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Integrating Storytelling and Scientific Communication: A Design Approach to Common Disease Health Communication Based on the Course Visual Information Design Research

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Abstract

Against the backdrop of the “High-order, Innovative, and Challenging” (Two Properties and One Degree) standards proposed by China’s Ministry of Education, art and design education urgently needs to explore interdisciplinary and research-oriented training models. The course Visual Information Design Research takes the visualization of common diseases as its entry point, transforming medical knowledge into artistic narrative and information visualization expression, thereby serving as a representative case for cultivating application-oriented research talent.

Through an investigation of the cognitive status of residents in urban and rural communities across three cities in southern Jiangsu regarding 18 common diseases—including diabetes, postpartum depression, and coronary heart disease—the course guides students to understand medical knowledge within an interdisciplinary context, construct visual communication models, and optimize design solutions using a “three-stage progressive” narrative strategy.

The course not only employs diverse methods such as information graphics, interactive design, AI generation, and eye-tracking experiments to verify communication effectiveness, but also seeks a balance between scientific rigor and artistic expression. In doing so, it embodies the cultivation of higher-order thinking, the application of innovative methodologies, and the challenge of integrating cross-disciplinary knowledge.

The study finds that this curriculum reform effectively enhances students’ research sensitivity and sense of social responsibility. The resulting works demonstrate practical application value in smart community health communication scenarios, helping to reduce public blind spots in understanding common diseases and improve preventive awareness. At the same time, interdisciplinary curriculum design under the “High-order, Innovative, and Challenging” standards not only promotes the cultivation of application-oriented research talent in design disciplines, but also provides a replicable model for the deep integration of art and design education with public health communication.

Keywords: High-order, Innovative, and Challenging; Visual Information Design Research; common disease health communication; application-oriented research talent

1. Introduction

The *Implementation Opinions on First-Class Undergraduate Curriculum Construction* issued by the Ministry of Education in 2019 clearly proposed the “High-order, Innovative, and Challenging” standards, namely that curriculum development should embody higher-order thinking, innovation, and a certain degree of difficulty. This standard not only provides clear guidance for talent cultivation in higher education in the new era, but also points out the development direction for art and design education.

For a long time, design discipline courses have focused primarily on professional skill training, which often results in students remaining at a basic level of “doing design,” lacking interdisciplinary thinking and research literacy that allow for transferability across contexts. This limitation has been further challenged in the context of the rapid proliferation of AI generative tools. The introduction of the “High-order, Innovative, and Challenging” framework emphasizes that courses should break through disciplinary boundaries, focus on the comprehensive application of knowledge and practical innovation, and promote the overall enhancement of students’ abilities in solving complex problems.

The reform of the *Visual Information Design Research* course, which takes the visual communication of common diseases as its objective, represents a typical pedagogical exploration aligned with the requirements of this standard. On the one hand, medical knowledge is highly specialized and abstract, requiring art and design students to conduct interdisciplinary research and interpretation, transforming medical terminology and complex mechanisms into visual symbols and narrative structures that are accessible to the public—thereby reflecting the “challenge” dimension of the course. On the other hand, with the implementation of the “Digital Health” strategy and the *Outline of the National Action Plan for Scientific Literacy (2021–2035)*, the role of information visualization in health communication has become increasingly prominent.

Common diseases such as diabetes, postpartum depression, and coronary heart disease often suffer from delayed diagnosis and poor behavioral compliance due to insufficient public awareness, making them a significant challenge in the field of public health. Therefore, introducing visual communication projects of common diseases into the curriculum not only responds to the real societal demand for health science communication, but also provides students with a teaching context that integrates higher-order learning, innovative exploration, and interdisciplinary challenges. Such curriculum reform aligns with the essence of the “High-order, Innovative, and Challenging” standards and offers a new practical pathway for cultivating application-oriented research talent.

2. Theoretical Foundation and Research Framework

The “High-order, Innovative, and Challenging” standard is a core criterion proposed in the *Implementation Opinions on First-Class Undergraduate Curriculum Construction* issued by the Ministry of Education. It is not only an important benchmark for evaluating curriculum quality, but also a key pathway for promoting connotative development in undergraduate education and cultivating high-quality talent. For the discipline of art and design, this concept provides both theoretical guidance and practical principles for curriculum reform.

Traditional foundational courses in design tend to focus on skill transmission, with a teaching orientation often limited to “how to operate,” lacking reflection on “why it is done this way,” “what social problems exist,” and “how to solve problems creatively.” In contrast, the “High-order, Innovative, and Challenging” standard requires courses to go beyond isolated skill training and guide students toward interdisciplinary integration and practical innovation, thereby enhancing research literacy and social responsibility.

Within this framework, higher-order thinking emphasizes that courses should not only transmit knowledge and skills but also cultivate students’ critical thinking, cross-domain analytical abilities, and competence in identifying and solving complex problems. Innovation requires breakthroughs in course content, methods, or technologies, enabling students to explore new models, tools, and outcomes through practice. Challenge implies engaging students with real and complex problems, transforming learning from the application of preset answers into a dynamic process of exploration and creation.

Applied to the *Visual Information Design Research* course, the visualization of common diseases becomes a typical entry point: students must navigate unfamiliar medical information, identify key insights, and translate scientific data into intuitive, understandable, and communicative visual works. This process clearly reflects the dimensions of higher-order thinking, methodological innovation, and practical difficulty embedded in the “High-order, Innovative, and Challenging” framework.

The inherent nature of design determines its strong compatibility with interdisciplinary integration. Design is not merely an art of form-making or aesthetic expression, but a synthesis of science, technology, and humanities. In the context of common disease visualization, the integration of design with medicine, communication studies, and information technology is both rational and necessary.

First, medical knowledge provides the scientific foundation for design content. Although disease mechanisms, pathological processes, and diagnostic procedures are highly specialized, students can gradually understand and extract their core elements through interdisciplinary research, expert interviews, and data analysis.

Second, communication studies provide theoretical support for public-oriented expression. Health communication requires not only accurate information delivery but also sensitivity to audience cognition and cultural differences. By drawing on narrative communication theory, students can construct expressive models aligned with public cognitive patterns. For example, the “three-stage progressive narrative model” used in visual health communication (Figure 1) effectively enhances communication effectiveness.

Third, design serves as the key process of knowledge transformation. Students translate abstract medical terminology and complex logical structures into concise symbols, images, and narratives. This process is not only an exercise of professional competence but also a manifestation of interdisciplinary integration.

Finally, technological tools expand the boundaries of the course. From static information graphics to dynamic video-based science communication, from AI-generated imagery to eye-tracking

experimental validation, the application of technology enhances scientific rigor, interactivity, and verifiability, enabling the course

to keep pace with cutting-edge developments in the digital era.

“Three-stage Progressive” Narrative Strategy Model

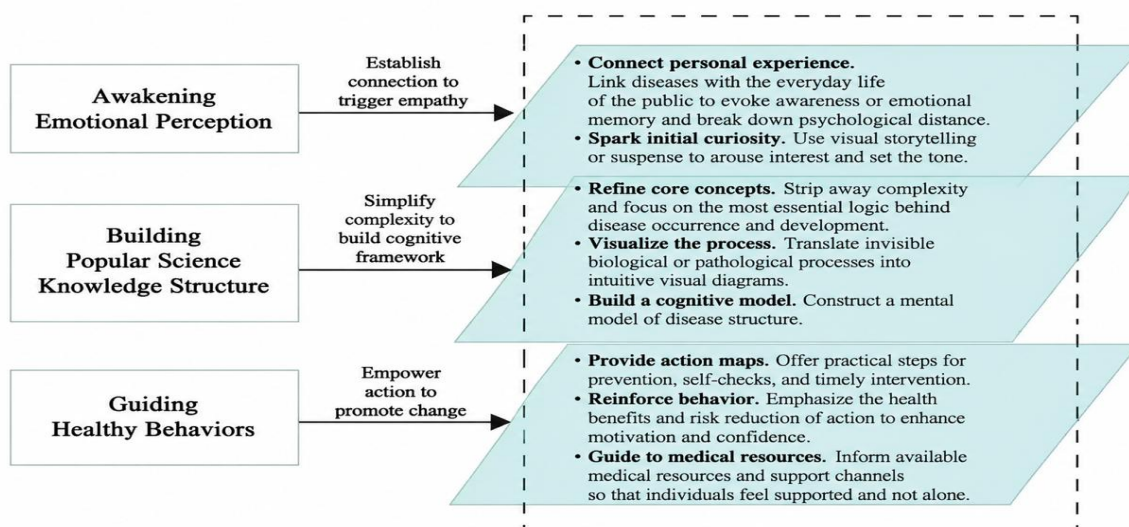


Figure 1: Three-Stage Progressive Narrative Model

Interdisciplinary coupling is not only a pedagogical choice in teaching practice, but also an inevitable pathway for the implementation of the “High-order, Innovative, and Challenging” standards within curriculum design. Through such coupling, higher-order thinking is achieved, as students move beyond the mere mastery of visual language into an integrated level that involves understanding medical knowledge, applying communication logic, and selecting technological tools. Innovation emerges through interdisciplinary interaction, which often generates new modes of expression and design outcomes—for example, combining traditional illustrative explanations of chronic pharyngitis self-assessment with video-based interaction to develop more participatory digital interfaces. Challenge is also naturally embedded, as students must confront unfamiliar knowledge domains, interdisciplinary communication barriers, ethical considerations, and complex technological applications. It is precisely through addressing these challenges that students’ comprehensive literacy and problem-solving abilities are enhanced.

Based on this logic, the *Visual Information Design Research* course can construct a multi-layered research framework. At the cognitive level, students develop a foundational understanding of common diseases through investigation, thereby breaking disciplinary boundaries. At the methodological level, narrative theory from communication studies is introduced to provide a scientific logic for visual design. At the tool level, information visualization technologies, AI generation tools, and experimental validation methods are employed to ensure both scientific rigor and innovation. At the outcome level, course outputs are applied in real-world contexts such as smart communities and health education platforms, thereby meeting the societal demand for public health communication while cultivating students’ research sensitivity and social responsibility. This chain—from cognition to method, from tools to outcomes—not only ensures alignment with the “High-order, Innovative, and Challenging” standards, but also demonstrates the logical validity of interdisciplinary coupling.

The “High-order, Innovative, and Challenging” framework provides theoretical guidance for the reform of art and design

education, while interdisciplinary coupling serves as the practical pathway for its realization. In the *Visual Information Design Research* course, the deep integration of medicine, communication studies, design, and digital technologies endows the curriculum with the characteristics of higher-order thinking, innovation, and challenge. Its rationality is reflected not only in the improvement of students’ competencies but also in the social impact and research value of the course outcomes. The combination of this theoretical framework establishes a solid foundation for subsequent instructional design and case analysis, and offers new perspectives and paradigms for cultivating application-oriented research talent in design disciplines.

3. Course Design and Teaching Pathway

The *Visual Information Design Research* course takes the visualization of common diseases as its core task, aiming to cultivate students’ interdisciplinary abilities and research literacy through real-world health communication design practice. Guided by the “High-order, Innovative, and Challenging” standards, the course constructs a complete teaching chain consisting of: “problem identification – information retrieval – data visualization – narrative construction – online dissemination,” enabling students to gradually transition from professional skill training to interdisciplinary, application-oriented research practice.

First, the course begins with field research. At this stage, students are required to visit representative local specialized hospitals or community healthcare institutions, with a focus on departments related to common diseases such as cardiovascular medicine, endocrinology, oncology, and psychiatry. The primary task of this investigation is to collect and analyze existing health education materials provided by hospitals. These materials are typically text-heavy, professionally dense, and highly medicalized in expression.

Through analyzing these materials, students can clearly identify the main issues in current medical science communication: high information density, excessive technical terminology, insufficient visual representation, and limited communication channels. The pedagogical objective of this stage is to cultivate students’ problem awareness, helping them recognize the communication limitations

of traditional text-based health education in today's digital society, while also providing an entry point for subsequent design tasks.

Second, the course proceeds to the stage of online literature and data retrieval. Instructors guide students to use academic databases, public health knowledge repositories, and open-access scholarly search platforms to collect multi-dimensional information on specific diseases. Students are required to master core content such as basic symptoms, pathological mechanisms, prevention and response strategies, and rehabilitation considerations.

This process not only requires students to develop competencies in information acquisition and screening, but also demands that they translate specialized medical knowledge into forms that are understandable to non-expert audiences. At this stage, instructors emphasize the importance of interdisciplinary understanding: students are not medical experts, but they must learn to deconstruct medical knowledge from a designer's perspective and transform it into scientifically grounded visual expressions for subsequent design development.



Figure 2: Health Communication Design for Attention Deficit Hyperactivity Disorder (ADHD) in Children Author: Li Jinyu; Supervisor: Sun Zhihao

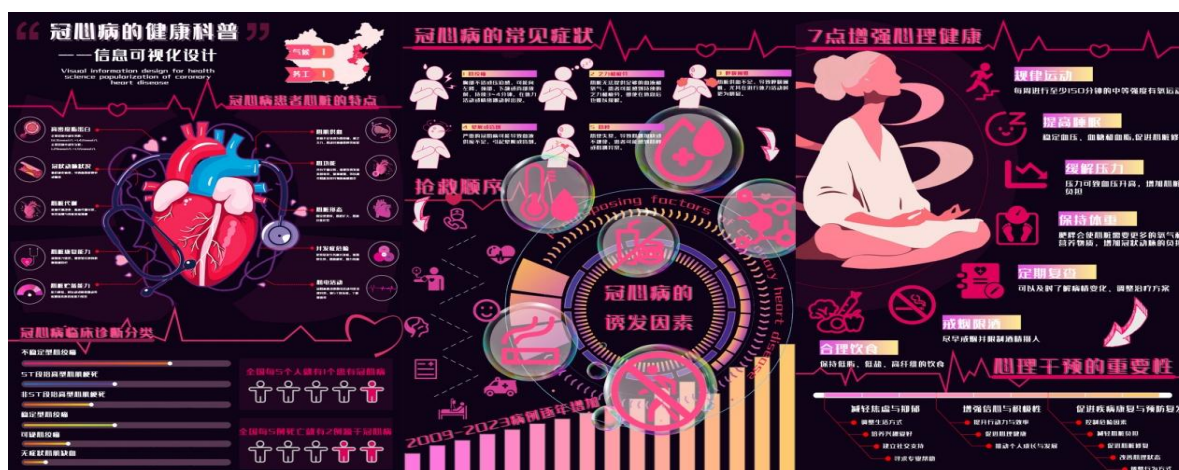


Figure 3: Visual Health Communication Design for Coronary Heart Disease Author: Yu Tao; Supervisor: Sun Zhihao

After completing information collection, the course guides students into the stage of data organization and visualization design. Students are required to transform complex medical data into visualized information that enables public self-checking and self-assessment, rather than remaining at the level of cold and abstract tabular presentation. Instructors encourage students to employ graphical thinking and design data as intuitive icons, flowcharts, dynamic curves, or interactive interfaces.

For example, the global prevalence of attention deficit hyperactivity disorder (ADHD) in children can be visualized by using ten dark-colored child icon cards, with one highlighted in a bright color to represent an approximate 10% prevalence rate (Figure 1). Clinical diagnostic analysis of coronary heart disease can be categorized according to the degree of symptom correlation and structured into diagnostic classifications (Figure 2). Such data visualization not only improves readability and memorability but

also effectively shortens the cognitive distance between the public and complex disease-related information.

Building upon data visualization, the course further emphasizes the construction of narrative language. Instructors guide students to explore how to organize fragmented information and charts into a coherent communicative work through a continuous visual storytelling approach. Unlike traditional “information listing,” narrative design emphasizes logical coherence and emotional resonance. For instance, students may begin with a typical scenario from a patient's daily life, gradually introduce risk factors and symptoms, and then explain the underlying causes through data and diagrams, ultimately providing coping strategies and self-assessment methods.

The introduction of visual narrative language not only enhances the attractiveness and accessibility of the work but also evokes emotional resonance among the public, thereby improving information acceptance and behavioral compliance.

In the final stage of the course, students are required to transform their visualized health communication designs into 3–5 minute science communication short videos. This ensures that the work not only organizes visual information but also incorporates concise, dynamic digital media communication formats aligned with contemporary mainstream dissemination channels. Students are required to publish their video works in real online communication environments.

This stage emphasizes validation within authentic communication contexts. Students must select appropriate dissemination platforms, such as open social media platforms, short-video platforms, or community health service terminals, to publish their works and observe feedback in practice. During online dissemination, students can directly perceive how different audience groups respond to the information, thereby gaining a deeper understanding of the relationship between communication effectiveness and visual design. Some works have attracted significant public attention after release, further confirming the value of narrative-based visualization in contemporary public health communication.

Through the above teaching pathway, the course establishes a complete closed loop from problem identification to practical dissemination. It not only cultivates students' interdisciplinary research capabilities, but also trains their visual expression and narrative construction abilities, while providing opportunities for validation in real social contexts. Within the framework of the “High-order, Innovative, and Challenging” standards, the research phase reflects challenge, requiring students to confront unfamiliar domains and break disciplinary boundaries; the literature review and data organization phases reflect higher-order thinking, as students must achieve deep cognitive transformation between understanding and interpretation; and the narrative construction and online dissemination phases highlight innovation, encouraging students to transform scientific knowledge into engaging social communication products through novel approaches.

The *Visual Information Design Research* course, through the teaching pathway of “investigation – retrieval – organization – narrative – dissemination,” effectively implements the principles of the “High-order, Innovative, and Challenging” framework into concrete practice. It not only enhances students' interdisciplinary competencies but also endows course outcomes with tangible social application value. This teaching pathway breaks through the

boundaries of traditional classrooms, emphasizing the integration of research and design while strengthening a sense of social responsibility, thereby demonstrating the important role of design education in contemporary health communication and public service.

4. Teaching Implementation Cases

In the implementation of the *Visual Information Design Research* course, students are guided to develop information visualization projects based on 19 common diseases. This pedagogical practice is structured under the “High-order, Innovative, and Challenging” framework, emphasizing an integrated process of interdisciplinary investigation, data visualization, narrative construction, and digital dissemination. Representative cases selected in this section include insomnia and melatonin-related health communication design, wind-cold type common cold, diabetes, postpartum depression, eczema, and urticaria.

These cases address the physiological and psychological characteristics of different diseases and construct targeted visual language systems accordingly. They not only strengthen students' interdisciplinary competence and design innovation capability but also demonstrate practical social value in public communication contexts.

4.1 Laryngitis: Visual Representation of Voice Loss

Laryngitis is a common respiratory condition characterized by hoarseness or even complete loss of voice. In the visual information design process, relevant medical literature was first reviewed to understand its causes and symptoms.

In visual translation, the concept of “diminishing voice” was adopted as the primary metaphor. For instance, typographic design was developed using gradually fading text to simulate the weakening of vocal output. A grayscale palette with selective use of red was employed to emphasize inflammation in the throat region. In layout design, extensive negative space was used to visually represent the absence of sound, creating a sense of silence and emptiness.

This work demonstrates a transformation from pathological information to visual expression, enabling viewers to associate the visual narrative with the experience of hoarseness and achieve emotional resonance.

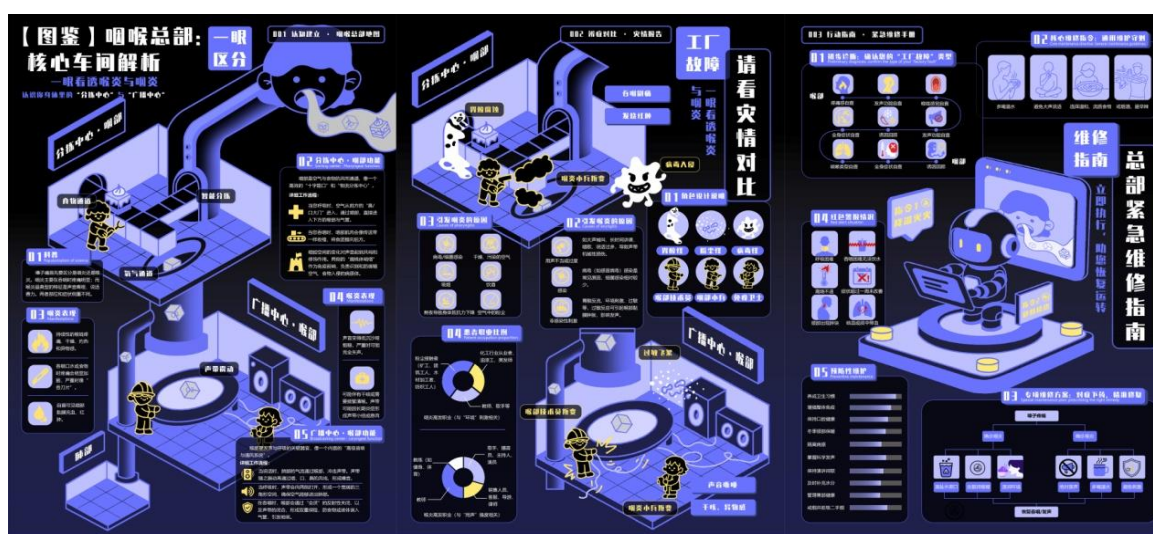


Figure 4: Visual Health Communication Design for Laryngitis Author: Wang Ying; Advisor: Sun Zhihao

4.2 Wind-Cold Type Common Cold: Narrative Design of Thermal Contrast

The wind-cold type common cold is one of the most prevalent illnesses, with symptoms including runny nose, chills, and coughing. Field investigation revealed that most existing health communication materials remain text-based and lack visual representation.

To address this limitation, a “thermal contrast” strategy was introduced in visual design, using strong contrasts between blue and red to represent fluctuations in body temperature. Shivering sensations were expressed through trembling line structures, while exaggerated respiratory lines were used to symbolize nasal congestion and coughing.

The final outcome not only conveys the physiological experience of the common cold in a direct visual manner but also constructs a narrative sequence that helps audiences understand symptoms and coping strategies. Such works demonstrate strong communicative resonance due to their alignment with everyday embodied experiences.

4.3 Diabetes: Data-Driven Visual Transformation

As a typical chronic disease, diabetes requires long-term monitoring and self-management. In this case, data were positioned as the core design element. Students collected blood glucose monitoring standards through research and translated them into graphical curves and color blocks.

The design visualizes glucose levels through gradient color transitions, transforming abstract numerical values into perceivable “safe zones” and “risk zones,” thereby facilitating public understanding of health risks. To enhance readability, circular diagrams and matrix-based color systems were applied to support rapid self-assessment by non-specialist audiences.

This approach transforms traditional tabular representations into “visual health indicators,” significantly improving accessibility and communicative effectiveness. The case reflects both higher-order thinking and challenge, as it requires not only comprehension of medical data but also its transformation into effective public health communication through design.

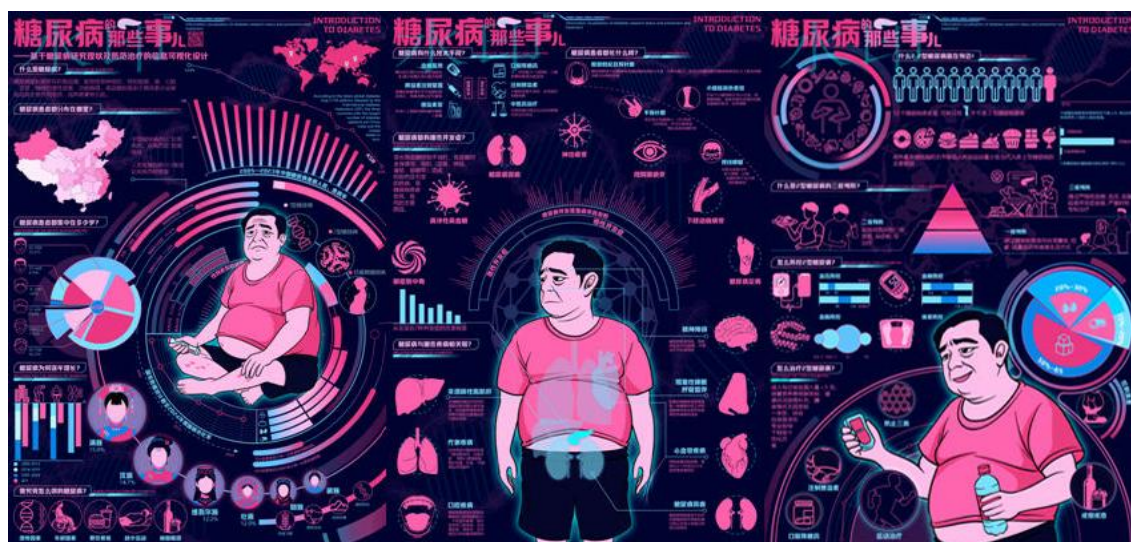


Figure 5: Design for Diabetes Health Communication Author: Liu Jiaheng; Advisor: Sun Zhihao

4.4 Postpartum Depression: Emotional Visual Narrative

Postpartum depression is a psychological condition characterized by subtle symptoms such as persistent low mood, feelings of helplessness, and anxiety. In teaching practice, particular emphasis was placed on the visual translation of psychological states.

Some student works employed grayscale tones and fragmented visual compositions to express emotional suppression, while downward-curving and collapsing typographic forms were used to represent psychological decline. Other works constructed narrative structures based on disrupted mother–infant interactions, using contrasting imagery to highlight the impact of depression on maternal relationships.

Unlike physical diseases, the visualization of mental health conditions requires a careful balance between scientific accuracy and artistic interpretation. It is essential to avoid stereotypical representations while employing visual metaphors to evoke public

understanding and attention. These works ultimately function as forms of social advocacy, raising awareness of mental health and calling for increased care for postpartum women.

Eczema: Visual Representation of Skin Surface Conditions

Eczema is a common inflammatory skin disease characterized by redness, swelling, itching, and exudation. In instructional practice, students were encouraged to simulate skin texture directly to represent pathological features.

Grainy textures and irregular red patches were applied over skin-toned backgrounds to simulate diseased skin conditions. In addition, tactile metaphors were introduced by translating the action of scratching into linear abrasion effects, allowing viewers to visually experience the sensation of itching.

These works not only communicate pathological characteristics but also enhance sensory engagement through synesthetic visual strategies, resulting in strong communicative impact.

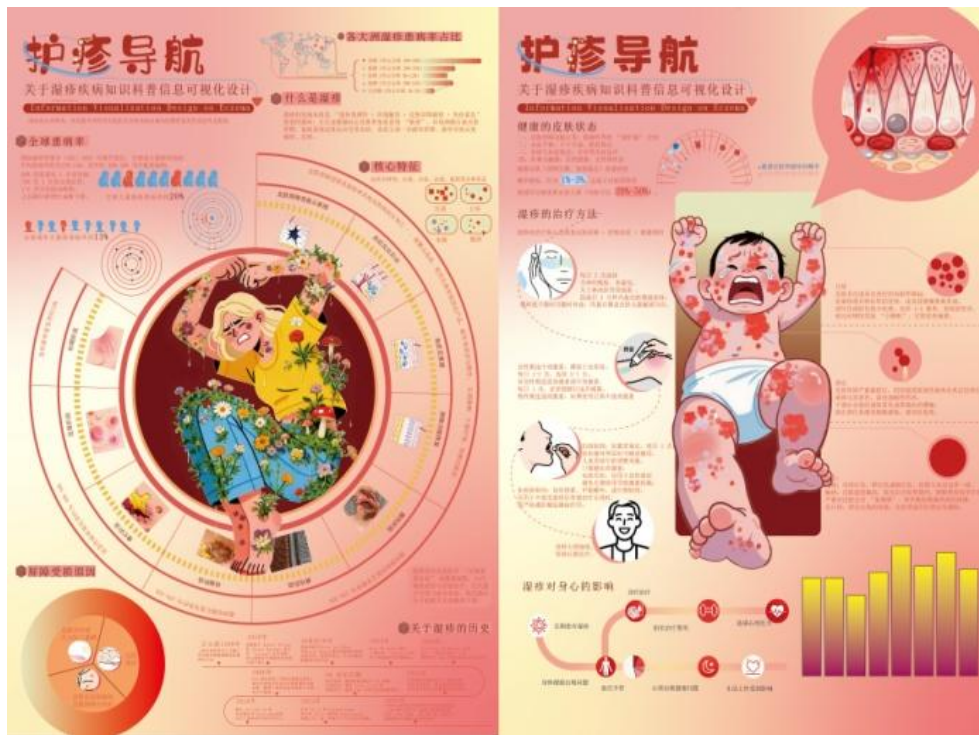


Figure 6: Health Communication Design for Eczema Author: Wang Erqi; Advisor: Sun Zhihao

Urticaria: Sensory Mapping through Typography and Symbols

Urticaria is an allergic condition primarily characterized by severe itching. Instruction emphasized the conceptualization of “itchiness” as the core experiential element for visual translation.

In typographic design, jittered and unstable edges were used to simulate discomfort and instability. A combination of skin-tone colors and red blotches was adopted to visually represent allergic reactions. Overall composition intentionally disrupted visual stability to convey bodily discomfort and unease.

This case demonstrates how metaphorical design language can transform abstract sensory experiences into perceptible visual information, highlighting the value of cross-disciplinary interpretation and creative expression in design education.

Series Works and Communication Practice

In addition to the above cases, the curriculum also covered visual design projects involving asthma, migraine, gastritis, conjunctivitis, arthritis, and other common conditions. Students applied different design strategies depending on the nature of each disease, including data visualization, visual metaphor, and narrative-based design approaches.

The 19 completed works were compiled into a systematic atlas of disease visualization, serving both as a course outcome and as a medium for public health communication. Furthermore, selected works were adapted into short videos and interactive digital formats for dissemination through social media platforms.

Empirical observation indicates that these works rapidly attract audience engagement in online environments, particularly those featuring emotional resonance and strong visual impact, which are more likely to generate sharing and discussion. This significantly enhances both the breadth and depth of health communication.

Teaching Reflection

Through this series of case-based teaching practices, students demonstrated substantial improvement in interdisciplinary integration and visual language innovation. From initial unfamiliarity with medical knowledge to the ability to independently complete data transformation, narrative construction, and communication design, students gradually developed competencies in addressing complex real-world problems.

This process also highlights the pedagogical value of the “High-order, Innovative, and Challenging” framework. Higher-order thinking is reflected in the advancement of cognitive and analytical abilities; innovation is manifested in breakthroughs in visual expression and technological application; and challenge is embodied in students’ engagement with multidimensional real-world health issues.

More importantly, these works function not only as course outputs but also as socially impactful communication artifacts. With the increasing public emphasis on health literacy, the integration of scientific rigor and artistic expression has become a key trend in health communication. Through visual and narrative innovation, student works provide intuitive and accessible ways for public understanding of diseases, demonstrating the practical value of design education in serving society.

This “teaching–research–society” integrated model offers a replicable paradigm for cultivating application-oriented research talent in design disciplines.

Conclusion

This study explores the pedagogical reform of the *Visual Information Design Research* course under the “High-order, Innovative, and Challenging” framework, with a focus on common disease visualization as a practice-oriented entry point. By integrating medicine, communication studies, design methodology, and digital technologies, the course constructs an interdisciplinary

teaching model that transforms abstract medical knowledge into accessible visual narratives for public health communication.

Through a structured teaching pathway—spanning field investigation, data collection, visualization design, narrative construction, and digital dissemination—students are guided to progressively develop competencies in interdisciplinary research, visual translation, and communication design. The implementation cases demonstrate that different diseases can be effectively expressed through tailored visual strategies, including data-driven representation, metaphorical visualization, and emotional narrative design, thereby enhancing both scientific clarity and communicative impact.

The findings indicate that this teaching model not only strengthens students' higher-order thinking, innovation capacity, and ability to address complex design problems, but also enhances their research awareness and social responsibility. Moreover, student-generated works show significant potential for public engagement in real-world health communication contexts, particularly through digital and social media platforms.

Overall, the course reform provides a replicable model for integrating design education with public health communication. It demonstrates how interdisciplinary and research-oriented teaching can foster application-oriented design talent while contributing to the broader goal of science communication and public well-being in the digital age.

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