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Research Article

Design and Analysis of Immersive Interaction Scenarios for Social Products

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In the Internet era, with the continuous iterative updating of communication technology and the development of artificial intelligence, Internet of things, 5g, and other technologies, all kinds of social products have become one of the main ways of communication. For example, Facebook, WeChat, and ins are essential products for people in modern society. From personal communication to world interconnection, they are inseparable from the support of social products. At present, various social products in the market have different advantages or specific users and often cannot deal with all user groups. Because the needs of different customers are different and cannot fully meet the needs of different users, coupled with the development of technology, the communication media is becoming more and more innovative, the boundary between virtual and reality is broken, and the immersive scene breaks through the boundary of traditional communication, which is the way people want to communicate. In view of these shortcomings and needs, this paper introduces the methods of immersive scene diversification. First, sort out the user needs, then build different user models according to the specific characteristics of different scenarios, and realize the interaction of different scenarios according to different scenarios. The end-user model interacts with the corresponding design. After continuous testing, feedback, and improvement, the efficiency, quality, and specific methods of socialized products are improved. The experimental analysis results of this paper show the effectiveness and rationality of the immersive scene diversification method. The design can break the barriers and enhance the interaction efficiency and quality of both sides of information flow. The main body of information dissemination also presents a multilateral form and improves the inequality of information dissemination.

1. Introduction

With the continuous development of social economy, Internet technology, network transmission technology, mobile equipment, etc. continue to improve and upgrade, which has brought revolutionary changes to many industries [1, 2]. In actual communication, social products, as one of the important methods in the Internet era, are becoming more and more popular, such as WeChat and Douyin [3, 4]. Social products have also changed from the initial text-based chat and communication tools to comprehensive products that integrate multiple technologies, such as sharing of videos and pictures [5, 6]. As a new technology that can simulate the scene, virtual reality technology has gradually introduced social products [7, 8]. This kind of technology can let users experience the immersive feeling through external equipment and meanwhile realize the creation and experience of the virtual environment. This method is applied in a wide range of fields such as games, tourism, architecture, aviation, and medicine. The traditional virtual roaming method is usually to project the corresponding content on the screen through the computer equipment to realize the interaction of the mouse and the keyboard, but this method is less subjective, less involved, and the experience of immersion is relatively poor [9, 10]. However, it should be noted that as for an Internet product or new software products emerging in endlessly, if only a single, traditional service is provided, it will gradually lose users and even the experience, and the iterative update of the product is also poor, which will affect the actual demand

of users [11, 12]. In the context of global economics, the emergence and improvement of 5G transmission technology have greatly improved the corresponding network speed, especially the selling well of mobile devices, making various software products attached to mobile devices gradually become rich and diverse [13, 14].

In response to these limitations and needs, a method of immersive scene diversification is introduced by trial in this paper to sort out the needs of different consumers in different scenarios, build corresponding demand models, and implement interactions in different scenarios based on different user models. Relying on the corresponding design for interaction, we design products that meet the needs of different customers and meet the requirements of enterprises through continuous testing, feedback, and improvement, aiming to improve the quality and efficiency of interaction of social products.

2. Related Works

Definition of Scene: the so-called scene refers to the diversification of its environment, location, and state as a scene or situation of a film and television [15, 16]. In order to provide high-satisfaction user experience and product sustainability, ensuring the correct direction of product information architecture and the usability of interactive design are necessary conditions for software success [17, 18].

In the process of social interaction, interest is used as a medium to attract users and generate content and improve the social ecology of software [19, 20].

The first four parts of "discovery" need to go to the next level for finding content, and the waterfall flow is used to directly display the content of interest for the latter three, but the social connections in this sector are weak.

First, it is necessary to explore the depth of the path according to the corresponding interest content. If only a part of the hobbies is displayed, the other hobbies require more complicated operations to be discovered and found, which will hinder normal social interaction.

Secondly, the level of interest is followed too deeply. If you want to find nearby people to exercise with you, you need to take the following steps: discover—same city—someone—follow, and the enthusiasm of users to follow actively is hit by multiple levels [21, 22].

Finally, it needs to be classified according to user interests in different environments, which will enable more users to participate [23, 24].

Therefore, under the premise of correct framework structure, it is necessary to explore deeper interest points and classifications, reduce flashy operations and unnecessary operations, establish new interest points and operation methods, promote the socialization of products, and further enhance the user's experience. With stickiness, users can "love, want to use, and know how to use it".

The "Following" part is divided into followed and group. Friends or coaches are displayed in the followed, and group dynamics are displayed in the group, creating clear and definite hierarchy. The form of the follow part is like the homepage of Weibo, where you can view other people's dynamics and generate social behaviors.

The current problem is that the "Follow" section is not highly interactive, and the group level is too deep. It only takes one to two steps to see the follower's information, while the content of the group requires one more step. The lack of recommendation of related interests is not conducive to promoting users to add new followers.

The Application of the Scene in the Internet: research on the relevant basic status quo of social participation involved in the current smart elderly care process is performed, including the characteristics of infrastructure, service provision, related policies, and public acceptance.

The vector metaphorical mapping relationship between behavioral characteristics of target users' social participation, the social elderly care needs, and product design expressions is researched, to realize the twice vector mapping of smart elderly care communication products: "existing product demand expression-target user social participation needs semantic collection-future product innovation design".

Combining the development laws of smart technology, through qualitative research methods in psychology, physiology, behavior, and informatics, the possible emotional transmission needs are explored in future smart elderly social services with the help of physiological test data representation, and design methods are used to expand the virtual construction of future scenes. With the help of subjective scales and physiological instrument tests, potential needs are selected and screened through user experience testing to summarize design rules and establish smart elderly care cognitive group and individual theoretical models based on interactive multimodal input-physiological representation-interactive feature vector mapping and to explore the mechanisms and laws of social-emotional transmission of elderly care at different stages of information technology development and the laws of group-to-individual cognitive evolution.

In summary, based on the mapping relationships of "elderly care social needs input-physiological representation information-social participation behavior output," a product cognition and experience model of this group of people's future social participation can be established. Based on the cognitive model and behavioral habit perception, a hierarchical model of the interactive design information of smart elderly care products under different interaction modalities can be established to explore the iterative rules of design logic prediction and compensation strategies that the behavioral pleasure of elderly users evolves with the time sequence of social participation behavior characteristics, which provides theoretical and methodological references for the interactive design methods of future smart products.

Teaching Analysis: the analysis of courses and learners helps to clarify the learning goals and the current level of learners. The film and television topics of the "Visual Culture and Media Literacy" course are selected for the research, with "micro-film" as the theme, to guide learners to explore the knowledge of microfilm; recognize, understand, and reflect on the characteristics of microfilm; and combine

Table 1: Activity resource design.

Resources form	Resources content	Resources function
Literature resources	Teaching material of visual culture	Supplementary knowledge learning
Courseware resources	Multimedia courseware	Supplementary knowledge learning
Case resources	International Micro Film Festival of China awards video, short film behind the scenes of the microfilm "Beijing Love Story"	Stimulate interest in learning and create an activity context
Website resources	15 related websites such as Iving, iruing.com, vmovier	Provide reference information to expand knowledge content
Thematic learning website	Visual culture website	Expand knowledge content

theoretical learning with practical activities. Learners' interest is excited in film and television arts, to enable learners to grasp the latest developments in current film and television arts, while cultivating visual literacy and media literacy simultaneously. Course learners come from the faculties of sophomore and junior colleges, aged between 18 and 25 years old. Learners in this age group have matured minds, with high abstract and theoretical thinking, and possess a certain degree of dialectic logic thinking; they have accumulated theoretical knowledge of visual literacy, media literacy, and experience knowledge of film and television arts and have mastered certain information technical ability, and most of them have a Renren account and use experience; they have a high interest and enthusiasm for exploring the popular "micro movies".

Mission Design: reasonable design of activity tasks is conducive to the realization of activity goals and the orderly development of activities. According to the main objectives of the activity tasks, three types of tasks are designed: sharing, discussion, and design. Shared tasks refer to learners to search for resources around a topic and share them in a collective space, that is, learners are required to recommend a micromovie to share on a public, explaining the reason for the recommendation, and then vote for the recommended micromovie, and "Excellent Micro Film in My Mind" is selected. Discussion tasks refer to learners to discuss about a topic or problem, that is, learners are required to discuss the essential elements of a good microfilm in the discussion area. Design tasks refer to learners to design works according to task requirements, and to summarize and report, that is, learners are required to discuss how to make microfilms, while designing microfilm creation plans, and display and vote to select the "best planning plan."

Resource and Tool Design: online learning activities are mainly based on network resources, so the design in this paper is mainly performed from the content, form, and function of the resources. The content of resources includes basic resources, related resources, and extended resources; the form of resources includes literature resources, courseware resources, case resources, website resources, etc.; resource functions mainly include assisting knowledge learning, stimulating learning interest, creating activity scenarios, providing reference information, and expanding knowledge content, providing resource support for the activity for learners. The specific content is shown in Table 1.

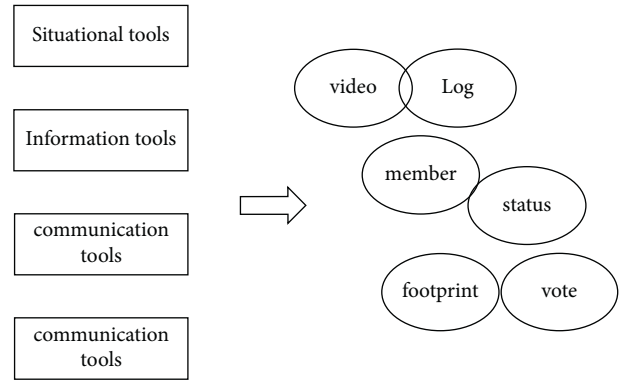

Figure 1: Activity tool design.

According to the functional characteristics of web pages and the requirements of activity tasks, the learning platform is mainly composed of public home pages, situational tools, and information tools. The detailed architecture of communication tools, evaluation tools, and management tools is designed, as shown in Figure 1.

Rules and Strategy Design: activity rules can ensure the smooth development of learning activities and help build a favorable and harmonious humanistic environment. According to the theory of group dynamics, the group norm of the behavior standard expected by the whole group and each member must abide by has the function of guiding, constraining, and correcting the behavior of group members, which ensures the sustainable development of the group to a large extent power. The rules of activity development and interpersonal communication are designed in the research, requiring learners to abide by the corresponding behavioral norms and systems during the activity. Activity strategies can be used to guide and promote the communication and emotional exchanges of learners in the course of the activity so that the learning collective becomes a harmonious group with strong cohesion, active interaction, and mutual help. The research designed a situation creation strategy (introduce activities through typical cases or questions), task-driven strategies (dividing learning activities into subtasks), supervision and guidance strategies (timely announcement reminders or guidance with appropriate questions), and reward and evaluation strategies (appraisal and reward links are set up for sharing type and

design activities) to guide and manage learners. In the design of learning situations, attention should be paid to the purpose, virtuality, and interactivity of the situation, and the enthusiasm of learners should be cultivated through the interaction between learners and the learning environment and teaching content.

3. Methods

3.1. Scenario-Based Interactive Design Thinking

3.1.1. Scene Analysis in the Design Process. For the design process, designers relying on immersive scenes need to consider specific designs from the needs of users and focus on the user's expected experience, process experience, conversion costs, etc. throughout the entire process. In the actual design, we mainly take the comprehensive correlation of psychology as the theme, think from the perspective of users, meet the basic needs of users, and formulate corresponding analysis methods according to the real needs and objectives of various scenes, so as to improve and perfect the user needs in the iterative version of the product.

During the process of product use, the diversification of scenarios can be distinguished according to different use environments. The social products are mainly used to determine the user's geographic location and the information obtained by the user opening the software, and the evaluation of the product and the search for the product belong to other secondary scenarios. In different scenarios, it is necessary to consider not only the liquidity of social products in the main scenarios but also the response speed and content of other secondary scenarios so as to ensure the quality and advantages of social products and provide various users with need.

3.1.2. Key Points of Use Scenario Design. According to different user needs, a diversified interactive design process is proposed for immersive scenes in order to provide users with more and better actual experience, combined with the current more mature interactive design methods, which specifically needs to address the following three key issues:

(1) Product interaction design after opening social products: this part is about how to switch and analyze the real-time experience of each other in different scenarios. When interacting with different Internet products, you need to ensure that social products can respond to the corresponding speed in a timely manner and, meanwhile, let more users adapt to the corresponding switching product. For other special needs, they need to be considered separately.

(2) The interactive design of the product in the process of switching between different scenes: in the interactive design process of social products, the multiparty experience of the product designer and the user needs to be considered comprehensively, to meet the needs of users as the first priority, to achieve the usability and convenience of social products, to establish a close relationship with the iterative update of the product, and to gradually make users rely on and willing to use relevant social products. For users with low engagement, further publicity and analysis can be carried out.

(3) In the process of scene transformation, it will affect the user's experience and perception, and design according to the characteristics of the product.

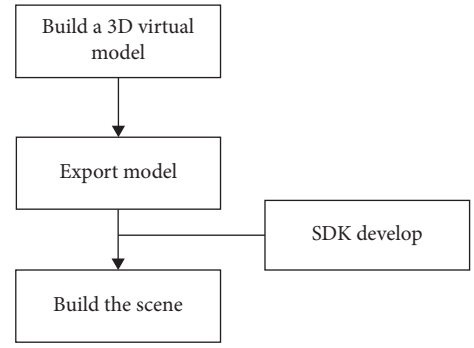

Figure 2: Flow chart of virtual scene construction.

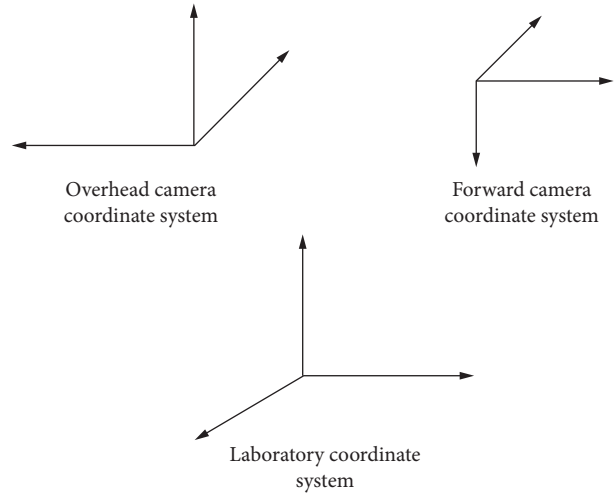

Figure 3: Several different coordinate systems.

3.2. Construction of Immersive Virtual Scene. The construction of the immersive scene is mainly completed by relying on the corresponding auxiliary tools. Its essence is divided into two steps: the first is to construct the corresponding immersive virtual scene, and the second is to integrate the corresponding virtual scene with real data. The specific process is shown in Figure 2. When constructing a virtual scene, first use the corresponding software to construct a three-dimensional virtual scene model and then import tools to achieve the integration of real data and virtual scenes. While constructing virtual scenes, you also need to perform processing and analysis of real data.

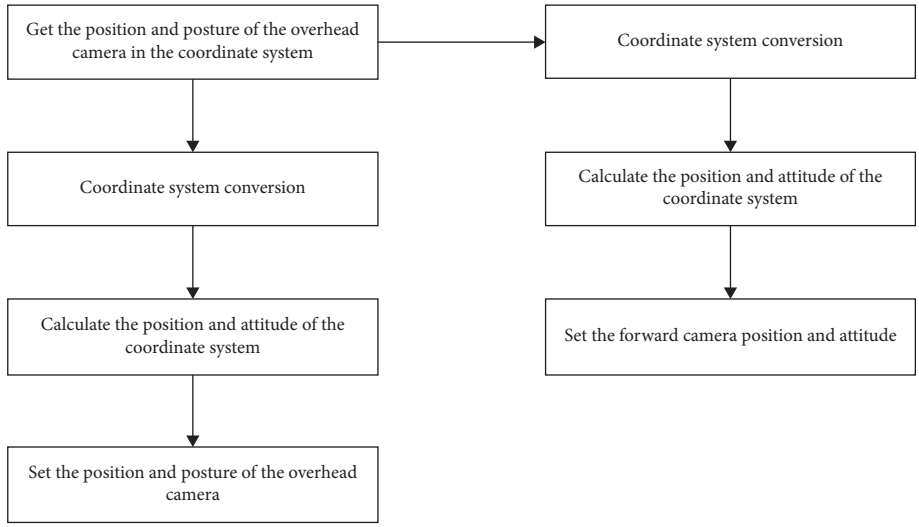

Figure 4: Schematic diagram of the transformation process between virtual and real registration coordinates.

Before constructing the corresponding immersive virtual scene model, you first need to initialize the software and set the corresponding step length as meters so as to ensure that the subsequent measurement units are accurate, consistent, and comparable.

The corresponding immersive virtual reality scenes, character's film, and portray of people are derived from the corresponding software and according to the set parameters to ensure that the corresponding original model is consistent with the exported model size.

In order to realize the matching between virtual and reality, the data output by the high-precision positioning and tracking system needs to be processed, that is, coordinate transformation as shown in Figure 3.

The specific implementation process of the coordinate conversion is shown in Figure 4. In immersive virtual reality, the external device on the head is used as the first perspective to simulate the user's perspective. According to the corresponding visual principle, the corresponding transformation matrix model can be calculated and verified [25].

First of all, according to the software interface of the corresponding position tracking, and according to the interface, the relevant position information shall be obtained so that the position and status in the corresponding coordinate system can be obtained, which can be expressed by M_{e_top}, such a matrix is $4 * 4$.

Secondly, the transformation matrix of the camera can be calculated according to the information obtained by the corresponding interface and the corresponding coordinate transformation. After transformation and verification, the position and state of the coordinate system can be obtained, expressed as M_{e_front} by the following formula:

$$M_{e\_\text{front}} = M_{e\_t2f} \cdot M_{e\_\text{top}}. \tag{1}$$

In the third step, according to the transformation relationship between the laboratory coordinate system and the Virtools coordinate system, the transformation matrix M_{e2v} is obtained, and the position and posture of the overhead camera and the forward camera in the Virtools coordinate system are, respectively, denoted as M_{v_top} and M_{v_front}, and the calculation is as shown in the following formulas:

$$M_{v\_\text{top}} = M_{e2v} \cdot M_{e\_\text{top}}. \tag{2}$$

$$M_{v\_\text{front}} = M_{e2v} \cdot M_{e\_\text{front}}. \tag{3}$$

The fourth step is to use the SetPosition and SetOrientation functions to set the position and orientation of the two cameras.

The calculation of up vector is shown in the following formula:

$$V_{\text{up}} = V_{\text{dir}} \times V_{\text{right}}. \tag{4}$$

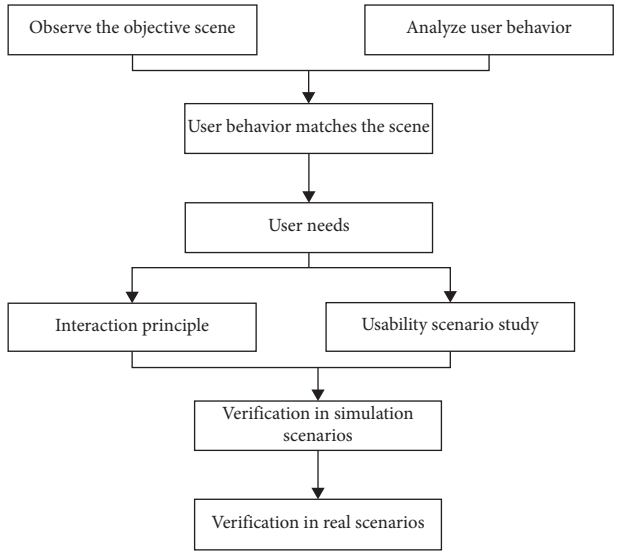

Figure 5: Scene-based interaction design process.

3.3. Interactive Design Process under the Usage Scenario. The scenario-based interactive design process is shown in Figure 5.

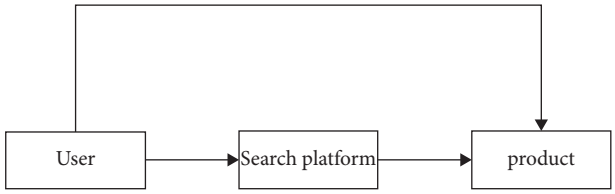

Figure 6: The use process of product initial user.

Confirm Different Scenarios: in order to better discover the human social phenomena and behavior laws implicit in the scene data, the constituent elements of the scene also need to be analyzed, and the complex human behavior is treated in a quantification manner.

Observe the Objective Scene: after confirming the scene, the designer needs to understand the objective needs of users in different scenes. Most users cannot clearly know their needs. Therefore, the preliminary research cannot completely rely on some traditional research methods, such as questionnaires and user interviews. Instead, designers need to use observation methods to imagine themselves as users and experience user's feeling by means of empathy.

Positioning Product Targets: when analyzing, it is necessary to take the product target as the subsidiary line meanwhile and consider the problem simultaneously from the perspective of users and business stakeholders.

Verification of Virtual Scene: the user scenario is not fixed. After the product design is completed, some users can be gathered offline to test the product in different simulated scenarios to verify the feasibility and effectiveness of the design.

4. Simulation Experiment

After investigating the product users, it is found that the product usage scenarios of users cherishing different consumption goals are quite different, such as Tieba, Weibo, Zhihu, and other products. The usage scenarios of the users with the browsing purpose are completely different, so design strategies need to be given to meet the needs of users in different scenarios.

After the corresponding investigation, it can be found that the corresponding products can be displayed in different forms on the network, and the corresponding results can be checked step by step so as to obtain the corresponding results. Such products often lack sufficient attraction, and the user's engagement is not high enough. The user use process of the product is shown in Figure 6.

Since the results displayed on the web pages are basically the same, when 65% of the test users in the test search on the web page, the user can only browse one by one. When the user enters the T product web page and finds that the product content does not perfectly meet expectations, they will choose to leave the product page immediately and browse other search results. When the user does not get a satisfactory answer after clicking on the T product many times, they are gradually disappointed with the product and no longer trust the T product.

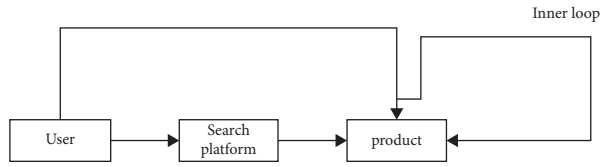

Figure 7: Product use process after modification.

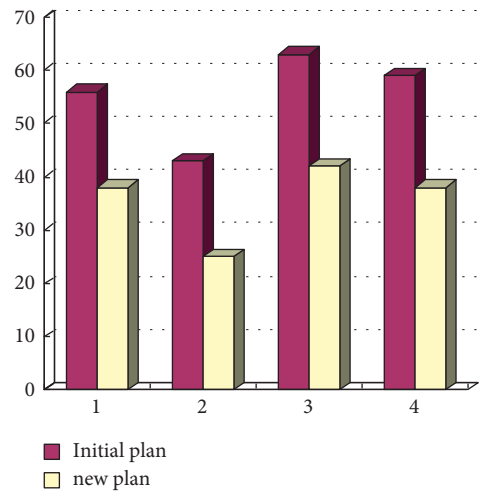

Figure 8: Usability test.

During the test, because they did not have accurate expectations of the search results, 35% of users would look for items with a higher repetition rate in the search results and then continue to search for relevant content in the opened page and click to view. After cycling like so for an average of 3 times, it will leave the product page.

Through the observation of user behavior during the test, it is found that users are divided into two scenarios when searching: (1) eager to get results as soon as possible and (2) looking for results in the browsing process with the purpose of browsing.

Based on the optimization of the design process, different special processing and design are performed orientating at different users in different scenarios. For products, the applicable scenarios can enable users to conduct related searches through semantically recommended related content to ensure users' experience has been greatly improved, and meanwhile, the perfection and promotion of the product have been further optimized as shown in Figure 7.

In order to verify the usability of the design, 10 users were invited to participate in the usability test after the subsample of product was developed. The test content is to use the predesign version and the postdesign version to search for the content of interest, and browse and search 10 pieces of content at a normal speed, to test which version the users spend the shorter time and has the higher operation efficiency. The test results show that the user operation efficiency in the new design is increased by 43%, which proves the effectiveness of the design, as shown in Figure 8.

5. Conclusion

The interactive service of social products as an important product promotes the online way of people communicating with each other and has tried a variety of different scenarios. Based on the method of immersive scene diversification, "scenes" is regarded as the corresponding perspective at first, and based on the needs of different users, consumer business analysis is sorted out in different scenarios. Through building corresponding models, based on the improvement of the corresponding feedback, mutual interaction in different scenarios is realized to ensure the design quality and feasibility of social products. After continuous testing, feedback, and improvement, we design products that meet the needs of different customers and meet the requirements of the company, aiming to improve the quality and efficiency of the interaction of social products. The results of simulation experiments show that the method of immersive scene diversification is effective, which can ensure the integration of theory and practice, further enhance the interaction design of social products, and optimize the process and methods of design.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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