contextualised interaction interaction.). Therefore, the strategy has a certain stage process: guiding use and producing effects. (2) Currently, the interactive design of urban public cultural space has gone through the improvement procedure of beginning and preliminary deepening. In the future, the interactivity of urban public cultural area need to focal point on person wants as the guide, think about the integration from function to form to content, and deliver higher non secular enjoyment and pleasure to the audience. This research has certain theoretical significance for the interactive design of urban public cultural space.
Keywords: Urban Public Cultural Space; Interactive Design; Grounded Theory; Design Strategy.

1. INTRODUCTION

With the change of social forms and the non-stop advertising of urbanisation, urban public cultural spaces have progressively fashioned in the course of the long-term development of human society, turning into the spatial carrier representing people's urban cultural life practices. Urban

public cultural space is now not simply a only bodily space, but a cultural construct and a cultural product. It plays a role in maintaining, strengthening and reconstructing social development, and is also a public arena for the presentation and expression of cultural demands, which is of amazing importance to the development of cities (Wang & Li, 2021). As cities enter the age of information technology, digital technological know-how has penetrated into all aspects of urban public cultural space and has gradually produced a transformation in artwork types in this context. Digital technology facilitates the increased frequency of communication between people, providing digital technological know-how assist for the realisation of in-depth interaction between people and objects, and human beings and the environment. In this context, the application of interplay format in urban public space has emerge as more and more necessary (Yao, 2020).

Interaction design in urban public cultural space is an effective medium for human interaction with urban public cultural space environment. With the application and development of digital technology, interplay sketch has gradually developed from ordinary services to intelligent digital technology. The new interactive science contains digital technological know-how into urban public facilities and public cultural spaces, providing new ideas and ways of interaction and communication between people and society, people and the environment. The development of digital technological know-how on the urban Internet has made urban public cultural areas greater targeted on the interactive design of digital technology, and the interactive communication between urban residents, technical equipment, the surrounding environment and public spaces and facilities has steadily emerge as a reality (Fu & Zhang, 2022). Interactive media guides the interactivity of spatial experiencers with non-spatial data switch in space, consisting of a digital house that builds on human-computer structures interplay with traditional simulated emotional, physical environments. These changes make the spatial experience change in both sensory and behavioural terms (Zhu et al., 2022).

The focal point of this find out about is the interplay diagram of urban public cultural spaces. At present, research in this field is commonly targeted on two aspects: on the one hand, the architecture and different components of urban public cultural spaces are studied from the perspective of spatial design; on the other hand, the literature related to the interplay format of urban public cultural spaces lacks a holistic overview, and the research objects are primarily centered on cultural spaces with a public interest nature, such as art museums, cultural centres and public

libraries.

Therefore, the aim of this paper is to sort out the principles associated to the interactive design of urban public cultural spaces, and to analyse applicable instances of interactive design of urban public cultural areas with the aid of collating the concepts of user participation and the types of participation stages of usual techniques and digital media. Finally, a theoretical approach is used to explore the characteristics, approaches and effects of interplay sketch in contemporary urban public cultural spaces, and to distil and abstract a model of interplay diagram techniques for urban public cultural spaces, with a view to providing theoretical support and reference for the design of interaction in urban public cultural spaces.

In short, this find out about ambitions to fill the gap in the overall literature of interplay sketch in urban public cultural spaces, sort out relevant concepts, analyse case studies, and distil a strategic model of interaction design, with a view to providing theoretical support and reference for interplay plan in urban public cultural spaces.

2. LITERATURE REVIEW

Based on a comprehensive learn about of the disciplinary background, lookup content material and research methods, this learn about critiques and organises research on the interactive design of urban public cultural spaces. The research on the interactive design of urban public cultural spaces has eight main parts, namely the research on "spatial theory" and "spatial turn", the lookup on "publicness" and "public space, public cultural space governance strategies, and spatial interaction and interaction design. Academic research on the interplay format design of urban public cultural areas locations exquisite emphasis on publicness and spatial theory, and lookup views are constantly diversifying and the boundaries and depth of research are continuously increasing and deepening.

Research on 'spatial theory' and the 'spatial turn'. Since 1970, Western industrial societies have entered the spatial era. In 1974, Henri Lefebvre, a French specialist in urban studies, first proposed a theory of spatial manufacturing with the help of Marxist critical methodology, artificially dividing space into three unique types: perceptual space, conceptual space and residing space, and the resulting triadic dialectic of 'time, space and society', which has led to a outstanding deal of controversy in the academic world. This led to the "spatial turn" in the educational world. Since then, architecture, art and literature have been influenced by the concept of

space, and area has come to be no longer solely a bodily and geographical concept, however additionally a political and sociological one. The phenomenon of urban cultural space is analysed from an evolutionary perspective, analysing the possibility of a process of cultural transformation in the context of altering varieties of frequent social life, and making use of a cultural evolutionary approach to the formation, development and refinement of modern urban cultural space, as well as the rationality of this law (Viktoriia & Tetiana, 2020).

Research on 'publicness' and 'public cultural space'. The 'public cultural space' discussed in this paper is a composite concept. In order to further express the central theme of this paper, it is fundamental to temporarily provide an explanation for and define the concept of 'public cultural space' in order to keep away from similarly ambiguity or controversy. "Public space first appeared in the 1950s in the fields of political and social philosophy; in the 1960s it used to be added through L. Mumford and J. Jacobs to the self-discipline of planning and design, and by way of the mid-1970s it had become a concept of public space. By the mid-1970s, it had progressively grow to be an object of learn about of city structure and urban life in the West (Nadal, 2000) This was once in addition analysed by the American scholar Richard Sonnett, who defined communal, shared public spaces such as squares and museums as no longer simply strictly physical spaces, but as reflections of current city lifestyles and public human relations. Scene idea used to be developed with the aid of the American scholar Terry Clark, who emphasised that the cultural scene is about developing the values of culture and shaping the fundamentals of a new dynamic of city tradition (RICHARD, 2008). In 2020, the scholar Huang Fang argued that publicness is the predominant attribute of public cultural space, and that urban public cultural house have to be defined from the perspective of public provider machine building (Huang, 2020). Scholars Wang Ziqi et al. in 2020 think about city cultural spaces as a series of physical spaces that reflect the historical and cultural characteristics of cities, as well as cultural environments such as cultural insurance policies and operational mechanisms (Wang & Fu, 2020). Scholars Jin Dongchang et al. in 2019 argue that urban public cultural space is an necessary region for spreading and passing on culture in the process of social development, is the foundation of urban culture, and belongs to the scope of city development and operation (Jin & Wang, 2019). In 2020, Zeng Li and different pupils described public space from three perspectives: political science, sociology and public culture, and found commonalities among these perspectives, i.e., although the emphasis of every standpoint is

different, they all revolve around "people" and "human interaction" (Zeng et al., 2020). Cultural house is no longer a bodily house in the pure sense, there are also people, cultural activities, interaction and many other factors.

Research on governance strategies for public cultural spaces. After an in-depth discussion of the universal thinking of public cultural space, scholars have begun to shift their lookup point of view to specific public cultural venues. Among them, Tony Bennett is the representative, who first discovered the need for governance of museums and put forward the theory of museum governance. As a new type of space, urban open space breaks through the boundaries of usual useful functional areas of urban space, and is a new highlight of regional financial improvement and social lifestyles growth in the new era, and an necessary course for urban spatial innovation and functional transformation (Liu & Xu, 2019). The using position of new media in the process of urban development, tracing its goal legal guidelines in strengthening the construction of spiritual civilization and constructing the smooth electricity of urban culture, and the mutual integration, penetration and extension between the two, providing a new path for the construction of urban public cultural space (Jin & Wang, 2019). The planning and governance of public cultural area ought to be transformed from "the designer decides" to "the human beings make the decision". Scholars such as Yu Jianxiang in 2020 argued that urban public cultural areas ought to realise a new way of service, actively expand new service objects, maximize the effect of space services, incorporate creative comprise innovative cities into the running physique below the new operation mode to inject new vitality into public cultural spaces, and create new urban public cultural spaces (Yu & Wang, 2020). In the context of rapid urbanization and industrialization in the country, creating public cultural spaces in line with social development requires continuous exploration and practice, strengthening the most beneficial transformation of traditional public cultural spaces, and creating public cultural spaces with diversity and adaptability (Fang & Liu, 2019).

A find out about on "spatial interaction" and "interaction design". In terms of the application of interaction design, many scholars have carried out lookup on the application of interplay plan in the field of space. In 2020, scholars such as ie Shan proposed a format approach for multi-sensory interactive architectural spaces, aiming to strengthen the a couple of interactions between users and architectural spaces from three perspectives: natural interaction, behavioral interaction and digital interaction (Shan & Mei, 2020). Based on existing museum digital exhibitions (Musa, 2020) discusses the have an impact on of technological

developments such as the emergence of interactive architecture as a direction for modern architectural trends and its have an impact on the formation of interactive and intelligent spaces, as well as the determinants of response and reaction. Professor Hong Zixiao in 2018 argues that the design of interactive urban public space refers to the interaction between a number of topics in the urban public space scene, which include the interaction between human beings and people, the interaction between people and the environment, and the interaction between human beings and a range of services in the environment (Hong, 2018). Meanwhile, scholars Huang Xin et al. argued in 2011 that focusing on multimedia technology strengthens the two-way interaction between the target market and the spatial surroundings inner the museum, exhibition equipment, etc., and well-knownshows to enhance target audience participation and enhance the attractiveness of the museum to visitors (Huang & Li, 2011). Therefore, interplay format will additionally come to be the new paradigm of museum design in the future. The concept of sustainable interplay factors out that interaction design is a kind of behavioural design, dealing with the interaction between people-objects-environment, and with clever records community structures as the technical support, interplay sketch will play a higher position in building a sustainable society (Lou, 2017).

According to the results of literature combing, academics have comprehensively launched research on the interactive design of urban public cultural spaces, and have accomplished positive consequences in terms of conceptual systems, research paths and application studies. However, the theoretical foundation of the present lookup is nonetheless now not not perfect, especially the research on the composite concept of urban public cultural area desires to be in addition developed. In addition, there are relatively few theoretical and utilized instances in the existing literature, and extra realistic ride is needed to complement and validate the theory (Becker et al., 2023).

This paper seeks to fill this research gap. On the one hand, a theoretical framework of interplay diagram techniques for urban public cultural areas wishes to be developed. This framework wants to make clear the relationship and content material between the characteristics, approaches and effects of interactive design for urban public cultural spaces. On the other hand, in order for theory to guide practice, concrete measures that can efficiently put in force idea want to be drawn from past experiences. Therefore, this find out about comprehensively collects, reviews and analyses relevant case studies on the interactive design of urban public cultural spaces, makes use of the Grounded Theory Approach to explore

the role and characteristics of interplay layout in the interactive design of urban public cultural spaces, and constructs a theoretical mannequin of interplay graph techniques for urban public cultural spaces. The theoretical mannequin of interplay diagram techniques for urban public cultural spaces is developed. The aim is to provide some theoretical guidance for the design of interaction in urban public cultural spaces (Zoé, 2023).

3. STUDY DESIGN

3.1 Study methodology

The design of urban public cultural area interplay is an rising lookup area, even though pupils have yet to develop a mature theoretical framework for the design of urban public cultural space interaction. Root principle offers a approach for analysing foremost records and constructing theories. It is regarded as the most scientific methodology in qualitative research, emphasising the use of inductive methods to explore and construct socially specific phenomena in natural contexts (Chen, 1999). Using this approach, researchers assemble standards and theories primarily based on a systematic analysis of empirical data (BG, 1967). This find out about consequently adopts classical grounded theory - an approach widely used in the social sciences - as its research methodology (Bamkin et al., 2016).

Grounded concept was once developed with the aid of Barney Glaser, a professor at Columbia University, and Anselm Strauss in their 1967 book "The discovery of grounded theory" (BG, 1967) is a widely used bottom-up qualitative research method, especially for problems that lack a theoretical explanation. In his 1996 article 'The Creation of Theory: A Recent Application of the Grounded Theory Method', the scholar Naresh R. Pandit in addition interpreted and applied grounded theory. The application of grounded principle is similarly defined in the article "The Creation of Theory: A Recent Application of the Grounded Theory Method" posted by using Naresh R. Pandit in 1996. The grounded theory has significant advantages in data collection, data analysis, research paradigms, exploration of relationships among social phenomena, and theory construction, and is "clear, step-by-step, operable, standardized and scientific" (Jia, 2015).

In this paper, the textual substances had been analysed in three steps the usage of In Vivo Coding, namely Open Coding, Axial Coding and Selective Coding. In the Open Coding stage, all texts had been coded phrase via phrase and match via tournament to pick out and categorise themes; in the

Axial Coding stage, the codes from the previous stage were summarised and the predominant classes have been extracted; finally, the principal classes have been organically related and a theoretical mannequin used to be built (see Figure 1).

This find out about used secondary sources and semi-structured interviews, and the pattern determination observed the following principles: first, typical and atypical case sampling and convenience sampling, in accordance to the typicality and atypical case sampling range for domestic and foreign designers involved in public cultural space interactive design works case sites 50 cases, collecting public cultural space interactive sketch instances in the design website platform, for induction of functional and characteristic elements;; Secondly, the diversity of interviewees. The pursuits protected professionals from home plan faculties and corporate designers involved in public cultural space interactive design projects, and finally 10 interviewees have been recognized for semi-structured interviews.

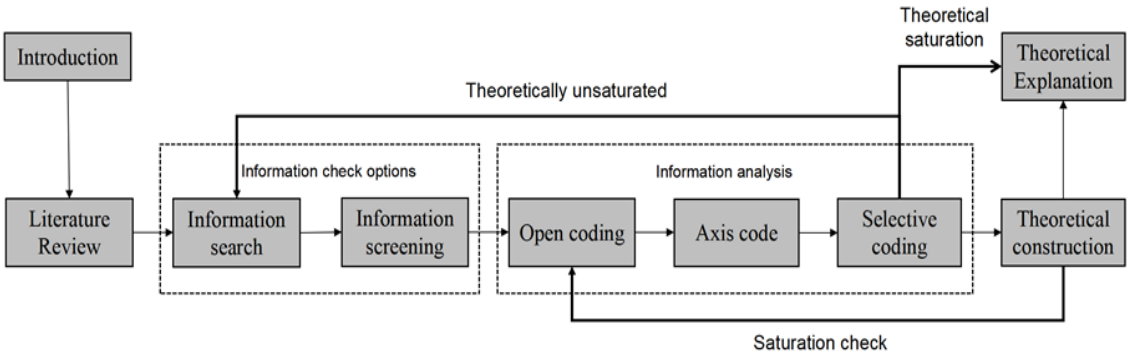

Figure 1: Is the study flow chart.

3.2 Data collection

In the literature screening stage, 56 textual substances have been first collected, consisting of museums, art galleries, reliable web sites of public space design, China Knowledge Network literature and Google Scholar on works profiles, designer profiles, lookup reviews and journal papers on urban public cultural space. Of these, 34 had been examples of works on official websites, 10 have been files and 10 have been questionnaires. The search used "urban public cultural space" and "public house interplay design" as keywords, and the retrieved literature was once filtered by means of title, abstract and full text. The resolution standards had been whether or not the retrieved literature contained data associated to the interactive design of urban public cultural spaces.

To determine the sample size, sampling used to be carried outwith the

aid of 12 months and more than one rounds of sampling had been performed based totally on the principle of theoretical saturation. A total of 41 samples had been drawn for coding in the first round, and a further 30 samples have been drawn from every 12 months for coding in the 2nd spherical till theoretical saturation was once achieved. A total of four rounds of data sampling have been performed in this paper, however solely two rounds have been taken due to the small amount of information in the literature questionnaire. From the coding, the third round of coding showed that the idea used to be saturated. (See Table 1).

Table 1: sources of information

Sources of information	Data	Access Address
CNKI Documentation Database	6	https://www.cnki.net/
Archdaily Network	6	https://www.archdaily.cn/search/cn/projects?ad_source=jv-header&ad_name=main-menu
Dezeen Network	8	https://www.dezeen.com/
Digital Art Network	5	https://www.d-arts.cn/article/article_info/key/mte5otyymtgzntcfuzessyogcw.html
DSRNY Network	6	https://dsrny.com/
Whitevoid Network	9	https://www.whitevoid.com/fluidic/
Google Scholar Network	4	https://scholar.google.com.hk/hl=zh-cn

4. CATEGORY EXTRACTION AND MODEL CONSTRUCTION

4.1 Open coding refines concepts and categories

The grounded theory emphasizes the sorting and analysis of data, which requires open coding, spindle coding and selective coding, and emphasizes the comparison and correlation of data. In this paper, through the induction of data, extraction and comparison, to make sure that every theoretical construction from the data itself. The core of coding is not to quantify data for statistical and computational analysis, but to effectively classify and generalize data in order to refine concepts, demonstrate meaning, make clear correlations, and construct theories.

Firstly, the textual content content material is sorted and coded in accordance to the published year of the case, report and document, and the original representative sentences related to the interactive design of urban public way of life area are extracted. Second, the development of the initial concept, the initial code comparison, analysis and induction, consolidation,

derived from 41 initial concepts.

The third category is the lean category. Category is the further refinement of concepts, from a number of concepts in the same direction after the convergence of refined. The end result is 21 preliminary classes (see Table 2).

Table 2: Open coding and category refinement.

Category	Initial concept encoding	The original statement
A1 Somatosensory interaction	A1-1 Uses projected images to interact with body movements	A large-scale interactive public projection"Body Movies-Relation Architecture # 6" will be shown in the public square, showing the Body movements of the models in the form of projector images. .
	A1-2 Using multimedia digital technology to create dance choreography to interact in space	French artists Claire Bardainne and Adrien Mondot use multimedia digital technology to create vintage volatile dance choreography in a vibrant cube environment, exploring the ephemeral nature of dreams and the fickle nature of life.
A2 Auditory interaction	A2-1 Using moving images to interact with the audience	It tells the story of the rise of the Kingdom of Wu in the spring and Autumn period (AD 514-496) . Through 15 minutes of moving images and poetic narration, the audience begins to travel back in time.
	A2-2 Through the use of images and music, visitors engage with the exhibition or experience	For 30 minutes, in a space filled with images and music, the device allows the audience to collectively engage in a critical experience, one before and one after. .
A3 Taste and smell interaction	A3-1 Interacts with the visitor's sense of smell through scent art	At the New York Museum of Art's exhibition, "Scent Art," by the team of architects"Diller Scofidio + Renfro," focuses on 12 key odors. Visitors enter a seemingly empty white gallery dotted with 12 carved niches. .
	A3-2 The olfactory experience arouses the emotions of the visitors	A good olfactory experience can arouse tourists' positive emotions and set the emotional tone of the visiting process. Therefore, some odors can be marked to form olfactory marks.

Table 2: Continue

A4 Visual interaction	A4-1 The visually presents the LED circular screen in a cinematic manner	Digital Art on display in the lobby of the London Museum. The work is a cinematic representation of the 24-hour life in the City of London, news, weather, traffic, and other data are constantly updated via the web and visualized on a 24-hour second-hand giant LED circular screen.
	A4-2 Salt particles stimulate the visitor's vision	From the map of the world and along the ridges into the sea. One million people. The salt particles stimulate the visitors' vision and transfer to different senses, allowing people to be involved in the work.
A5 Tactile interaction	A5-1 Data visualization by contact.	The Namu Cube is used as a means of accessing and manipulating digital content. The wooden cube is directly in contact with the round desktop to retrieve data on the screen in front of it and on the desktop.
	A5-2 Contacts salt crystals for interaction	The spectator touches the salt crystal and it starts to glow, and the salt particles are sprinkled under the table. Then merge into video, image, text, and other information windows.
A6 Creative experience	A6-1 Allows viewers to create interactive installations	Created by Los angeles-based artist Neil Mendoza, it is an art installation that remakes 21st-century classical painting. It allows spectators to poke, inflate, add water and even disco balls to fulfill their wishes.
	A6-2 Enabling audiences to actively create interactive art experiences	The installation consists of 15 drums that trigger light waves to propagate towards a 3m helium-filled sphere floating above the area. This achieves the main goal of creating an interactive art experience, allowing the audience to actively participate in the production of the work .....
A7 Feedback interaction	A7-1 The shape of the light changes into new shapes as the visitor moves	If an individual walks in a circular area, the inherent color of the colors will follow around. As people move closer to each other, the shape of the light gradually becomes a single state, turning yellow and filling the circular space.
	A7-2 To participate in learning discussions and voting, presented in data visualization	The roundtable's 'Ting' is a communication platform where visitors discuss and vote, moderated by a moderator. Through visualisation, learn to become informed about the controversial technologies that are the subject of discussion .....

Table 2: Continue

A8 Participate in environmental experience	A8-1 Viewer participates in the operation of the sensing device	Based on its unique digital 3-d, the work uses digital technology to control the fall of rain. When the audience passes through a raining environment, they are not wet, because the sensor tells the computer that the rain, which is controlled directly above your body, stops falling.
	A8-2 The moves in response to audience participation	These eight"Wings" allow the white ball to float freely in the theater mid-air, the principle of flying similar to a drone. Random International's designers have embedded sensors and algorithms that allow these bio-white balloons to sense the movement of an audience as it participates.
A9 Engaging interactions	A9-1 Shows the dream-to-reality interaction	The show by Studio Cutback offers a journey from dream to reality, through decorative materials and lighting, organic patterns and glass and ceramic mosaics adorn the hyperbolic vaults, inclined columns, and wavy facades.
	A9-2 The art of memory	His exhibition is not only immersive, but interactive. James George Frazer's exhibition plays an artistic role in various forms of activism by using images to evoke memories of the systematic oppression of the black people before and after slavery.
A10 Interesting interaction	A10-1 To increase the interesting interaction between the audience and the exhibition	To show the life and culture of Liangzhu culture, put your hand on the display wall, and there will be animations like grain loading. It's as simple as a mobile game, but also more intuitive and interesting, without any cultural background of the visitors. . It reduces the dull feeling of the culture museum and increases the interest of viewing the exhibition.
	A10-2 Fun connects the space to the audience	Interesting, dynamic and effective connection between the space and the participants.
A11 Transferable interactions	A11-1 Draws the audience's attention	It is shaped like a mirror, and when you stand in front of it, the pieces of wood on the mirror start to rotate, and the reflective pieces on its surface change, creating your appearance and attracting the attention of the audience.

Table 2: Continue

	A11-2 Capture the different behavioural characteristics of visitors and attract attention	The audience consists of a large group of head-sized mirror objects. Each object moves its head in a specific way to give it different human characteristics. Some people talk to each other, some are shy, some move confidently to get your attention.
A12 Diverse behavioral interactions	A12-1 Diverse behavioral interaction opportunities	The device comprises three positive connecting chairs and three negative connecting light cubic chairs. When these blocks are connected, information is passed from one block to another, and children are free to add building blocks and change the design and color of the space.
	A12-2 Changes the viewer's behavior to interact with the urban landscape	They're scanned, transformed into three-dimensional, virtual three-dimensional cityscapes. . Children can interact with the final cityscape by touching individual components to change their behavior.
A13 Emotional interaction	A13-1 Complex emotions	The Mandala Lab is an interactive device that stimulates curiosity about our emotions. . creating five thought-provoking, yet fun, sensory experiences.
	A13-2 Emotion recognition algorithm	The aim is to develop an expressive and effective interactive interface that uses a custom emotion recognition algorithm to read the viewer's facial expressions and, in turn, to trigger an eye-like dynamic simulation feedback formed by ferromagnetic fluid.
A14 Scene experiential interaction	A14-1 Different stages of interactive experience	The device consists of three large white screens and a still water surface in front of the screen. Participants stand in the area in front of the water scene and can complete different stages of the“Flying” interactive experience through infrared sensors.
	A14-2 Sense of experience	Using a motion-sensing device to capture movements, a book-flipping effect can be realized by waving one's arm. The Experiencer can flip a book at a certain distance from the book-flipping screen through the motion-sensing manipulation of the motion-sensing hand gestures, participants had a stronger sense of experience.

Table 2: Continue

A15 Interactive narrative	A15-1 Sound, visual art, technology and storytelling combined	An exhibition at the Bunjilaka Aboriginal Cultural Centre at the Melbourne Museum. The exhibition invites visitors to share moments of sensory awakening with an installation that combines sound, visual art, technology and storytelling .....
	A15-2 Linked to the corresponding story	An installation idea for 'New Forms of Future Storytelling', which explores the possibilities of storytelling using the 5 senses, was presented in the exhibition 'Sensory Stories' at the Museum of the Moving Image in New York. It speaks to the existence of the possibility of using multiple senses to portray stories .....
A16 Entertaining interaction	A16-1 Play equipment	The air bubble, located in the Polish Copernicus Science Centre, is a real clean air bubble and the world's first integrated air-purifying microalgae biotechnology playground.
	A16-2 Entertainment space	A park in East London has been designed as an activity structure to provide temporary shelter to the public. A space full of entertainment, showing the possibilities of urban space to stimulate our imagination, and providing a more innovative way for people to meet.
A17 Immersive scene interaction	A17-1 The immersion experience of the combination of virtual and real	Through the collaborative innovation of Space Design and imaging technology, it creates a brand-new experience of combination of virtual and real for the viewer. Inside the pavilion, visitors can experience the overlapping and interaction of multiple images, expanding the sense of spatial depth. .
A18 Emphasis on "human-centered" services	A18-1 Provides more services to the audience	The museum represents the cultural features of a country, a city and a region, is an important place to shape the regional image, and shoulders the great responsibility of“Urban regeneration”, we need to enrich and close to people's public life as much as possible, and provide more services of study, entertainment, leisure and experience for the audience.

Table 2: Continue

	A18-2 "People-oriented" services	The mission of the museum is to educate, research, spread, protect and serve the carrier of culture, it is in the inheritance of history
A19 Audience-centred design of learning experiences	A19-2 Makes the audience a participant in history	Under the influence of interactive art, the audience is urged to become participants in history, and the basic starting point is to awaken the audience's inner feelings, so that the audience can not only learn the relevant knowledge from their own experience, but also get the catharsis of their inner feelings, which triggers an empathetic response from the audience.
	A19-3 Stimulates learners' sense of social presence	It is recommended that the learners use their own mobile devices to assist the museum learning, which can increase the effective time of the Young Learners' museum learning, and at the same time ensure the continuity of learning, it is beneficial to stimulate the social presence of the learners.
A20 Multimedia technology applies	A20-1 Reduces sensory stimulation only by enhancing or using only cutting-edge techniques	Exhibition design should always be designed to maximise the effective dissemination of information and to reduce the need for sensory stimulation or the mere application of cutting-edge technology.
	A20-2 Rational use	In the design of museum exhibitions, we should make rational use of multi-media technology and seek for novelty and difference, but we should not blindly seek novelty regardless of the characteristics of the exhibits themselves.
A21 Interactive Media Service System	A21-1 Systematic	User Experience (UX) is a complex system process, which is based on a variety of perceived activities of the audience. As a display design that provides users with perceived objects, spaces and scenes, it also necessarily puts forward clear and systematic requirements for its process and results.
	A21-2 Constructs the service system	To construct a closed-loop service system of museum experience design for on-line and off-line services.

4.2 The spindle code establishes the master category

The task of spindle coding is to develop the nature and dimensions of the categories and to discover the underlying logical connections between the categories, for this reason growing the most important class and its sub-categories (Huang et al., 2020). This study explores strategies for the interactive design of urban public cultural spaces, categorizing the specific classes in accordance to their logical internal connections at the conceptual level and grouping them into 7 principal classes (see Table 3)

Table 3. Axial coding extraction.

The main category	**The corresponding category**	**Connotation interpretation**
B1 Multimodal interaction	A2 Auditory interaction	In the interactive design of urban public culture space, the use of hearing is also an important factor can not be ignored. The audience can sense the surrounding space environment through sound and experience the three-dimensional feeling it brings.
	A3 Taste and smell interaction	The smell can stimulate the audience's taste and olfactory organs, and make the audience produce different emotional and psychological changes, thus realizing the exchange of information.
	A4 Visual interaction	Visual interaction is visual and objective, depending on the eye's experience of light processing, and the audience's first impression of things is from the visual start.
	A5 Tactile interaction	In the interactive design of urban public cultural space, the audience perceives the real information conveyed by the environment or elements through the sense of touch during the interactive experience, that is to say, the distance between the audience and the whole space environment is emphasized, so that more viewers are willing to further participate in the activities of space, resulting in touch on the interactive.
B2 Full-sensory interaction	A1 Somatosensory interaction	As a new, capacity form of interaction, it is transforming people's understanding of traditional spaces and exploring new forms of behavior. Somatosensory interaction is a kind of interaction with the surrounding devices or environment by means of body movement, voice, eye movement and so on.

Table 3: Continue

	A8 Participation in environmental experience	The aim of urban public cultural space interaction design is to achieve the interaction and communication between people and Space Environment and environmental elements. Emphasize its active participation in the whole process of experience, fully mobilize the enthusiasm of audience interaction, in order to achieve better experience effect.
	A12 Diverse behavioral interactions	Conduct is conduct. The most favorable public cultural space for the development of physical, cognitive and social abilities of the audience should provide them with diversified opportunities for behavioral activities
	A14 Environmental experiential interaction	The essence of interactive design is to emphasize the user's experience, through the feeling, entertainment and emotional experience of the way between people and the space environment for interaction.
	A9 Engaging interactions	Through the sense of immersion into the space environment, the audience into which the whole body and space interaction with the environment interaction
B3 Experiential interaction	A11 Transferable interactions	From a psychological point of view, that is, through the perception of external things to obtain a sense of a certain object or phenomenon, and thus the formation of the psychological process. The overall sensory experience conveyed by sensory transfer.
	A17 Immersive scene interaction	When the visitor is fully engaged in the interaction of the spatial environment while performing an activity, he or she becomes immersed by paying attention and filtering out all irrelevant perceptions.
B4 Gameficati on interaction.	A6 Creative interaction	The so-called creative experience, is the audience produces a new unique, social value products and create a new phenomenon of the ability or attributes, so as to get a good experience.
	A10 Interesting interaction	Through carefully designed to create an interactive and interesting environment for the audience to interact with, so that visitors get emotional experience.
	A16 Entertaining interaction	Entertainment is a project, performance, or activity that gives visitors pleasure through the design of public cultural space to better interact with the space.

Table 3: Continue

	A7 Feedback interaction	Real-time feedback exchange on visitors' participation.
B5 Contextualised interaction	A13 Emotional interaction	The interaction of information and emotion between visitors and urban public cultural space environment and each element belongs to the interaction brought by immaterial environment.
	A15 Interactive narrative	In the narrative process, the expansion of the story line is not fixed, but will change according to the input of the audience to the narrative system, let the audience feel personally involved in the story, in order to better participate in the work of communication.
B6 User Experience Design	A18 Emphasis on "human-centered" services	"People-oriented" service as the center, to the audience to bring more learning, entertainment, leisure, experience and other services. It is of great significance to enrich culture and promote social change, and at the same time, it is also a kind of self-innovation based on people's needs.
	A19 Stimulation of learner participation	Based on the market demand and the potential audience's needs and desires, the theme and form of exhibition can be determined, which will help to arouse the social presence of learners.
	A20 Multimedia technology applicable	Adhere to the maximum efficient dissemination of information as the starting point for the design, reduce only enhance sensory stimulation or simple application of cutting-edge technology, and so on.
B7 Multimedia interactive technology	A21 Interactive Media Service System	The so-called interactive media service is a process that allows the audience to fully experience the service of the spatial interactive media. It takes improving the overall service experience of the customer as the starting point, and pays attention to every experience of the customer, use them to create service products.

4.3 Selective coding and model building

In the selective coding stage, it is necessary to identify and determine the core category, i.e. 'urban public cultural area interplay sketch strategies', which can be used as the overarching category for all other categories, and to carefully analyse the links between the core category and the primary class and different classes in order to outline its story line. find out about takes the core category of urban public cultural area interplay sketch

strategies, which includes three main categories: public cultural house interplay layout features, public cultural area trip carrier approaches, and public cultural house interplay ride effects. The story line structure of this core class consists of the following: multimodal interaction., full-sensory interaction, and experiential interaction are the characteristics of public cultural house interplay design; person trip format and multimedia interactive technolog are the ways of experiencing public cultural space; and gamefication interaction. and contextualised interaction are the effects of public cultural space interaction. The experience effect. These three factors collectively represent the interactive plan method for public cultural spaces. Based on the above "story line" framework, this find out about constructs a strategic mannequin of interplay sketch for city public cultural spaces (see Figure 2).

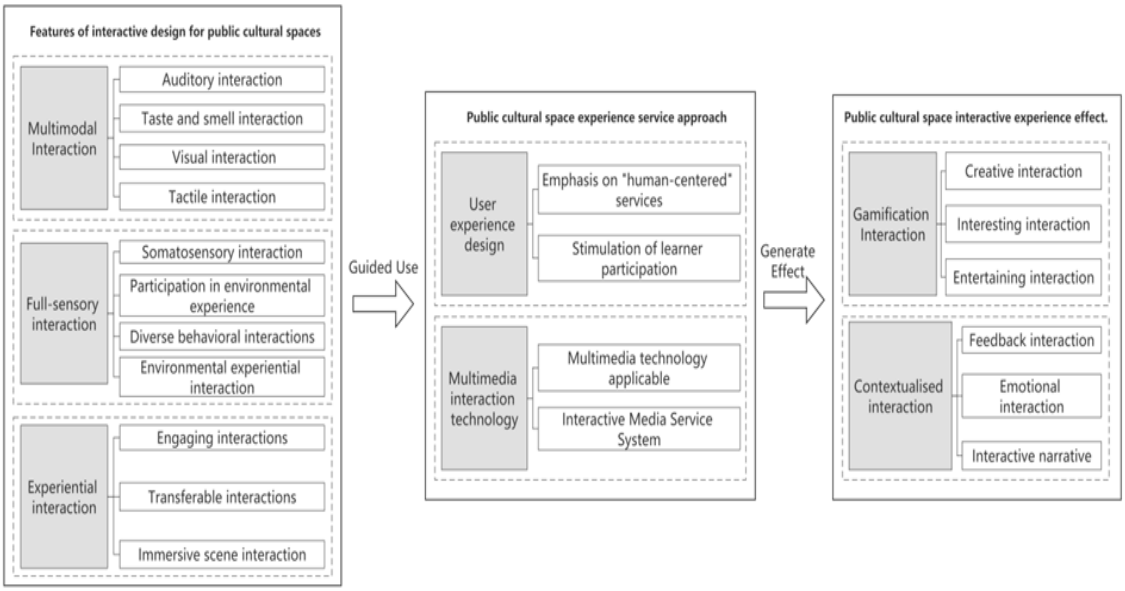

Figure 2. The model construction of interactive design strategy of urban public culture space.

4.4 Theoretical saturation test

In order to test the theoretical saturation of the model of interplay graph techniques for urban public cultural spaces, a random sample of 1/3 of every textual content from the cases and 10 interviews described in Table 1 was once sampled to pass the theoretical saturation test, and once more the open coding, axial coding and selective coding have been re-run in flip in accordance to the steps described previously. After analysis and with no new concepts or categories identified, sampling could be stopped. This indicates that the theoretical mannequin proven shown in Figure 2 passed the theoretical saturation test.

5. INTERACTION DESIGN STRATEGY MODEL FOR URBAN PUBLIC CULTURAL SPACES

5.1 Interaction design strategy model for urban public cultural spaces

Through the above coding and analysis, a model of interplay graph techniques for urban public cultural spaces has been established. The logical relationship between the interplay diagram facets of public cultural spaces, the service modes of public cultural space experiences and the interplay consequences of public cultural space immersion experiences in the model will be explained in relation to particular cases of best practice.

Multimodal interaction, full-sensory interaction and experiential interaction are theprincipal facets of interplay diagram for public cultural spaces. User ride format and multimedia interplay technological know-how are necessary factors of the experiential provider strategy of public cultural spaces, while the interplay plan of public cultural areas must be the core of consumer ride design. Interaction design in public cultural areas wishes to take into account factors such as users' behavioural habits, cultural backgrounds and interplay patterns in public cultural spaces, in order to guide users' interaction experiences in public cultural spaces. At the same time, playful interaction and contextual interaction are vital methods to promote the effectiveness of interactive experiences in public cultural spaces. The public cultural house trip carrier method enhances user engagement and delight via presenting customers with a broad vary of experience services. Specifically, thru person ride sketch and multimedia interaction technology, public cultural spaces can furnish extra comfortable, convenient and personalized journey services. In addition, through gamification and contextual interaction, public cultural spaces can create a extra difficult and fascinating trip environment, as a consequence attracting active participation and generating a more profound interactive experience. Therefore, the ride carrier strategy of public cultural spaces is to promote the interactive trip impact of public cultural areas via offering diverse, personalised and fascinating journey services. On this basis, the dimensions of the model are described in detail below.

5.2 Composition and dimensional connotations of the model of interaction design strategies for urban public cultural spaces

5.2.1 Interaction design characteristics of public cultural spaces

As mentioned above, multimodal interaction, full-sensory interaction and experiential interplay represent the characteristics of interplay sketch

for public cultural spaces (Lv & Zhang, 2022). Multimodal interaction is the process in which a man or woman acquires records via special through different perceptual channels and merges and unifies this information to have interaction with objects (including people, machines, animals, etc.). Perceptual channels are the main way in which the human body comes into contact with the external world, and human perception of the world starts offevolved with perception. The stimulus signals perceived through the auditory, visual, olfactory, tactile and gustatory sensory channels are transmitted to the Genius thru the neural transmission system, as a consequence forming our perception of the properties of things. In multimodal interaction, different perceptual channels collaborate with every different to enhance and complement each other's information, for that reason making the interaction richer and greater positive (Xu & Xu, 2021) (see Figure 3). According to the summary overview performed by means of the Hakuhodo Institute for Integrated Living Research in Japan in The Age of the Five Senses - The Sociology of Consumption of Sight, Sound, Smell, Taste and Touch, cultural experiences are pursued, digital technological know-how is applied, sensory perceptions are restored and human nature is mastered as a whole.

These applications are manifested in a variety of ways, such as the need for multisensory integration in cultural communication, advances in digital technological know-how that have driven the development of virtual reality, augmented reality and blended fact applied sciences to restoration multimodal cognition via supplying customers with a variety of sensory elements, and in social lookup the place multimodal human interaction has obtained growing interest in order to master the wholeness of human nature (Xu & Xu, 2021) Full-sensory interaction refers to the creation of an built-in ride and interplay via a couple of sensory channels so that users can experience and participate in the interaction in a more realistic and natural way. Full-sensory interaction integrates different sensory inputs to allow the user to gain a deeper understanding and experience of the content material being interacted with. It can be applied in the fields of virtual reality, augmented reality and multimedia interaction to provide users with a richer, more vivid and fascinating trip (Li, 2017).

For example, the Museum of World Cultures in Stockholm, makes use of superior holographic projection technological know-how to present visitors with different cultures and histories from around the world (see Figure 4). Experiential interactivity is centred on the consumer ride and allows for an all-encompassing sense of engagement and interactive journey thru a couple of sensory and technological means (Palibak-Kiryu,

2022).

This interactive approach transforms users from passive recipients of information to lively individuals and creators, allowing them to fully and deeply understand and experience the things and scenes in the interactive surroundings via immersive feelings and behaviours (see Figure 5). The Aboca Experience, for example, is the new multimedia presentation part of the Aboca Museum in Italy, opening up and offering to the public a special historic experience in the world and a new fully interactive and immersive room. Here the target audience can experience, rather than just visit, thru remarkable views and new tools, delivered through an emotional and intuitive journey.

Figure 3: Multimodal interaction
(credit: https://artmuseumteaching.com/tag/gallery-one/)

Figure 4: Experiential interaction
(credit: https://www.dotdotdot.it/works/aboca-experience)

Figure 5: Experiential interaction
(credit: https://www.dotdotdot.it/works/aboca-experience)

Therefore, in the interaction of public cultural spaces, more than a few interactive methods such as senses, actions, speech, AR, VR, and others are in most cases used to play a role in highlighting the diagram points of public cultural spaces, appeal to the audience's attention to interactive behaviors as a good deal as possible, and thereby enable them to have a deeper memory and understanding of the information conveyed by means of the design (Zhou & Liu, 2022). Through public cultural spaces, the inventive traits of exhibits can be reflected, and visitors can be guided to site visitors in a dialogue with the exhibits, in particular thru capability such as space, text, images, color, and lighting, the ideas and content material of exhibitions can infect visitors, thereby achieving aesthetic effects of visual impact (Liu, 2021). In the design of public cultural spaces, it is necessary to utterly fulfill people's demand for the integration of art and science, to reflect the conversation capacity between human beings and the surroundings via visible language and auditory perception, and also to consider the aesthetic and emotional conversation amongst exceptional corporations of people, in order to create a harmonious atmosphere and enable them to achieve the most impact (Zhou & Guo, 2022).

5.2.2 Public cultural space experience service approach

The experience service mode of public cultural space is a service mode that integrates knowledge, interaction, entertainment, and participation, which can better exert its very own useful role, promote public participation in social life, and improve people's cultural literacy (Li & Fu,

2017). Specifically, person trip format places the user at the core of public cultural space, and user experience design and multimedia interplay science can be one of the ways for public cultural space to provide experience services. Multimedia interplay technological know-how is increasingly more built-in into urban public cultural space, and this trend is particularly evident in exhibitions. The application of user experience design and multimedia interplay technological know-how permits traffic to have richer and more vivid experiences in exhibitions, thereby increasing the attractiveness and participation of cultural space (Cao, 2020).

In terms of consumer ride design, it is necessary to fully understand the needs and expectations of the goal target audience and provide diversified services and experiences for different audiences (Yang et al., 2021). For example, for child and teenage audiences, interactive and fascinating exhibition items can be designed to stimulate their curiosity and interest; for adult audiences, more in-depth and expert content material and experiences can be provided to help them gain more knowledge and thinking in exhibitions.

Multimedia interplay technological know-howcan bring users a more vivid and intuitive exhibition experience. Through technologies such as multimedia display, virtual reality, and augmented reality, visitors can gain a deeper understanding of exhibits and have a more three-dimensional and immersive experience. For example, in a museum, various technologies such as touch screens, VR glasses, sound contributions, and digital animation can be used to allow visitors to interact with exhibits and have immersive experiences, thereby enhancing the attractiveness and participation of exhibitions (Huang, 2019).

Therefore, the various needs of the audience generated during the experience of public cultural spaces should be met through the artistic exhibition and design of these events, in order to satisfy the spiritual needs of the audience in their daily lives. Currently, the development of public cultural spaces in cities is hindered by weak infrastructure, incomplete operation and management mechanisms, and low public participation. Against the backdrop of the new era, it is necessary to build a diversified content supply mechanism, establish an efficient interactive experience service system, cultivate public participation awareness, increase public participation, promote the improvement of public aesthetic level, and enable people to truly feel the progress and development of modern society's culture. In addition, attention should be paid to the interaction between online and offline services, and more interactive service methods should be used to understand the needs of the public, guide the correct

use, improve the service methods and platform construction, and increase public participation and satisfaction (Lin, 2022). Strengthening the integration and utilization of public cultural space resources and enriching the spiritual life of the audience is an effective way to enhance the services of public cultural spaces. (see Figure 7).

Figure 6: Spatial interaction service approach
(credit: http://mt.sohu.com/20160326/n442214182.shtml)

5.2.3 Interactive Experience Effect of Public Cultural Space

Public cultural spaces achieve an immersive experience by using gamified and scenario-based interactions to allow users to interact and communicate with cultural content and environments. This effect can help users better understand and experience cultural content, improving their level of awareness and perception of culture.

Gamified interaction is a technology and strategy that uses gamification to achieve user participation and interaction. It integrates the characteristics and elements of games, such as competition, rewards, and a sense of achievement, and applies them to non-gaming fields such as museums, exhibitions, and art galleries.

This approach can attract more visitors, increase their participation and learning effectiveness, present cultural knowledge in a more vivid and interesting way, enhance their understanding and memory of cultural knowledge, and thus expand the dissemination of culture. In addition, gamified interaction can also increase visitors' attention and awareness of museums, exhibitions, and art galleries, and enhance their brand influence (He, 2019).

Figure 7: Gamification interaction
(http://www.cnzhanting.com/news/latest/266.html)

The immersive interactive effects of public cultural space can be achieved through various technological means such as multimedia displays, virtual reality, interactive games, and artificial intelligence (Yang, 2021). For example, in museums or art galleries, immersive experiences can be created through digital displays, virtual reality installations, and other means to help visitors better understand cultural knowledge. In libraries, digital libraries and online reading methods make it more convenient for readers to access knowledge and information, while also enhancing their reading experience.The interactive experience in public cultural spaces can not only increase users' interest and participation in culture but also promote their understanding and inheritance of culture, thereby enhancing the social status and influence of public cultural spaces. At the same time, this type of interactive effect can also provide references and inspiration for the design and services of public cultural spaces, promoting their innovation and development (Deng, 2022). (see Figure 8).

Figure 8: Contextualised interaction
(https://www.katapult.co.uk/10-of-the-best-interactive-museum-exhibition-ideas-for-curators/)

6. RESEARCH CONCLUSIONS AND IMPLICATIONS

6.1 Research findings

This article uses the grounded theory method to gradually code and systematically analyze relevant textual materials on urban public cultural space interaction design. Word frequency analysis of the textual materials is conducted by year, and the following conclusions are drawn:

(1) A design strategy model for urban public cultural space interaction is constructed based on grounded theory. Multimodal interaction, multisensory interaction, and experiential interaction constitute public cultural space interaction design characteristics. User experience design and multimedia interactive technology are the public cultural space experience service methods. Gamified interaction and contextualized interaction are the interaction experience effects of public cultural space interaction. Therefore, the strategy has a certain stage process: guiding usage and generating effects.

(2) Currently, the interaction design of urban public cultural space has mainly undergone technological changes, and the construction focus of urban public cultural space has changed. In the initial stage of technology, the focus was on the category of multimodal interaction, multisensory interaction, and experiential interaction. With the application of information technology in social production and life, the development of new media technology has brought opportunities. In the stage of a continuous deepening of technology and service, "people-oriented" service user experience design is highlighted. The focus is on mobilizing learners' participation and applying multimedia technology, and interactive media service systems, but gamified interaction and contextualized interaction are the interaction experience effects that have been felt better in urban public cultural space interaction design.

6.2 Research Contributions

(1) Innovative research content. This paper systematically summarizes the textual materials of urban public cultural space interaction design by reviewing domestic and foreign literature and research results, and for the first time, applies the research method of grounded theory to extract categories and construct a theoretical model for urban public cultural space interaction design. It explores the characteristics, service methods, and interaction experience effects of urban public cultural space interaction design, clarifying the logical relationship between the characteristics of

public cultural space interaction design, the ways of public cultural space interaction, and the effects of public cultural space interaction experience. Finally, the paper proposes a design strategy for urban public cultural space to provide research and practical reference for urban public cultural space interaction design.

(2) Theoretical innovation in research. The paper constructs a model for the design strategy of urban public cultural space interaction. Currently, research on interaction design in the context of urban public cultural space mainly focuses on specific studies, emphasizing artistic, technical, and service considerations. For the first time, this paper abstracts a design strategy model for urban public cultural space interaction design by summarizing and analyzing existing practices as a theoretical framework for reference in urban public cultural space interaction design.

6.3 Research Outlook

The data for this study was obtained from textual materials such as cases, works and literature related to the interactive design of urban public cultural spaces. Although the process of collecting textual data for coding took into account the comprehensiveness and completeness of the data as far as possible and followed the principle of theoretical saturation, there may still be a certain degree of subjectivity and focus in the release of the data information itself. In-depth interviews can be used as a source of information to further validate and supplement the interaction design model for urban public cultural spaces in the future. At the same time, although this paper is a theoretical discussion of the interactive design of urban public cultural spaces based on practical summaries, there is still a paucity of theoretical research on the subject. This paper is a theoretical discussion of the interactive design of urban public cultural spaces based on practical findings, but there is still a lack of theoretical research on the subject.

References

Bamkin, M., Maynard, S., & Goulding, A. (2016). Grounded theory and ethnography combined: A methodology to study children's interactions on children's mobile libraries. *Journal of Documentation*, *72*(2), 214-231.

Becker, M., Eigenfeld, R., & Kerpes, T. (2023). Understanding the commercialization of intellectual property patents in Europe: Highlighting Implications and Regulations for the biotechnology sector. *Journal of Commercial Biotechnology*, *28*(1), 252-264. https://doi.org/https://doi.org/10.5912/jcb1902

BG, G. (1967). Strauss A. The Discovery of Grounded Theory. In: chicago: aldine.

Cao, S. (2020). User experience based on digital media technology in museum space display operation. *Computer products and circulation*(01), 113.

Chen, X. (1999). Ideas and methods of rooted theory. *Educational Research and Experimentation*(4), 58-63, +73.

Deng, N. (2022). "An Empirical Study on the Effectiveness of Interactive Experience Design Applied to Children's Museums - Taking Shanghai Children's Museum as a Research Object.". *Oriental Collection*, *12*, 70-73.

Fang, Y., & Liu, Y. (2019). Soft governance: The expansion of rural public cultural space in the new era. *Chang. Acad. J*, *35*, 138-145.

Fu, C., & Zhang, Y. (2022). A preliminary investigation on the interactive design of urban public space based on digital games. *Footwear Technology and Design*, *2*(07), 131-133.

He, H. (2019). Gamified participants and sexual experience design for future museums. *China Art*(02), 102-107.

Hong, Z. (2018). Designing Interactive Spaces in Urban Public Environments. *Smart City*, *4*(23), 4-5.

Huang, F. (2020). The path of integration and development of urban public cultural space. *Library Research and Work*, *191*(05), 5-9.

Huang, T. (2019). Exploring the application of multimedia interactive technology in museum exhibition design[A]. China Film Museum. The Film Museum - Influence Collection (2019). *China Film Museum*, 7.

Huang, T., Nie, R., & Zhao, Y. (2020). Archival knowledge in the field of personal archiving: an exploratory study based on grounded theory. *Journal of Documentation*, *77*(1), 19-40.

Huang, X., & Li, W. (2011). Interactive design approaches in contemporary museum displays. *Decoration*(4), 104-105.

Jia, Z. (2015). Application of grounded theory in public management research: Methods and practice. *Chin. Admin*, *3*, 90-95.

Jin, D., & Wang, L. (2019). Fusion of urban public cultural space and new media under the cultural interaction perspective [J]. *Journal of Chang'an University (Social Science Edition)*.

Li, C. (2017). A preliminary exploration of museum experiential exhibitions. *A preliminary exploration of museum experiential exhibitions*(01), 89-100.

Li, G., & Fu, C. (2017). Promoting the deep integration of culture and science and technology is the basic policy path to break through the cultural development dilemma. *Journal of Ocean University of China (Social Science Edition)*(03), 46-54.

Lin, H. (2022). Research on the development and utilization of local history under the perspective of public cultural services. *Guizhou university*.

Liu, K., & Xu, C. (2019). Research on the Dynamic Mechanism of Cultural Innovation in Urban Open Space. 2019 International Conference on Economic Management and Cultural Industry (ICEMCI 2019),

Liu, W. (2021). The application of Dieter Ramsay's "10 principles of good design" in museum exhibition design. *Hunan Packaging*, *36*(01), 140-143.

Lou, Y. (2017). Human-computer interaction, sustainability and design from the perspective of NHCAS. *Decoration*(1), 66-70.

Lv, M., & Zhang, X. (2022). Interaction design of Chinese umbrella museum based on emotional experience. *Industrial Design*(05), 113-115.

Musa, M. A. F. F. (2020). The development of architectural technology and Impact on the interior design of interactive spaces. *International Design Journal*, *10*(3), 193-201.

Nadal, L. M. (2000). *Discourses of urban public space, United States of America, 1960–1995: A historical critique* Columbia University].

Palibak-Kiryu. (2022). Exploration of interactive and experiential education in museums. *China Ethnic Expo*(16), 207-209+216.

RICHARD, S. (2008). The Decline of the Public Man. *Shanghai Translation Press.*

Shan, J., & Mei, H. (2020). A Theoretical and Practical Review on Multi-Sensory Interactive Space Design for Autistic Children. Proceedings of the 2020 4th International Conference on E-Education, E-Business and E-Technology,

Viktoriia, F., & Tetiana, U. (2020). Urba ain cultural space in the context of evolutionism. *Journal of History Culture and A Art Research*, *9*(1), 458-467.

Wang, C., & Li, S. (2021). Current status and reflections of international urban cultural space research. *China Famous Cities*, *35*(04), 15-23.

Wang, Z., & Fu, Z. (2020). Resilient, active, sticky: Re-discussing the governance of urban cultural space. *Chinese Administration*, *422*(08), 146-148.

Xu, W., & Xu, M. (2021). Exploring the strategy of multimodal interaction in digital experience design[*Art and Design (Theory)*, *2*(04), 72-74.

Yang, J. (2021). Exploring the design of ecological museum display platform based on VR virtual modern technology. *Environmental Engineering*, *39*(11), 213.

Yang, L., Liu, G., & Zhai, H. (2021). Research on the influencing factors of user acceptance of intelligent interactive exhibits in science museums oriented to user experience design. *Industrial Engineering Design*, *3*(06), 10-22.

Yao, W. (2020). Research on the application of interactive design in urban public spaces under the background of artificial intelligence. *Ju She*, *36*, 69-72.

Yu, J., & Wang, Y. (2020). Exploring the path of cultural innovation in China's cities based on cultural scene theory. *Journal of Urbanism*, *41*(02), 23-29.

Zeng, L., Zhou, H., & Gong, Z. (2020). Reengineering public cultural space in urban communities from the perspective of emotional governance--a field investigation based on the Tianping community in Shanghai. *Chinese Administration*, *415*(01), 46-52.

Zhou, C., & Guo, R. (2022). Research on immersive new media display strategies in folklore museums. *Beauty and Times (Urban Edition)*(08), 116-118.

Zhou, Y., & Liu, J. (2022). Interactive design of museums in the perspective of audience experience. *New Media Research*, *8*(22), 37-40.

Zhu, F., Xu, Y., & Wu, X. (2022). Research on the interaction of virtual reality technology in new media art from the perspective of modal theory. *Grand View*(07), 110-112.

Zoé, M. (2023). Leading the Path for Personalized Medication and Medical Technology: Highlighting the strategies to Overcome Barriers to Adoption, Regulation, and Reimbursement Perspectives. *Journal of Commercial Biotechnology*, *28*(1). https://doi.org/https://doi.org/10.5912/jcb1526