Overcoming Interdisciplinary Communication Barriers in the Video Game Industry: An Ethnographic and Interview Study

Xuan Sun, Yue Chen(✉), and Luying Zhang

East China University of Science and Technology, Shanghai, China
chenyue@ecust.edu.cn

Abstract. Video game development is one of the most complex interdisciplinary projects. It requires balancing technical execution with creative ideas and adapting to evolving project requirements, which is more challenging in interdisciplinary contexts. To facilitate interdisciplinary communication in video game development, this study conducted reflexive ethnography and semi-structured interviews with 10 employees from various disciplines in the game industry. We identified key communication barriers including inefficient information transfer, incomplete creative specifications, discrepancies in creative execution, misjudgment of other disciplines and ambiguous creative expressions. These barriers resulted from the lack of interdisciplinary knowledge, insufficient process standardization, differences in disciplinary thinking and aesthetics preferences, and limited knowledge sharing within teams. To overcome these barriers, game development teams took strategies such as establishing a rational SOP, proactively learning from interdisciplinary communication experiences, promoting information sharing, and keeping interactive and informal communication. Our findings highlight the importance of standardized workflows in managing creative complexities and provide actionable recommendations for enhancing interdisciplinary communication in the video game industry.

Keywords: Interdisciplinary Teams · Communication Barriers · Game Development

1 Introduction

Video games, traditionally seen as mere entertainment products, are among the most complex interdisciplinary projects. Their development involves a wide range of disciplines, such as art, computer science, and communication studies. Each discipline brings its own methods, terminology, and priorities, which can create interdisciplinary communication barriers. These barriers can delay progress, increase costs, and compromise the quality of the final product.

While interdisciplinary communication has been extensively researched in fields such as healthcare, education, and software development, the unique challenges of the

P.-L. P. Rau (Ed.): HCII 2025, LNCS 15784, pp. 238–253, 2025.
https://doi.org/10.1007/978-3-031-93739-2_15

video game industry remain underexplored. First, in healthcare and education, interdisciplinary collaboration typically involves smaller teams, clearly defined scopes, and structured workflows [1]. In contrast, game development spans multiple disciplines within large teams and operates in a dynamic, creative environment. Second, unlike other software that prioritizes productivity or utilitarian goals, video games aim to deliver immersive and emotionally engaging experiences [2]. Creating such experiences adds layers of complexity to interdisciplinary collaboration. Third, video games combine diverse elements, including visuals, audio, storytelling, and gameplay mechanics [3]. As a result, teams must balance technical execution with creative ideas while adapting to constantly evolving requirements. These characteristics make game development distinct from more structured industries. Consequently, strategies designed for other industries are often unsuitable for the unique demands of game development.

Moreover, most existing studies on communication barriers in the video game development rely on student-team simulations. While these studies provide valuable insights, they cannot fully capture the complexities of real industry contexts. In addition, game development teams often face tight deadlines, limited budgets, and high expectations. These pressures can compound interdisciplinary communication barriers.

This study aims to investigate interdisciplinary communication in real-world video game development projects. We aim to (1) identify the interdisciplinary communication barriers in interdisciplinary video game development projects, (2) deconstruct the factors that contribute to these barriers, and (3) systematize existing strategies to formulate actionable recommendations to overcome interdisciplinary communication barriers.

2 Literature Review

The literature discussed several overlapping concepts related to interdisciplinary communication including multidisciplinary, interdisciplinary, and transdisciplinary communication [4, 5]. Although these terms were theoretically distinct, they were used flexibly in practice. To ensure clarity, this study used the term "interdisciplinary" to refer broadly to communication and collaboration across different disciplines.

Most previous research on interdisciplinary communication was conducted in fields such as healthcare, education, architecture, and software development. Little research was conducted in the video game industry. In healthcare, interdisciplinary communication often aimed to solve well-defined problems such as patient safety and care efficiency. Engineers contributed by creating tools such as electronic health records and sensing devices to improve medical workflows. Nurses were responsible for identifying patient needs, testing tools, and ensuring their usability in medical workflows, while physicians provided medical insights to shape and validate these solutions [6]. These teams usually had clear goals, well-defined roles, and measurable outcomes. They emphasized scientific rigor and safety. Research in education focused on developing teaching and learning strategies to improve interdisciplinary communication. One prominent concept in this area is Interprofessional Education (IPE), which emphasizes collaboration between students from different disciplines to improve understanding. Studies showed that IPE helped students understand the responsibilities of different professions and increased their awareness of collaboration. However, it also caused communication barriers due to the misunderstandings about others' roles and differences in team members'

backgrounds [7]. In contrast, game development required balancing creative ideas and technical implementation in a fast-paced, iterative process. Team roles often overlapped, and collaboration needs were highly dynamic. These unique demands made it difficult to directly apply the findings from other industries to gaming, but research in this area was limited.

2.1 Factors Influencing Interdisciplinary Communication Barriers

Existing research on interdisciplinary teams has identified three primary factors contributing to communication barriers: disciplinary differences, communication methods, and unstable team structure.

Disciplinary Differences. Disciplinary differences refer to the variations in terminology, methodologies, and perspectives between different fields. These differences often stem from each discipline's unique knowledge systems. In the video game industry, team members often came from fields such as art, computer science, and communication studies. Each discipline used its own professional terms, impeded communication between team members [8]. A single term could have different meanings in different disciplines and confuse members from different backgrounds. Furthermore, such inconsistencies were hard to identify in the early phases of game development [9]. For clarifications, teams usually needed repeated discussions, which increased communication costs [10]. To solve this problem, Khaled and Ingram [11] recommend to create a shared language system. However, developing such a system required significant time and resources.

Apart from terminology, different disciplines also applied different methodologies. It also hindered interdisciplinary communication. For example, fundamental science used precise, controlled experiments, while data science relied on flexible, large-scale analysis [12]. These differences often led to misunderstandings and conflicts. Similar issues appeared in game development course projects, where computer science students focused on technical implementation, and game design students prioritized creativity [8]. This mismatch frequently caused friction when aligning creative ideas with technical requirements.

Communication Methods. Communication methods refer to the specific ways interdisciplinary team members interact to exchange information. These methods include face-to-face discussions, remote tools like email and phone calls, and informal conversations. Each method had its pros and cons, and different approaches worked better for members of different disciplines. For instance, art teams often relied on visual aids such as sketches or images to convey creative ideas, while programming teams preferred demonstrating solutions directly through technical tools or project environments. When communication methods failed to align with these preferences, misunderstandings and inefficiencies often arose.

Face-to-face communication was one of the most effective methods in interdisciplinary teams. It allowed immediate feedback and used non-verbal cues like gestures and tone to ensure accuracy. It was particularly helpful during complex discussions or decision-making [13]. It also built trust, which was essential for collaboration [14]. In contrast, remote communication, such as email and phone calls, was less effective at quickly establishing trust [15].

However, remote communication became common due to location and time zone differences. Tools like phone calls and emails were widely used, but they also had limitations [13]. Phone calls helped resolve urgent issues but lacked non-verbal cues, leading to potential misunderstandings. Emails were good for organizing tasks and recording decisions but lacked instant feedback, causing delays [14].Moreover, remote tools could not fully replace the trust-building and emotional connection of face-to-face communication [16].Therefore, interdisciplinary teams needed to flexibly use various communication methods in practice. For example, online visual tools like shared whiteboards or collaborative design platforms worked well for art teams, while live demonstrations might be more effective for programming teams.

Informal communication was also important. It referred to spontaneous exchanges where the timing, participants, and topics were decided based on immediate needs [17]. Informal communication was crucial in design and innovation fields. It strengthened trust, encouraged knowledge sharing, and improved interdisciplinary understanding [14]. Research showed that informal communication played a significant role in the early stages of design. It directly influenced team cohesion and work efficiency [4].

Unstable Team Structure. Team structure refers to the organization and allocation of roles and responsibilities within a group, including the stability of team membership. Unclear role assignments and frequent turnover among team members undermined the stability of the team structure. Such structural issues often led to a lack of accountability, disrupted communication, and unnecessary conflicts within the team.

First, unclear role assignments made team members feel that their contributions were undervalued or misunderstood. For example, Robert Pastel and Wei Zhang suggested that in interdisciplinary communication between computer science and art design, unclear roles made students from both fields feel like mere "executors." [18] Unclear roles caused dissatisfaction and resistance among team members. This led to blame-shifting during project execution. Second, frequent turnover among team members further compounded communication challenges. New members often lacked sufficient understanding of the project's background, progress, and goals. This knowledge gap made it difficult for them to develop a sense of ownership or accountability toward the project [18]. Consequently, team cohesion weakened [12].

2.2 Limitations of Existing Research

While existing studies have provided valuable insights into interdisciplinary communication, certain aspects remain insufficiently explored. Most research on interdisciplinary communication has focused on fields such as healthcare, education, architecture, and software development, with limited attention given to the video game industry. The dynamic and creative nature of game development introduces challenges that are not easily addressed by findings from other industries. Furthermore, existing studies on interdisciplinary communication in the video game industry also reveal significant gaps. Existing research in the video game industry is characterized by its focus on student simulations, small-scale teams, and short-term experiments. Most studies were conducted in controlled academic settings, offering limited insights into real industry environments.

They also primarily examined short-term collaboration processes, neglecting how communication evolves over long-term projects. Additionally, these studies rarely explored large-scale, complex projects, instead concentrating on small to medium-sized teams. This might prevent the findings from fully reflecting the real challenges of interdisciplinary communication in large organizations. In larger projects with more diverse team structures, communication barriers could take on entirely different forms.

While existing studies provided theoretical insights into disciplinary differences, communication methods, and team structures, further research is needed. Future studies should focus on in-depth empirical analysis using real industry data. This includes examining interdisciplinary communication in long-term projects and large-scale, complex team structures, areas. By focusing on real-world scenarios, future research could better capture how communication barriers develop and change in these contexts. Such efforts would help better understand interdisciplinary communication challenges in the video game industry. They would also provide insights that apply directly to large-scale game development projects.

3 Methodology

To identify and overcome interdisciplinary communication barriers, we conducted a two-phase study including first a reflexive ethnography and then semi-structured interviews. Reflexive ethnography was used to identify potential barriers and develop the interview framework. Subsequent semi-structured interviews confirmed these communication barriers, uncovered new challenges, and clarified existing solutions.

3.1 Reflexive Ethnography

From June to November 2024, the first author worked as a project management intern at a video game company with over 100 employees in Shanghai, China. She participated in the development of an action RPG game for PC, iOS, and Android, from the closed beta testing (CBT) phase to the soft launch phase. The author observed communication among team members from different disciplines, focusing on communication barriers and documenting strategies used to overcome them. She paid particular attention to interdisciplinary meetings, informal discussions, and communication records within requirement groups.

During her observations, the author identified four key factors contributing to interdisciplinary communication barriers. First, unclear requirements were the most significant issue. Downstream team members (such as those responsible for game design, art design, and game publishing) often struggled with the vague requirements passed by upstream members. This led to frequent changes, rework, and project delays. Second, she noted a lack of understanding of other disciplines' workflows. Some game design and publishing team members were unfamiliar with the processes and timelines of the art and programming teams. This led to overly urgent requests or unrealistic expectations, causing two common outcomes: unmet demands or delays in other tasks. Third, she found that newcomers experienced greater interdisciplinary communication problems. New employees or interns, especially those without standardized onboarding training

or guidance, often lacked knowledge of industry practices and terminology, and thereby could not well understand their colleagues. Finally, the author observed that a few leaders tended to overcontrol their team members and ignore others' ideas. This phenomenon made team members from different disciplines less likely to share their opinions, and it greatly undermined the enthusiasm for interdisciplinary communication within the team.

3.2 Semi-Structured Interviews

We conducted one-on-one semi-structured interviews with 10 employees (aged 22–35, six females and four males) from 10 different video game companies (nine in China and one in Japan). They were responsible for different tasks such as game design, art design, programming, and game publishing. The participants covered both experienced professionals with over 6 years in the industry and newcomers. Each interview lasted about 1 h and was conducted online via Tencent Meeting, a video-conferencing platform. Table 1 summarizes the participants' disciplines and basic information.

Interview Design. The interview guide was developed based on the literature review and the reflexive ethnography, including the following aspects.

- Team Structure and Work Environment. What is the size and composition of your team? What are the main departments involved in your project, and which departments do you interact with the most?
- Specific Workflows and Communication Experiences. Can you describe your workflow? What are the specific steps from receiving a requirement to completing a task? How do you resolve disagreements during communication?
- Communication in Interdisciplinary Teams. What communication methods do you usually use when interacting with other departments? Has your team implemented strategies to reduce cross-department communication barriers? Were these strategies effective?
- Reflection on Communication Barriers and Solutions. What are the main communication barriers you have experienced in interdisciplinary teams? How did these barriers affect your projects? In your opinion, which strategies have been most effective in addressing these barriers? What areas still need improvement?

All interviews were recorded with participants' consent. The recordings were transcribed and analyzed by the affinity diagram method. We extracted a total of 342 end-level labels. Among these labels, 118 addressed the main interdisciplinary communication barriers in actual game projects, 121 focused on factors contributing to these barriers, and 129 related to existing strategies for overcoming the barriers. Some labels unrelated to interdisciplinary communication were excluded. For the first two analyses, the data was clustered into three levels, while the third analysis yielded four levels of clustering. The analysis was conducted on Microsoft Excel and Figma.

Table 1. Participants' discipline and basic information.

Participants	Age	Gender	Discipline	Positions	Working experience in the game industry	Project team size
R1	25	Female	Product design	Game UI designer	1	20–40
R2	26	Female	Economics	Game systems designer	4	30–40
R3	32	Male	Animation	3D artist	6	10–15
R4	26	Male	Digital media art	Game environment concept artist	2.5	300+
R5	35	Female	Journalism and communication	Game publishing specialist	5	Not for publication
R6	22	Female	Digital media art	Game UI designer	1.5	60–80
R7	27	Female	Computer science	Game level designer	3.5	30±
R8	28	Male	Public art	Game character concept artist	5	20±
R9	28	Male	Computer science	Game client systems developer	6	100+
R10	23	Female	Design	Game UI designer	0.5	70–80

4 Results

4.1 Major Interdisciplinary Communication Barriers

This study identified five main communication barriers in video game development projects (Table 2): inefficient information transfer, incomplete creative specifications, discrepancies in creative execution, misjudgment of other disciplines and ambiguous creative expressions.

Inefficient information transfer was identified as the most significant communication barrier. This barrier was mentioned in 40 records. This issue included delayed synchronization of information between disciplines, confusion during requirement handovers, and missing critical details. Many respondents highlighted delays or omissions in sharing updates across teams. For instance, a game UI designer shared, "Sometimes new

Table 2. Major Interdisciplinary Communication Barriers.

Level 1	Level 2	Records	Number[a]
Inefficient information transfer	Delayed information synchronization between disciplines Confusion in requirement handover processes Missing information	40	9
Incomplete creative specifications	Creative details not considered fully	35	10
Discrepancies in creative execution	Differing interpretations of the same creative ideas among various disciplines Conflicts between creative suggestions from different disciplines	26	9
Misjudgment of other disciplines[b]	Misjudgment of other disciplines' workload and expected results Some disciplines' creative ideas were not appreciated	15	5

[a]Number of respondents mentioning this issue
[b]Misjudgment of the contribution, workload, or complexity of other disciplines

design changes in the art team are not communicated to us, which leads to outputs that don't meet our requirements."

Incomplete creative specifications referred to the oversights of important details in the output specifications due to a lack of downstream expertise. This barrier was mentioned by all the 10 participants. For example, a respondent shared an experience, "One time, the Game Copywriting Planner asked for a plot illustration, but the NPCs in it had not been designed yet. In fact, she should have first requested the character design, and only then could the illustration be started. Meanwhile, she should have postponed the specified submission deadline accordingly."

Discrepancies in creative execution arose from differing interpretations of the same creative ideas among team members from various disciplines, as well as conflicts between creative suggestions from different fields. A game publishing team member stated, "When we give requirements to programmers, they may say it's doable. But the final result often falls far short of our expectations. Their idea of 'doable' might just mean creating a rough version for us to review."

Misjudgment of other disciplines also contributed to communication barriers. This issue included two aspects. First, there was misjudgment of other disciplines' workload and expected results. This often led upstream team members to propose unrealistic creative ideas, creating additional challenges for interdisciplinary communication. Second, some disciplines' creative ideas were not appreciated, with team members dismissing

ideas from other fields as less important. This lack of mutual respect further hindered interdisciplinary communication.

Ambiguous creative expressions refer to the inability to clearly articulate creative ideas through text. This barrier had a minimal impact on interdisciplinary communication. Only four participants mentioned it, since most team members addressed it by providing image or video references to clarify their ideas.

4.2 Factors Contributing to Interdisciplinary Communication Barriers

This study identified four primary factors contributing to interdisciplinary communication barriers (Table 3): lack of interdisciplinary knowledge, insufficient standardization of processes, differences in disciplinary thinking and aesthetics preferences, and limited knowledge sharing within teams.

Lack of interdisciplinary knowledge was identified as the most significant factor contributing to communication barriers. This factor was mentioned by all the 10 participants. Many respondents noted that members involved in the upstream stages of the team, when lacking interdisciplinary knowledge, often proposed creative ideas without fully considering details or presented requirements that were difficult to execute. For example, a member of the environment concept art team shared, “Game planners sometimes give us vague requirements, like asking for textures without specifying details. When we deliver the work, they often express dissatisfaction.” This lack of understanding also fostered doubts about the expertise and contributions of other team members, which further hindered effective collaboration.

Insufficient standardization of processes was another major factor, which was also mentioned by all 10 participants. It manifested in various ways. First, many teams relied entirely on verbal communication without keeping written records, which often led to forgotten decisions. Second, feedback delays in online communication disrupted the workflow, as team members waited longer for responses. Third, the absence of visual aids, such as diagrams or prototypes, made it challenging to convey creative ideas across disciplines. Fourth, interdisciplinary communication in game projects often involved numerous steps, adding complexity to the process. During game development, outsourcing or internal collaboration, like mid—platform cooperation, was often needed. In such cases, the work had to go through repeated reviews involving various departments and people, such as the lead artist and game planner. Thus, the interdisciplinary communication process was relatively cumbersome, with many links and different approval steps. Lastly, the communication process of interdisciplinary teams did not cover all the relevant people, leading to creative outputs not being fully reviewed. Addressing these gaps in process standardization is essential to improving interdisciplinary collaboration in game development projects.

Differences in disciplinary thinking and aesthetic preferences was also a key factor. These differences included varied task priorities, ways of problem-solving, and aesthetic preferences among interdisciplinary team members. For example, technical teams often prioritized functionality, while art teams focused more on visual quality. A 3D artist shared, “The materials we wanted for the models were too difficult to create. The programmers suggested alternatives, but the results didn’t look good. In the end, we held a meeting with the game planners to discuss other options.”

Table 3. Factors Influencing Interdisciplinary Communication Barriers.

Level 1	Level 2	Records	Number
Lack of interdisciplinary knowledge	Insufficient basic knowledge of other disciplines Doubts about the professional knowledge contribution of other disciplines	54	10
Insufficient standardization of processes	Complete reliance on verbal communication without documentation Feedback delays in online communication Lack of visual communication strategies (e.g. diagrams or prototypes) in the creative expression process Cumbersome interdisciplinary communication processes The communication process did not cover relevant people	33	10
Differences in disciplinary thinking and aesthetic preferences	Interdisciplinary team members' different understanding of task priorities Interdisciplinary team members' different ways of problem-solving Interdisciplinary team members' different aesthetic preferences	22	9
Limited knowledge sharing within teams	The team has not established a shared knowledge base and therefore cannot systematically leverage past experience	12	5

Limited knowledge sharing within teams also contributed to communication barriers. This referred to the lack of a shared knowledge base, which made it difficult to systematically utilize past experiences. However, its overall impact on interdisciplinary communication was relatively minor, as only half of the participants mentioned this factor.

4.3 Strategies to Overcome Interdisciplinary Communication Barriers

This study also identified several effective strategies (Table 4), including establishing a rational SOP (Standard Operating Procedures), proactively summarizing and learning from interdisciplinary communication experiences, promoting information sharing, and keeping interactive and informal communication.

Table 4. Strategies for Interdisciplinary Communication Barriers.

Level 1	Level 2	Level 3	Records	Number
Establishing a rational SOP	\	Document change history for easy tracking and review	101	9
	Improve the requirements definition process	Multi-party participation in requirements definition Multiple parties involved in proposing requirements Sufficient communication in the early stage Create online groups to publicly align on requirement details		
	Improve the requirements implementation process	Establish documentation standards Clarify the person in charge at each stage of requirements Allocate tasks reasonably Timely update progress and risks Propose multiple alternative solutions Set up a standardized review process		
Proactively summarize and learn from interdisciplinary communication experiences	\	Regularly review and summarize work experience Learn from others' interdisciplinary communication experience Anticipate and avoid potential problems based on experience	11	6

(*continued*)

Table 4. (*continued*)

Level 1	Level 2	Level 3	Records	Number
Promote information sharing	\	Use shared collaboration tools Establish a standardized shared knowledge base	10	5
Keep interactive and informal communication	\	Communicate face-to-face to align on requirement details when necessary Generate creative ideas through informal communication	7	4

Establishing a rational SOP was seen as a core strategy, which was mentioned by the vast majority of participants. This process included documenting change history for easy tracking and review, improving the requirements definition process, and enhancing the requirements implementation process. For improving the requirements definition process, respondents suggested involving multiple parties in proposing requirements and emphasized the importance of sufficient communication in the early stage. They also recommended creating online groups to publicly align on requirement details. For improving the requirements implementation process, respondents suggested establishing documentation standards and clarifying the person in charge at each stage. They also recommended allocating tasks reasonably, updating progress and risks in a timely manner, proposing multiple alternative solutions, and setting up a standardized review process. These strategies could help reduce communication barriers and improve interdisciplinary collaboration.

More than half of the respondents believed that proactively summarizing and learning from interdisciplinary communication experiences was a key strategy. In the teams they are part of, team members need to regularly review and summarize their work, learning from both their own experiences and those of others in interdisciplinary settings. This helps interdisciplinary team members anticipate and avoid potential problems. A programmer explained, "Once I got some experience, I just limited the file formats they could upload. If it was the wrong format, it would not go through. No more back-and-forth fixing later."

Some respondents also mentioned promoting information sharing. In their teams, using shared collaboration tools and establishing a standardized shared knowledge base enabled them to easily access the details and progress of each requirement directly from the knowledge base, without the need for repeated communication. Additionally, owing to the shared knowledge base, even new employees could quickly and systematically understand the project situation.

The last strategy mentioned by respondents was to maintain interactive and informal communication. Some respondents emphasized that they would resort to face-to-face

communication when necessary, especially when requirements were complex. This approach helped them align on the details of requirements more effectively. Additionally, two respondents involved in game planning (R2 and R7) both mentioned that some of their requirement ideas originated from informal communication.

5 Discussion

5.1 Findings

This study identified the major communication barriers, influencing factors, and strategies in interdisciplinary collaboration in the video game industry. The primary barriers included inefficient information transfer, incomplete creative specifications, discrepancies in creative execution, misjudgment of other disciplines, and ambiguous creative expressions [9, 13, 19]. These findings partially align with those from the medical and educational fields, where barriers often stem from differences in thinking styles, research methodologies, and prioritization of goals among disciplines. For example, conflicts in these fields may stem from disagreements over quantitative versus qualitative methods or inconsistent interpretations of terminology [19]. However, in the gaming industry, interdisciplinary communication barriers were particularly concentrated in aligning creative expression with technical implementation, due to the highly creative nature of the industry. Additionally, information transfer barriers are more pronounced in the gaming industry compared to fields of medicine and education. The possible reasons are the larger team sizes, faster development paces, and more complex, evolving project requirements in gaming.

The study also revealed four key factors contributing to communication barriers including lack of interdisciplinary knowledge, insufficient standardization of processes, differences in disciplinary thinking and aesthetics, and limited knowledge sharing within teams. These findings align with organizational research, which highlights challenges in integrating diverse knowledge [20]. Team members from different disciplines often struggle to share a common understanding. Without adequate interdisciplinary knowledge, they may fail to bridge differences in perspectives, leading to inefficiencies and conflicts during collaboration. This barrier is particularly pronounced in the video game industry, which involves a wider range of disciplines and greater diversity.

Furthermore, the study summarized several strategies that respondents found effective in addressing communication barriers in the video game industry. These included establishing a rational SOP, proactively summarizing and learning from interdisciplinary communication experiences, promoting information sharing, and keeping interactive and informal communication. Previous studies in the game industry have suggested that interactive and informal communication strategies can remove interdisciplinary communication barriers [14]. Building on this, our study further highlights the importance of standardized processes in enhancing interdisciplinary communication within the game industry. In fact, the healthcare industry has demonstrated how standardized processes can enhance interdisciplinary communication. For example, referral and counter-referral systems [1], a common practice in healthcare, rely on formal communication to ensure consistency and accountability through structured workflows. However, interdisciplinary

collaboration in the video game industry is more complex. Unlike the healthcare industry, which often involves smaller teams and limited scopes, game development spans multiple disciplines within large teams. As a result, the need for standardized communication workflows in game development was even greater. In particular, these workflows had to be tailored to the specific circumstances of each game project, such as team size, game genre, and project scale, in order to set up a suitable SOP based on the unique needs of different project teams.

5.2 Contributions

This study expanded research on interdisciplinary communication by shifting focus from structured, small-team contexts such as healthcare and education [1, 6] to large-scale creative game industries. It revealed the unique challenges in balancing technical implementation with creative ideas, which frequently occurs in game development. Furthermore, the study also identified inefficient information transfer as a key communication barrier, which was often overlooked in prior research on interdisciplinary communication in game industry [2, 15, 19]. Inefficient information transfer was particularly prevalent in dynamic, large-scale projects where teams worked across multiple stages and departments.

This study also identified key factors that lead to communication barriers in game development. These factors explained how communication barriers developed arise especially in game development team. The findings established a foundation for developing strategies to improve communication in complex creative projects. In particular, this study further demonstrated that the unique demands (such as the need for creative flexibility) of game development, require suitable SOP. This finding builds on the existing literature [2] to provide a more solid theoretical foundation for developing interdisciplinary communication strategies in game development.

In practice, this study summarized various effective strategies used by existing game development teams. The most important strategy identified was establishing a rational SOP. This is similar to findings in studies by Huang and Musil et al. [2, 21], but this study emphasized the need to set up a suitable SOP based on the specific situation of different project teams. It also provided suggestions for improving each step of the SOP. Additionally, the study proposed strategies such as proactively summarizing and learning from interdisciplinary communication experiences and promoting information sharing. These strategies can be applied to other creative fields facing similar challenges. They can also serve as useful references for smaller game development teams or course-based game project teams looking to improve interdisciplinary communication.

The conclusions of this study also supported the development of tools. For example, using the identified barriers and their factors, standardized assessment tools could be created to quantify the level of interdisciplinary communication and the effectiveness of communication strategies in projects. Automated communication tools could be developed to address the main interdisciplinary communication barriers, by referencing existing communication strategies. Additionally, based on this research, game team members could optimize communication by addressing information flow barriers, which was effective for both large projects and small teams.

5.3 Limitations

This study had several limitations. First, the sample size of interviews was small, potentially affecting the reliability and limiting the generalizability of the findings. Second, we used qualitative methods, lacking the confirmation from quantitative analysis of a larger scale of data. Third, this study only collected self-reported data, which could introduce biases. Future research may verify these findings by large-scale quantitative studies, such as behavioral analytics or survey studies.

Acknowledgments. This study was funded by the National Natural Science Foundation of China (Grant Number 72301104).

References

1. Saint-Pierre, C., Herskovic, V., Sepúlveda, M.: Multidisciplinary collaboration in primary care: a systematic review. Fam. Pract. **35**(2), 132–141 (2018)
2. Musil, J., Schweda, A., Winkler, D., Biffl, S.: Improving video game development: Facilitating heterogeneous team collaboration through flexible software processes. In: Riel, A., O'Connor, R., Tichkiewitch, S., Messnarz, R. (eds.) Systems, Software and Services Process Improvement Communications in Computer and Information Science, vol. 99, pp. 83–94. Springer, Berlin, Heidelberg (2010)
3. Zhao, Q., et al.: A study on the relationship between the dynamic behaviors of the leader and group performance during creativity. J. Intel. **10**(4), 4 (2022)
4. Nguyen, M., Mougenot, C.: A systematic review of empirical studies on multidisciplinary design collaboration: findings, methods, and challenges. Des. Stud. **81**, 101120 (2022)
5. Van Den Besselaar, P., Heimeriks, G.: Disciplinary, multidisciplinary, interdisciplinary—concepts and indicators. Presented at the 8th international conference on scientometrics and informetrics proceedings—ISSI-2001, pp. 705–716 (2001). Accessed: Jan. 21, 2025. [Online]. Available: http://pascal-francis.inist.fr/vibad/index.php?action=getRecordDetail&idt=14194174
6. Zhou, Y., Li, Z., Li, Y.: Interdisciplinary collaboration between nursing and engineering in health care: a scoping review. Int. J. Nurs. Stud. **117**, 103900 (2021)
7. J. Rodrigues Da Silva Noll Gonçalves et al., "Potentialities and limitations of interprofessional education during graduation: a systematic review and thematic synthesis of qualitative studies," BMC Med. Educ., vol. 23, no. 1, p. 236, 2023
8. Bidarra, R., et al.: The making of an interdisciplinary games project
9. Laursen, B.K.: What is collaborative, interdisciplinary reasoning? The heart of interdisciplinary team research. Inform. Sci. Int. J. Emerg. Transdiscip. **21**, 075–106 (2018)
10. Bidarra, R.: Experiencing the engineering challenges of game development
11. Altizer, R., et al.: Design box case study: Facilitating interdisciplinary collaboration and participatory design in game development. In: Extended Abstracts Publication of the Annual Symposium on Computer-Human Interaction in Play, pp. 405–412. ACM, Amsterdam (2017)
12. Slade, E., et al.: Collaborative team dynamics and scholarly outcomes of multidisciplinary research teams: a mixed-methods approach. J. Clin. Trans. Sci. (2023) Cambridge Core. Accessed: Jan. 21, 2025. [Online]. Available: https://www.cambridge.org/core/journals/journal-of-clinical-and-translational-science/article/collaborative-team-dynamics-and-scholarly-outcomes-of-multidisciplinary-research-teams-a-mixedmethods-approach/A0729A9353FB58DC4CDC5992A05BDD10

13. Wong, W.-K, et al.: Collaboration of multidisciplinary students on the development of mobile games
14. Lakhani, J., et al.: Attributes of interdisciplinary research teams: a comprehensive review of the literature. Clin. Invest. Med. (2012) Accessed: Jan. 21, 2025. [Online]. Available: https://utppublishing.com/doi/abs/10.25011/cim.v35i5.18698
15. Wolz, U., et al.: Cooperative expertise for multidisciplinary computing. In: Proceedings of the 42nd ACM Technical Symposium on Computer Science Education, pp. 329–334. ACM, Dallas, TX (2011)
16. Maxim, B.R., Ridgway, B.: Use of interdisciplinary teams in game development. In: 2007 37th Annual Frontiers in Education Conference—Global Engineering: Knowledge Without Borders, Opportunities Without Passports, pp. T2H-1–T2H-5. IEEE, Milwaukee, WI (2007)
17. Kraut, R. E., et al.: Informal communication in organizations: Form, function, and technology
18. Pastel, R., Zhang, W.: Achieving effective communication between diverse disciplines in small teams. In: 2018 IEEE Frontiers in Education Conference (FIE), pp. 1–9. IEEE, San Jose, CA (2018)
19. Moirano, R., Sánchez, M.A., Štěpánek, L.: Creative interdisciplinary collaboration: a systematic literature review. Think. Skills Creat. **35**, 100626 (2020)
20. Edmondson, A.C., Harvey, J.-F.: Cross-boundary teaming for innovation: integrating research on teams and knowledge in organizations. Hum. Resour. Manag. Rev. **28**(4), 347–360 (2018)
21. Huang, Y.-H.: Understanding the collaboration difficulties between UX designers and developers in agile environments. Open Access Theses (Aug. 2018). [Online]. Available: https://docs.lib.purdue.edu/open_access_theses/1542